

Leapfrogging to Education 4.0: Student at the core

November 2017





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Foreword- FICCI

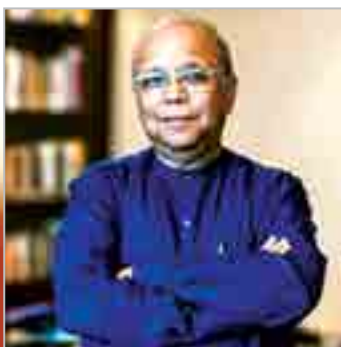
India today is rapidly getting transformed into a knowledge society. A young and aspirational India and its ease with technology have created this change momentum. Entrepreneurship, innovative business solutions, and new education and training concepts, especially those that involve skilling, have today created new paradigms in the society. Today's new-age literacy is significantly fueled by media, internet and social media technologies. These new paradigms require a different response mechanism from organizations and individuals.

The rapid pace of technology diffusion today has also altered business models in all sectors of the economy, affecting jobs. At the same time, technology-enabled businesses have also created new jobs that require entirely new skills sets. The recently released FICCI-EY Future of Skills and Jobs in India report highlights that by 2022, India's development and growth will be determined by the country's response to the inevitable impact created by the interplay of three primary forces: globalization, demographic changes and the adoption of Industry 4.0 exponential technologies. It also highlights that 9% of youth would be deployed in new jobs that do not exist today and 37% would be deployed in jobs that have radically changed skill sets.

FICCI Higher Education Committee, in its endeavor to remain relevant and in sync with the industry needs, had come out with a report last year titled The Future of Jobs and its implication on Higher Education. This year's report takes the reader through the evolution of Education 1.0. (Guru-Shishya method of teaching), Education 2.0 (massification of education with the teacher as the knowledge provider and the student as the passive recipient), Education 3.0 (use of computers and internet in teaching and learning, which helped in increasing access and equity) and Education 4.0 (high-speed internet, mobile technology, social media platforms etc. facilitating personalized learning anytime anywhere and changing the role of teachers to facilitators and mentors).

The present developments in the industry are all geared to make India leapfrog in the knowledge world. Today, the sources of knowledge are global and hence Education 4.0 is about preparing students for future leadership positions in a globalized knowledge society. Education institutions and regulatory framework have to embrace Education 4.0 technologies and processes at a much faster pace than it did more than three decades ago when computer education came to India.

This report highlights the roadmap for higher education institutions, policymakers and regulators to adopt and adapt to this change. We are confident that various recommendations emanating from this report will help in formulating a long-term plan and strategies to achieve the objective of "education for all and work for all" and enable meeting the aspirations of 1.25 billion people.



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Chairman
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Foreword- EY

Higher education has a symbiotic relationship with the society at large. The society and economic considerations have been impacting the way the education system has evolved, while the education system itself provides knowledge and manpower to the society.

The Guru and religious leader driven education system was transformed by the invention of the printing press – which developed the credit driven mass teaching methods we see around us today. The printing press itself is on the verge of being irrelevant by the advent of an era of digital communications and knowledge. Higher education is equally being redefined in this age of omnipresent information and channels of access to this information. The changing future of jobs is challenging the fixed learning paths propagated by the universities of today – with the economy looking for workers with strong life skills than just cognition.

The learner today is a digital native who is at ease with the mobile and computing devices and look for information on the internet. Each learner is different in its aspirations and learning needs. They are always online, as are the nimble footed providers of anywhere anytime education – the MOOC providers, peer learning platforms, publishers and content providers. Learning options are equally available today outside the classroom as in the class. The universities and faculties are still treading with caution with their limited digital forays, trying to understand how these social and technological changes impact them.

The universities need to break away from the process driven, technology supported mass teaching systems to a new way of education that appreciates the personalisation of learning. Flexible learning paths, focus on imparting life skills, student centric learning methods and use of technology are bringing in the concept of “Education 4.0”.

This report takes an initial step towards identifying some of these trends and how they impact the higher education system today. The report provides some pointers as to how Higher Education institutes of today prepare themselves to the changing paradigm of education. It also profiles some good practices of countries and institutes that we consider are ahead of the curve in their intent and execution. This report helps with some suggestions on specific actions for a quick alignment with the evolving scenario.

We hope you enjoy reading the report.



Amitabh Jhingan
Leader and Partner,
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Executive summary (1/2)

The landscape for education has changed across ages.

Education 1.0 in ancient ages was limited to few privileged people, largely influenced by religion and governed by informal methods of teaching. In the Renaissance age and after the Industrial Revolution, the concept of education changed, focusing more on development of people and providing them with basic learning and skills. With education becoming the primary responsibility of the state, enrollments across all ages and sections of society grew rapidly.

In Education 2.0, with the advent of printing presses and establishment of universities, the process of teaching evolved and the concept of formal higher education (HE) focused on both academics and research developed. Some of the major universities such as Yale, Harvard, Columbia University and Princeton University were set up in the US during this time. Many new age scholars developed practical learning to prepare students to manage their social, economic, and political affairs efficiently rather than focus on religious aspects of the Greek and Latin classics.

In the new millennium, technology has impacted almost every aspect of life today, and Education 3.0 was no exception. Technology has provided a platform that has greatly expanded access to education and changed the ways of learning. The traditional setting of a lecture hall has been transformed with the integration of new tools and technologies in teaching that help students learn virtually and deliver targeted information to them effectively.

Evolution today is taking place at an accelerated pace as change is now measured in years and not centuries. Today, we are again at the cusp of a change where the learner will be at the center of the future ecosystem in Education 4.0.

Education 4.0 empowers learners to structure their learning paths. It is characterized by personalization of the learning experience, where the learner has complete flexibility to be the architect of his or her own future and has the freedom to aspire, approach and achieve personal goals by choice

Increased innovation in teaching methods, demand for an improved HE experience and availability of better learning opportunities supported by technology have been the major impetus for this shift toward personalization.

The “traditional” profile of the learner has been changing and he or she is no more a student right from high school, enrolled in a full-time course to complete a degree; the new majority demands greater deal of flexibility and customization. Technology has made personalized learning both approachable and dynamic. Without educational technology ranging from digital content to adaptive learning software, it would be extremely difficult and resource-intensive to implement personalized learning.



Executive summary (2/2)

The HE system in Education 4.0 will focus on the learner, supported by technology, in-person guidance and industry-relevant content to meet the learner's individual learning needs.

This transition from one paradigm to the other is uneven, and how fast universities adapt to this change and continue to evolve will determine their future. With the changing paradigm, universities have a critical decision to make: Embrace new opportunities and succeed or make the wrong choice and perish? It is crucial for universities to focus on enriching student experience, aligning to individual needs across the student life cycle, focusing on student employability and acting as a hub for research.

- ▶ Universities could focus on building unrivalled student experience through flexible program structures that enable lifelong learning and provide learners with multiple entry and exit options. They could provide learners with predictable schedules and opportunities for collaborative learning.
- ▶ Universities will have to address employability challenges by providing the required employability skills and integrating with industry to provide greater exposure to students right through their university experience. They need to enable development of thinkers, complex problem solvers and decision makers who are prepared for a broad range of jobs across sectors and thus can be fungible across changing job scenarios.

- ▶ Global integration and technological advancement have had a transformational effect on research. As research becomes democratized, funds would need to be spent in the most optimal manner. Universities need to build project management capabilities around research to ensure quick turnarounds, reduce cost and schedule overruns and better collaborations across industry and academia.
- ▶ Universities with weak financial statements could pass this financial burden to the student in form of rising tuition fees, but the price-sensitive student is now turning to alternative affordable education sources such as massive open online courses (MOOCs). Universities will need to diversify their revenue stream and explore sustainable business models to continue operations. They will have to ensure that resources are optimally aligned with financial stability at the core.
- ▶ Regulators need to appreciate online as a viable medium of learning. They would have to provide a forward-looking ecosystem for Education 4.0 and work with higher education institutions (HEIs) on developing a regulatory framework that addresses issues of quality control, accreditation and information privacy.

Our report explores how the current university model might evolve to keep pace with the changing paradigm and advent of Education 4.0 in the near future.



Education ecosystem has transformed over the centuries basis the social shifts and economic and technological discoveries



Education systems have evolved over the centuries in response to social, economic and technological innovations, which in turn are impacted by the evolution in education system itself

Education is evolving in response to the changes in the society – the changes that are in turn driven by the evolving education system.

Changing social paradigms and environment have transformed students' motivation and career expectations, emphasising the need for comprehensive education ecosystems. Today, there is a widespread need for improved skills and human capital, which form the backbone of effective education systems.

Education has gradually transformed from a person-to-person learning system to a formal system of education that focused on one-to-many education to, today, providing various broad learning opportunities to the masses with increased use of technology.

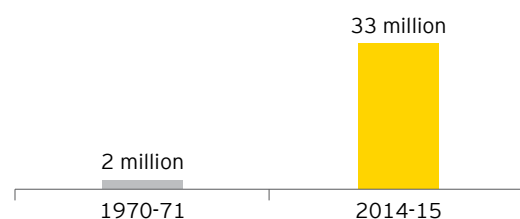
Additionally, higher education (HE) systems have evolved from social, economic and demographics changes to political and technological trends.

Social changes

Diverse cultural background and family provisions impact education attainment of students.

With changing beliefs, involvement of students in HE has improved in the last few decades.

HE enrolment in India increased by 16 times in last 44 years⁽¹⁾



Economic pressures

Economic uncertainties such as the great depression in 1929 and financial crisis in 2008 have severely impacted HE, especially enrolment of college graduates from lower income groups.

The percentage of college graduates in the US declined from 31.5% in 1929 to 22.9% in 1933 during the Great Depression⁽²⁾

and from 55.9% in 2008 to 45.5% in 2013 for low income groups during the 2008 economic crisis.⁽³⁾

Technological advances

As students demand greater mobility and personalized learning experience, universities are adopting new technologies. Innovative teaching methods, online content delivery, blended learning models and smart spaces are becoming the essence of HE.

In the US, as per a survey by EDUCAUSE, more than half of the university teachers are using new technologies to support the learning material, encourage online collaboration among students and maintain their attention.⁽⁴⁾

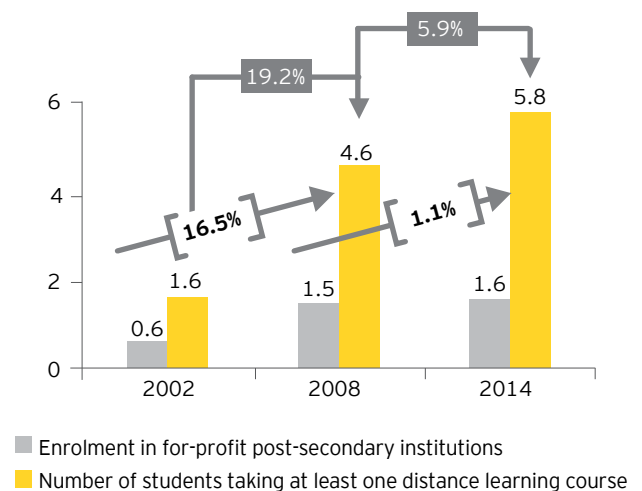
Local in-country regulatory changes and global forces such as increasing international trade impact growth of HE across countries

Policy and regulatory changes

Government support through regulatory policies and robust accreditation systems influence trends in education.

The US Government is coming up with regulations aimed at improving distance education. After opening up of federal student aids for distance learning programs in 2006, several US students from for-profit institutions got enrolled in distance learning courses. The number of students taking distance learning programs grew at a CAGR of 19.2% during 2002-2008.⁽⁵⁾⁽⁶⁾

Enrolment in for-profit institutions and distance learning programs (million)⁽⁵⁾⁽⁶⁾



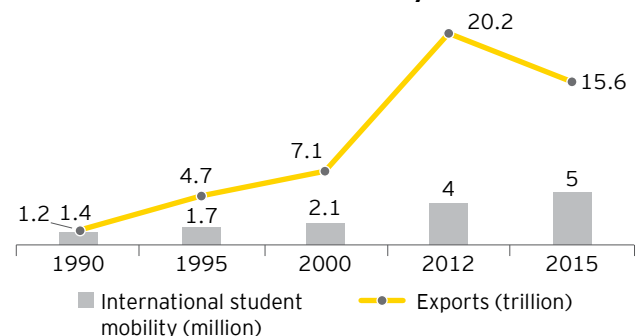
Global integration

Countries such as the US, Germany, Japan, China and the UK are attracting foreign students to improve mutual capabilities of universities and provide international experience to their students and teachers.

Strengthening of networking possibilities and improved trade relations are also contributing to the rise of cross-border student mobility.

Many countries are now focusing on international student populations. High international student recruitment targets as planned by various countries are also viewed as a driving force for increasing student mobility.

International trade and mobility of students⁽⁷⁾⁽⁸⁾



International student recruitment targets⁽⁹⁾



720,000 onshore enrolments by 2015



300,000 international students by 2020



450,000 international students by 2022

Education 1.0

During ancient to Middle Ages, education was imparted on a person-to-person basis, thus limited in scale and informal in nature

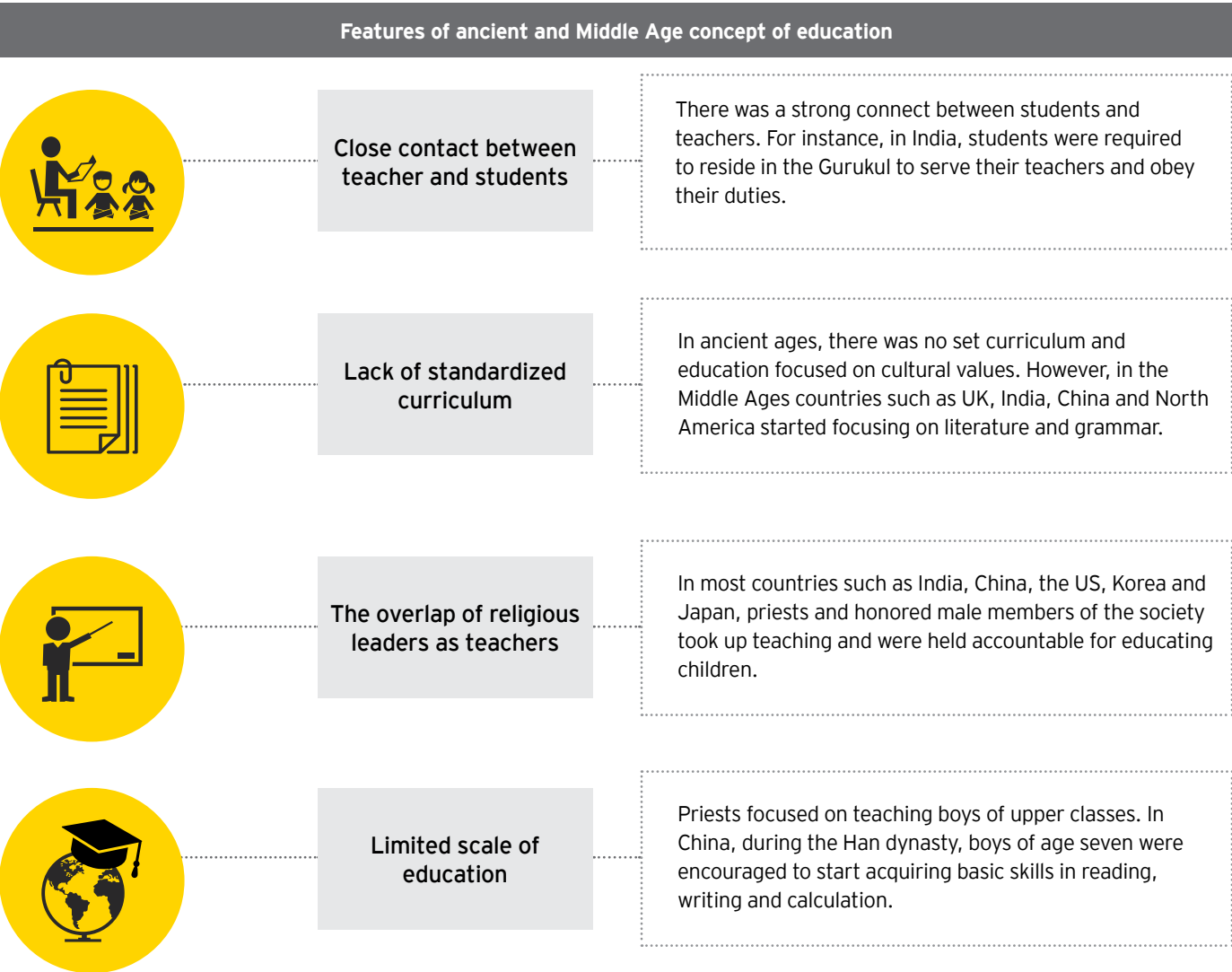
Education in the ancient and Middle Ages comprised of personalized education confined to few students, skilling for the masses, low literacy rates and informal methods of education, which gradually developed into formal schools in later centuries.

Ancient education gained popularity with the advent of informal education in India, China, Israel, Rome and Greece and was focused on teaching only elite classes and educating boys.

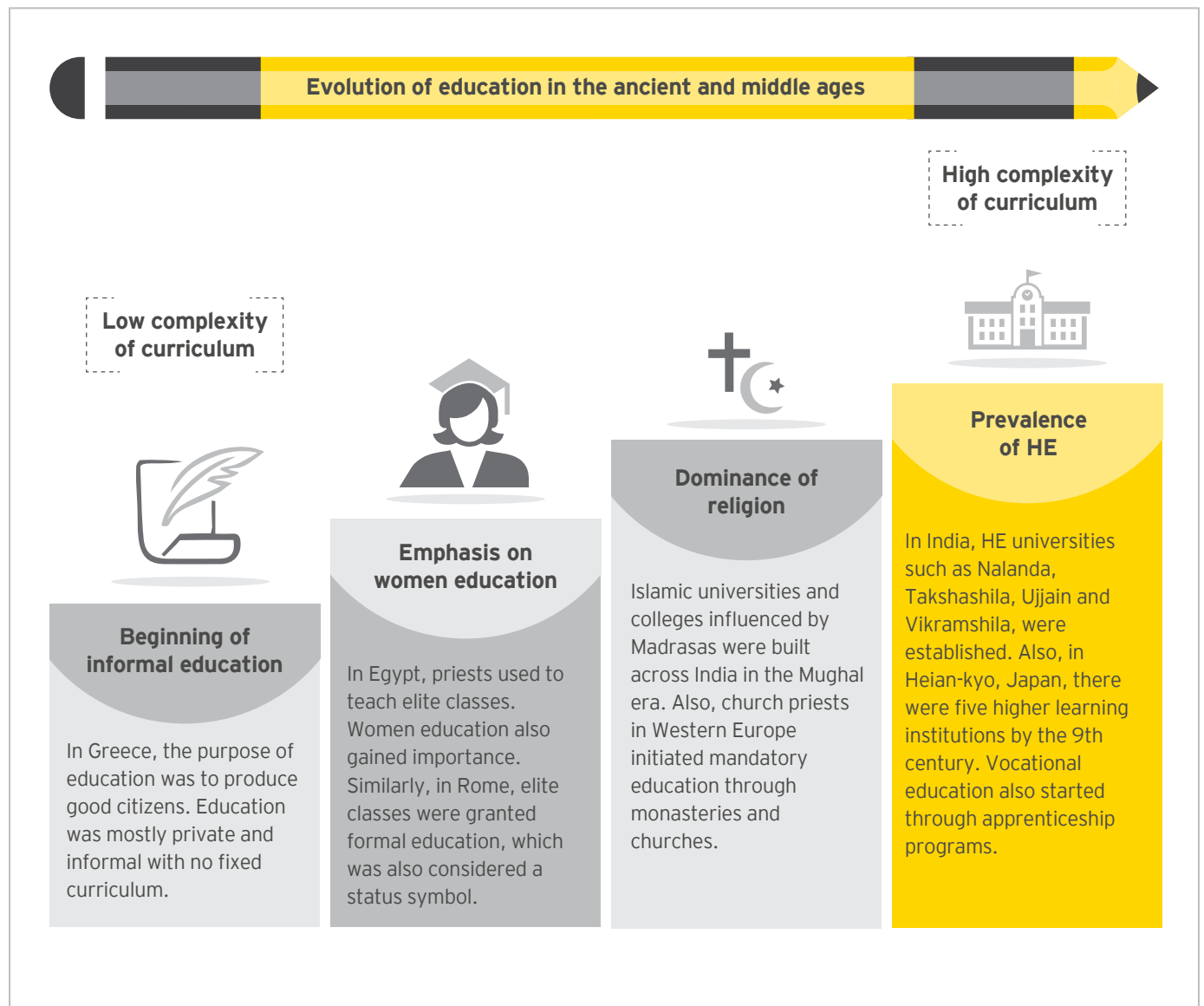
With increasing awareness and importance of education, education of girls gained prominence and the concept of formal education governed by priests developed.

In the Middle Ages, education transformed with the dominance of religion in Western Europe and India, along with a focus on scientific research in Rome.

Several priests from churches were appointed to provide quality education and the period saw the emergence of various scholars. A formal system of HE started developing with countries such as Japan, China, India, the UK, Korea and France starting to build universities and colleges.



The age saw some of the earliest universities supported by the kings, driven by religion and philosophy



India always had a rich culture of education and learning with focus on the Gurukul system during the ancient period. It was considered essential for boys and was free; however, students from well-off families paid guru dakshina. Nalanda and five other universities were founded in 6th century India; however, they were destroyed in the 12th century.

Education 1.0 gradually transformed from basic level of education to beginning of HE, which resulted in the establishment of a few universities.

However, there was no formal system of curriculum, assessments and credentials. Also, the education process lacked diversification.

Education 2.0

The invention of the printing press allowed the masses to get access to basic education, and brought in a culture of scientific inquiry

The invention of the printing press in the mid-15th century completely transformed the education sector and helped increase literacy levels as it enabled rapid dissemination of ideas through books. Socio-economic advances in this period led to Education 2.0, which took several thousand years to transform from traditional Education 1.0.

With the invention of the printing press, knowledge dissemination was no longer person dependent and could be done to the masses through printed books. Printing press technology had a profound effect on literacy levels in France, England, Germany, Russia and the Asia in the 15th and 16th centuries.

The period witnessed a shift from manuscript to printing, which was further supported by the scientific revolution, Renaissance and Reformation, leading to the development of a society where inquires, new ideas and innovations were encouraged.

The spread of educational institutes as centers of discussion, science and experimentation further helped with social, philosophical and scientific innovations.

Vocational education gained popularity in India, Japan, Europe and South Korea through apprenticeships and monasteries. New age scholars developed practical learning to prepare students to manage their social, economic, and political affairs efficiently rather than focus on religious aspects of Greek and Latin classics.

Changes in HE after the advent of the printing press



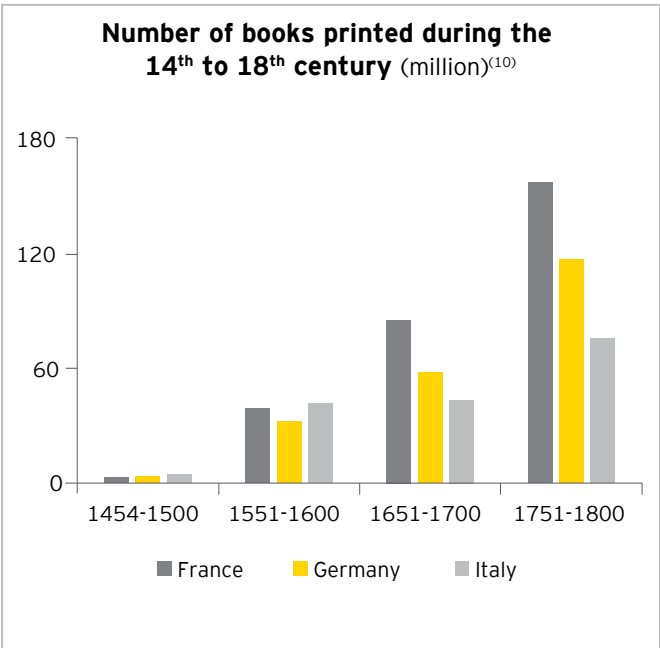
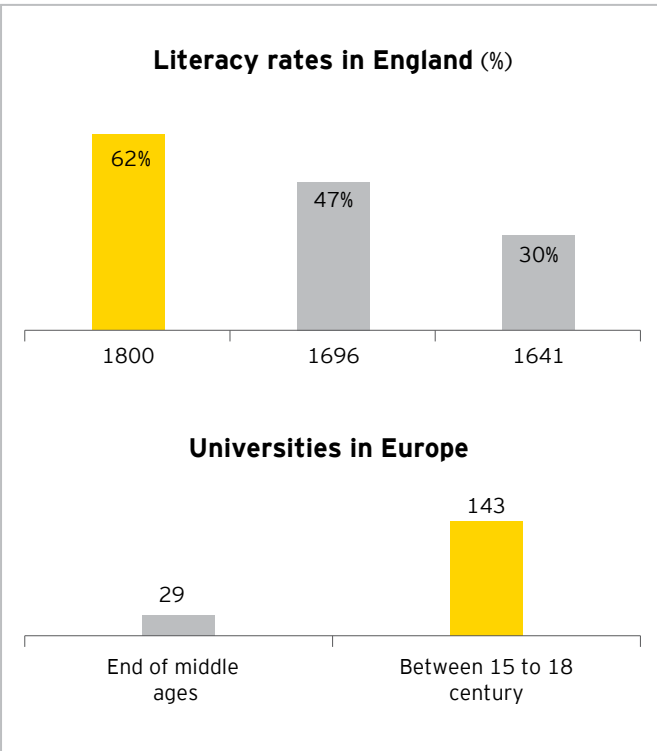
Education to the masses: The concept of one-to-many emerged

Until the 14th century, 80% of adults in England could not spell their names. However, HE systems flourished after the middle ages with mass reach of education.

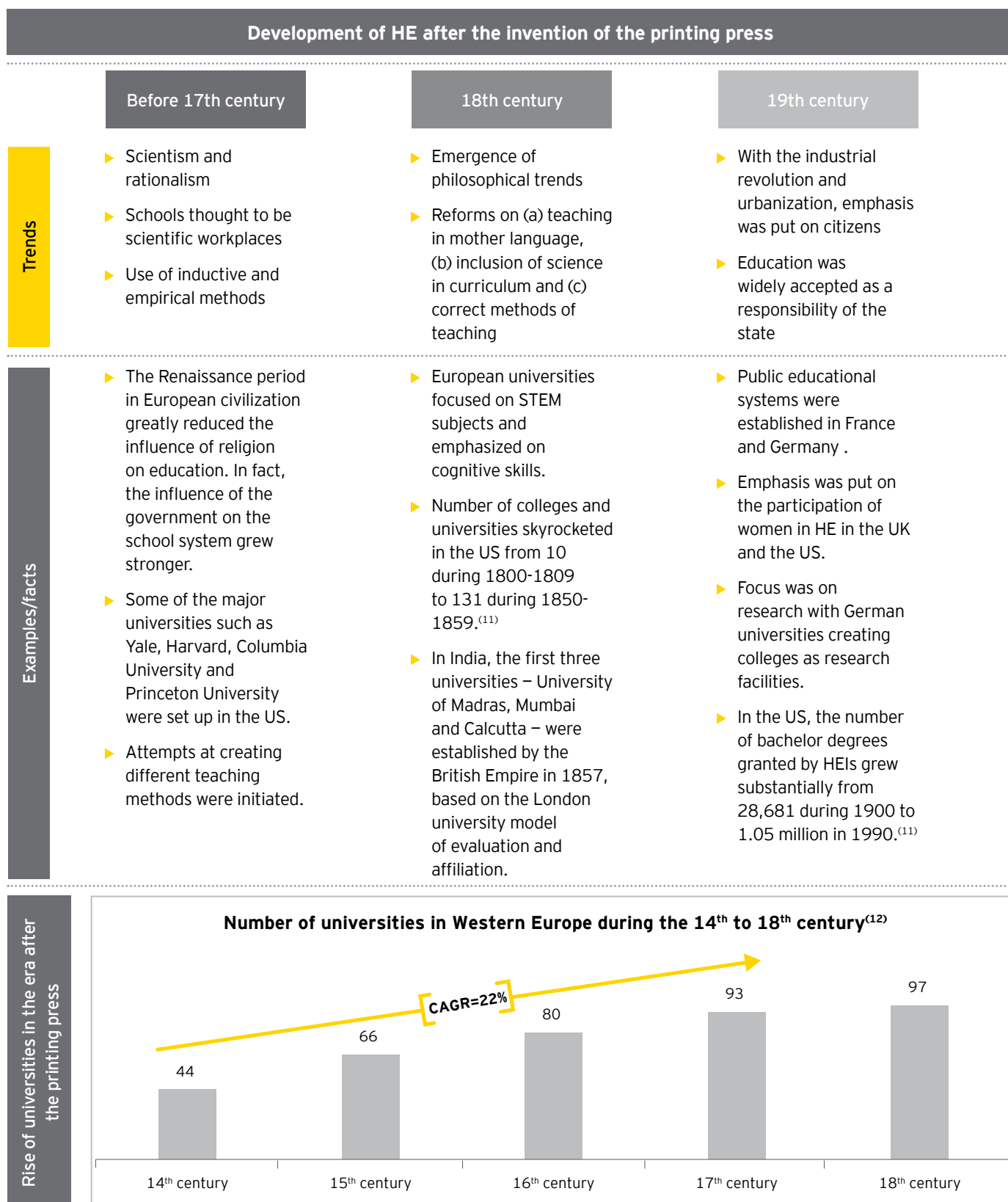


Physical books allowed a means to disseminate knowledge

Number of books published grew to almost 3 times between 16th to 18th century⁽¹⁰⁾



The “process” of education delivery developed – to impart mass teaching around a university system with fixed and rigid structures – and also brought in a culture of research



The increasing scale of HE led to the need for regulations – Governments regulated and supported education delivery as a public good, leading to increased enrolments

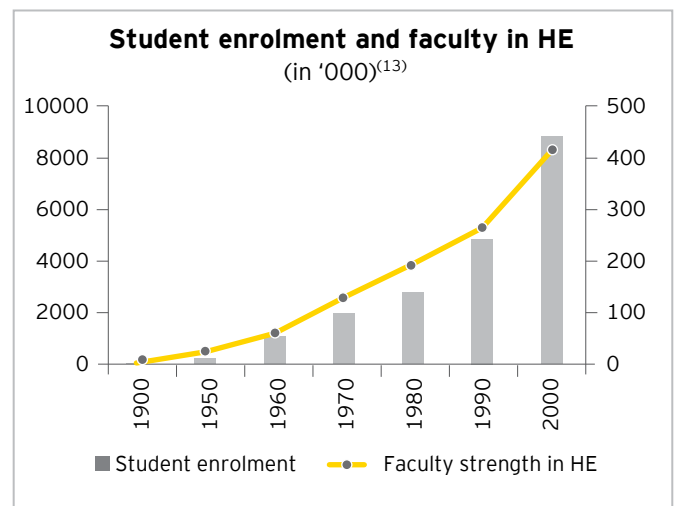
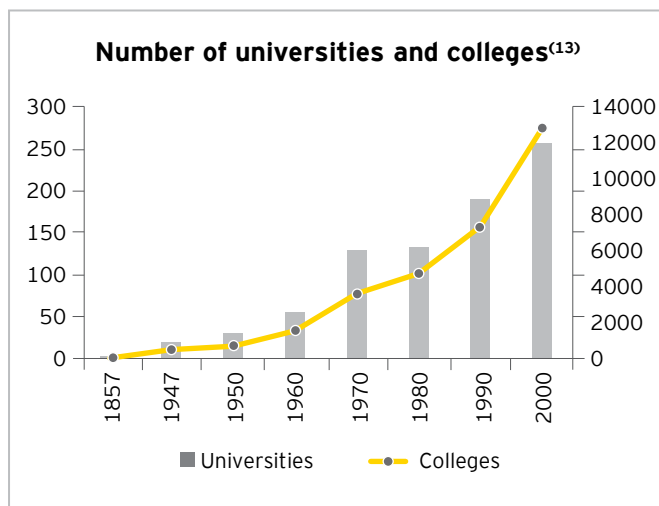
India showed a remarkable transformation in its HE landscape during the 17th till 19th centuries. Major developments were made during the Mughal period when Islamic universities and colleges influenced by Madrasas emerged.

After the Mughals, the British Empire helped in establishing more HEIs and improving the number of students and teachers. Also, to reduce drug imports during the 18th century, the British encouraged scientific research in Indian medicinal plants.

After independence, the Government initiated a planned development of HE in the country particularly focused toward growth of grant-in-aid institutions. University Grants Commission was established in 1953 to enable it.

Efforts of the Government encouraged research in Indian universities and improved the gross enrolment ratios across states. Female enrolment rates also improved significantly from 11.3% in 1950 to 36.9% in 2000.⁽¹³⁾

Till 1980, the HE sector was controlled by the Government; however, after the economic reforms of 1991, the number of private universities also grew rapidly.



Education 2.0 grew rapidly toward the end of the 18th century with the establishment of several universities across the world and focus on research; however, students still lacked the appropriate skills to fill employment gaps. The research output of the HE system, namely internet and IT applications, paved the way for the next transformation in the HE ecosystem.

Education 3.0

The emergence of internet and IT changed the mode of delivery, providing a technology platform to learn

The transition from Education 2.0 to 3.0 took a couple of decades and the period saw a significant increase in enrolments due to increased accessibility of HE.

HE has evolved across the centuries in response to external forces. Today, in Education 3.0, there has been a massive increase in global demand for education, the role of a teacher has changed from that of an instructor to a facilitator, and technology has become omnipresent for content delivery in various online and distance learning programs.

Initially, this period saw huge public investments; however, now the funding has moved toward private investment and donations.

As per a survey conducted by Pew Research Center, nearly **73% teachers** in the US use mobile technology in their classrooms and **47% strongly agreed** that students need digital literacy courses to be successful academically.⁽¹⁴⁾

Characteristics of HE with the rise of internet and use of technology

Technology driving use of interactive boards, thus replacing chalkboards



The phase from the 20th century saw the replacement of chalkboards with smart boards in HEIs. Since then, millions of interactive whiteboards, interactive displays and interactive projectors have been installed across the globe.

Increasing use of personal devices in colleges



In this digital age, with increasing use of computers and smartphones in all walks of life, students are carrying them to classrooms as well. According to a survey by Pearson Education, nearly 87% college students in the US use a laptop, notebook or Chromebook computer every week to do their work.⁽¹⁵⁾

Improved administrative structures through LMS



Learning management systems (LMS) and enterprise resource planning (ERP) solutions provide automated administration services, help students in learning virtually and deliver targeted information effectively. The global market for LMS is over US\$5 billion currently and is expected to grow at a CAGR of 24% during 2016-20.⁽¹⁶⁾

Better learning through collaborations



Technology has enabled improved interaction between communities. For instance, the Conseil Européen pour la Recherche Nucléaire (CERN) laboratory in Switzerland collaborates with technology companies to quicken the development of cutting-edge technologies.

The transition toward platform-enabled learning drove exponential growth in the education technology (edtech) market, but the core learning methods have remained unchanged

Increasing adoption of new technologies in the HE sector, possibility of learning on devices and disassociation of education and learning are changing the overall dynamics in education and leading to the rise of the edtech market globally.

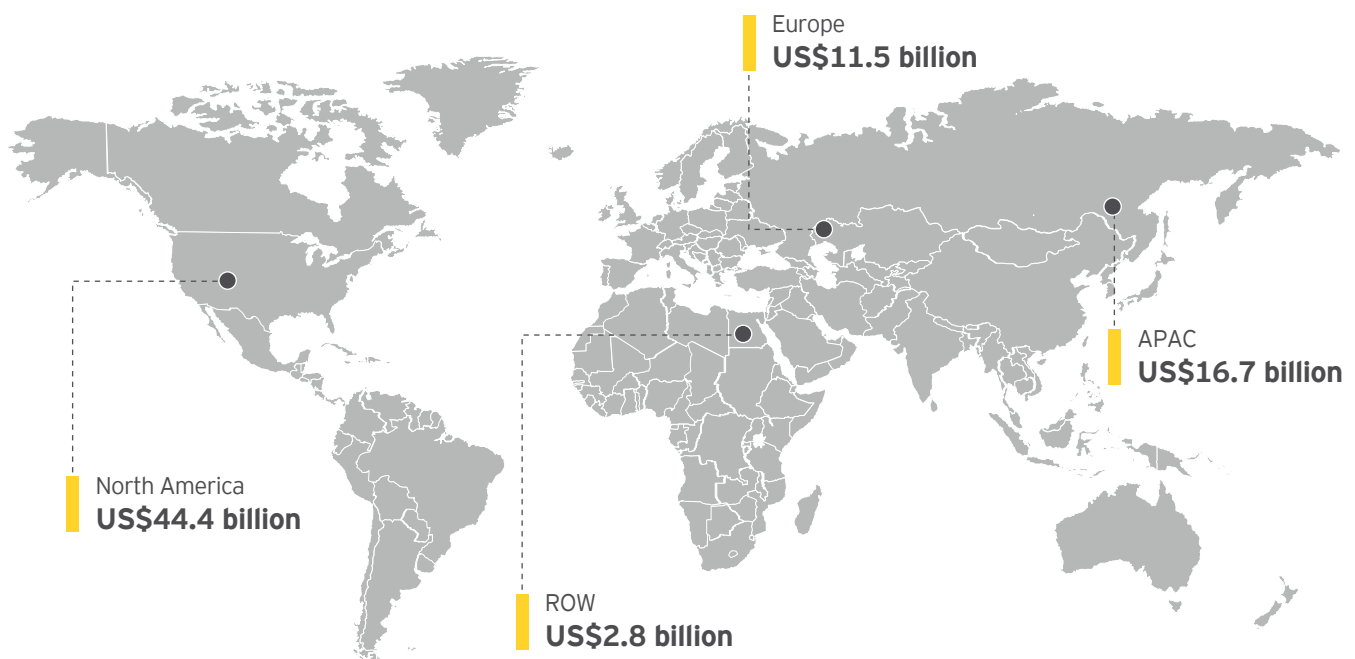
The global edtech market is growing rapidly with the growing need for skills and changing workforce in the 21st century. With growth of smart classrooms, increasing mobile penetration and increase in online education qualifications, the market is expected to reach US\$94 billion in 2020 from US\$43 billion in 2015, growing at a CAGR of 17%.⁽¹⁷⁾

Until now, the US is the fastest growing market for online learning, followed by Asia and Europe, but the trend could change. According to a report by KPMG Consulting, the online

learning market in India is estimated to grow 8 times from US\$247 Million in 2015 to US\$1,960 million by 2021.⁽¹⁸⁾ The growth will be driven by engaging course materials, innovative ways of delivering courses and extensive reach out to distant locations having limited education infrastructure.

India is the third largest online market for education in the world after the US and China. The online HE market in India was valued at US\$33 million in 2015 and is expected to reach US\$184 million by 2020, growing at a CAGR of 41%.⁽¹⁸⁾

Global e-learning market (US\$75.4 billion) by region, 2017E



Innovation in e-learning tools, advanced delivery methods and vast availability of virtual communication tools are contributing to the growth of the market.

The HE sector is benefitted by growing demand for certifications and diplomas for vocational courses, prevalence of distance education, possibility of quick credentials or qualifications and the concept of classroom taking a backseat.

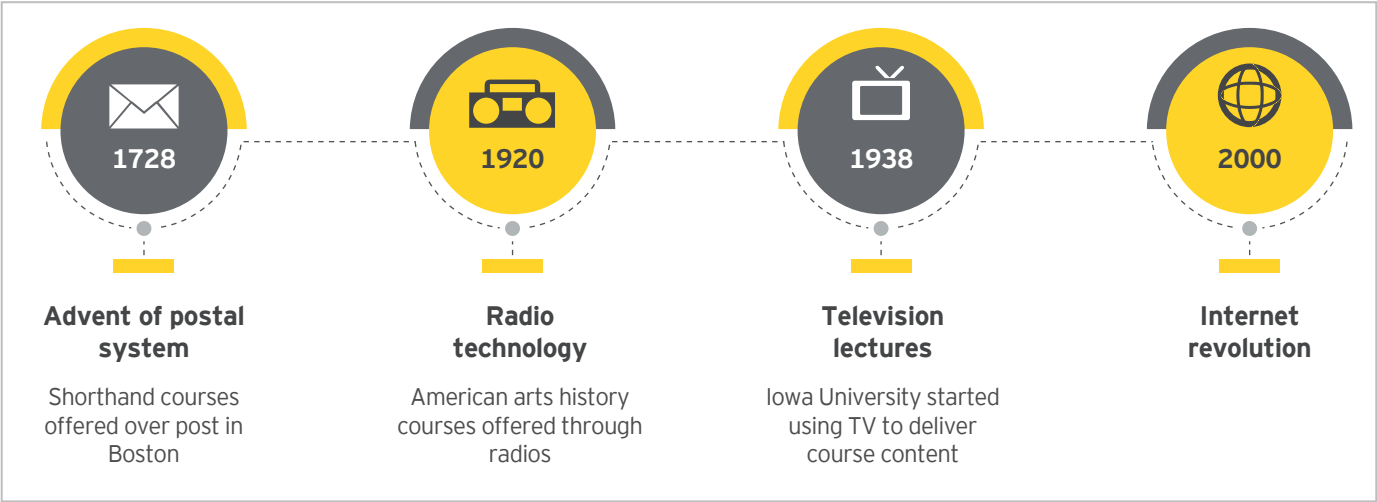
While the speed and space of teaching have changed, the core philosophy of teaching with the teacher at the center has remained unchanged

A 14th century illustration by Laurentius de Voltolina depicts a university lecture in medieval Italy. The scene, sans the dresses of the teacher and the students, could as well be of a lecture in a modern day Indian college. The teacher lectures from a podium at the front of the room while the students sit in rows and listen. Some of the students have books open in front of them and appear to be following along.

This constant picture of the classroom well underlines the need to critically look at whether learning has kept pace with the changing needs of the society and the learner.

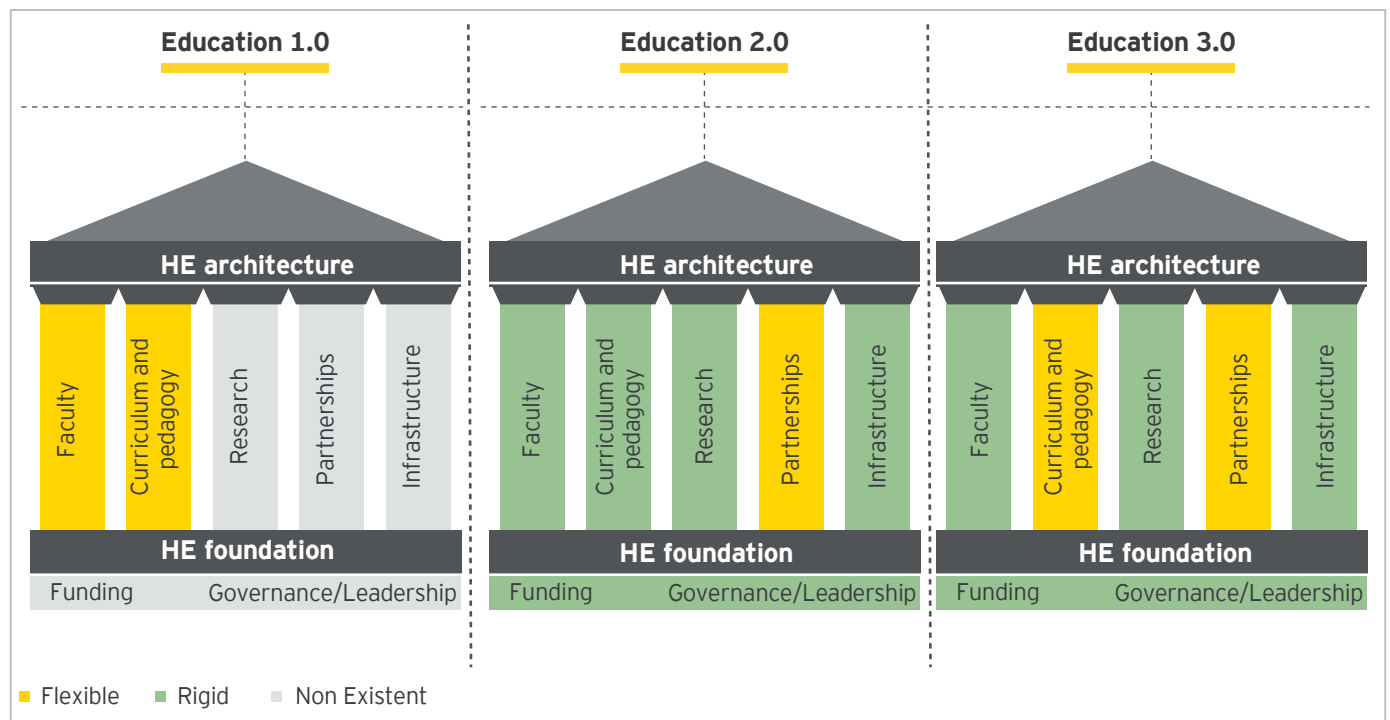
While education delivery has evolved over the ages – through Education 1.0 to Education 3.0 – the core process of teaching has remained almost constant. A teacher-instructed classroom has been the way knowledge is disseminated. Content is prepared in a fixed curriculum structure, delivered at a point of time to the learner cohort and standardized in terms of the content and its delivery.

The “innovations” of respective ages such as the post, radio or television have done little to change the core concept of this teaching philosophy. It is only the speed and space that have changed.



| Comparison of various teaching mediums | | | | | |
|--|-----------------|------------------|---------------------|-------------------|--------------------------|
| | Content | Teacher | Place | Time | Objectives |
| | What is taught? | Who is teaching? | Where is it taught? | When do we learn? | What do I want to learn? |
| Post | Fixed | Flexible | Flexible | Flexible | Fixed |
| Radio | Fixed | Fixed | Flexible | Fixed | Fixed |
| Television | Fixed | Fixed | Flexible | Fixed | Fixed |

The HE system we know of today has evolved over these waves of transformation – The only thing that has remained constant is the change



| | Faculty | Curriculum and pedagogy | Research | Partnerships | Infrastructure | Funding | Governance/ Leadership |
|----------------------|---|---|---|--|--|--|---|
| Education 1.0 | Priests and religious figures No qualification requirements | Unstructured and undocumented, Person to Person | Limited to debate on religion and social aspects | Limited to the co-religionists, and segregated by kingdom boundaries | Adjacent to religious regions, in gurukul, church, or mosque - with strong connects with the society | Supported by religious donations and support from monarchies | Social monitoring through the court of the kings Informal hierarchy among faculty based on religious seniority |
| Education 2.0 | Full-time career teachers Rigid educational qualification requirements | Structured and rigid in class teaching One-to-many mass teaching systems with a fixed curriculum | Strong research systems in scientific and social sciences | Limited to the country or region | Evolution of university campus - large physical spaces with study halls, residences and recreation areas | Evolution of fee-based funding and government support for public institutions Research and endowments growth for old institutions | Advent of country-level regulators Definition of institute governance systems and rigid hierarchy |
| Education 3.0 | Full-time career teachers Rigid educational qualification requirements | Rigid curriculum but some flexibility through online modes of learning | Transition toward collaborative research using technology | Growth in partnerships due to enhancements in telecommunications | Some investments in technology infrastructure in addition to the physical campus based infrastructure | Fee-based funding systems | Move toward accreditation in addition to firm regulations |

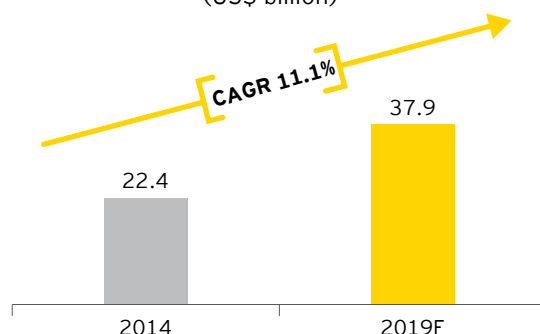
The interplay between industry needs, social mobility and constantly evolving job skills is redefining the demand drivers for HE



Demand for effective learning programs led to the rise of blended e-learning

Blended learning is becoming a prominent delivery method in workplace learning. Teachers in universities are increasingly using this to reach out to a wider user base effectively.

Global blended e-learning market size
(US\$ billion)⁽²⁰⁾

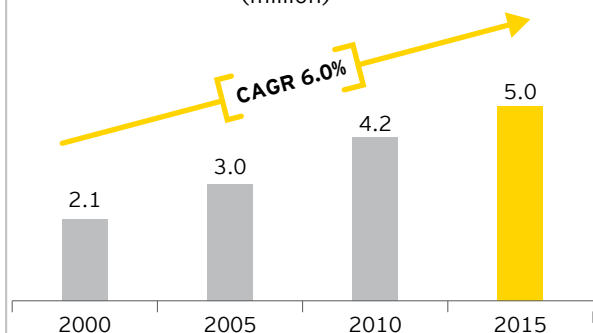


Increased awareness about HE courses led to the beginning of international mobility

International mobility allows students to acquire better skills and experience.

Students are looking for better opportunities to study outside and governments are providing adequate investment to encourage mobility.

Global international student mobility
(million)⁽²¹⁾

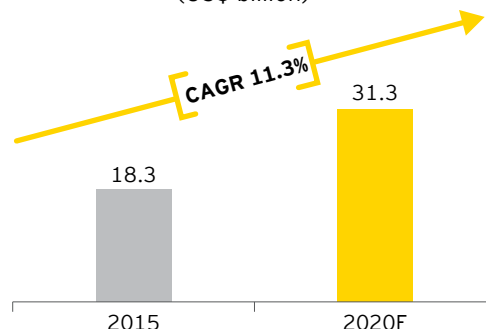


Better learning opportunities for workforce led to an increase in L&D investment by companies

Companies are becoming aware of the advantages of online learning for skill building and hence are spending increasingly on e-learning for employees.

For instance, SAP developed the openSAP massive open online course (MOOC) platform to educate its employees and partners on SAP technologies.

Global corporate e-learning market mobility
(US\$ billion)⁽²²⁾



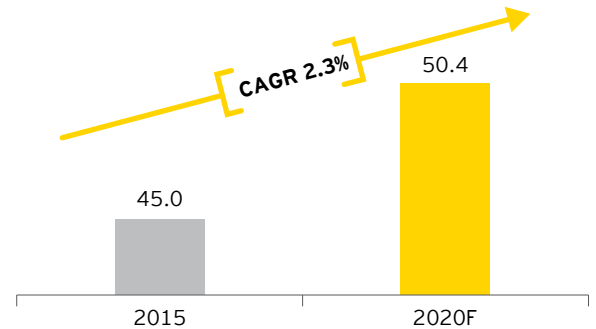
Need for innovative teaching technologies and better learning opportunities is transforming student demands, thus bringing in changes to the idea of learning itself



Need for flexible learning arrangements led to the popularity of self-paced e-learning

Students are rapidly adopting self paced e-learning as it allows them flexibility to attend courses and complete their assignments. The growth rate of self-paced e-learning market for India is 55%, highest in world, with China following at 52%.

Global self paced e-learning market
(US\$ billion)⁽²³⁾



Lack of appropriate skills transformed the HE curriculum

With the advent of online learning, college students prefer technology to be integrated into their curriculum and teaching.

This requires faculty in universities to update their courses regularly and adopt new methods of teaching.

According to a survey conducted by Center for Digital Education, 91% of the colleges offer professional development courses on how to integrate technology into curriculum and instructional practices.⁽²⁴⁾

Education 3.0 was benefitted with rising internet usage and technological advancement.

However, to keep pace with the growing needs for students and rising cost of education, there is a need for HEIs to offer cost-effective learning and better employability solutions to learners.

The force upon
us – The needs of
industry and society
are rapidly evolving

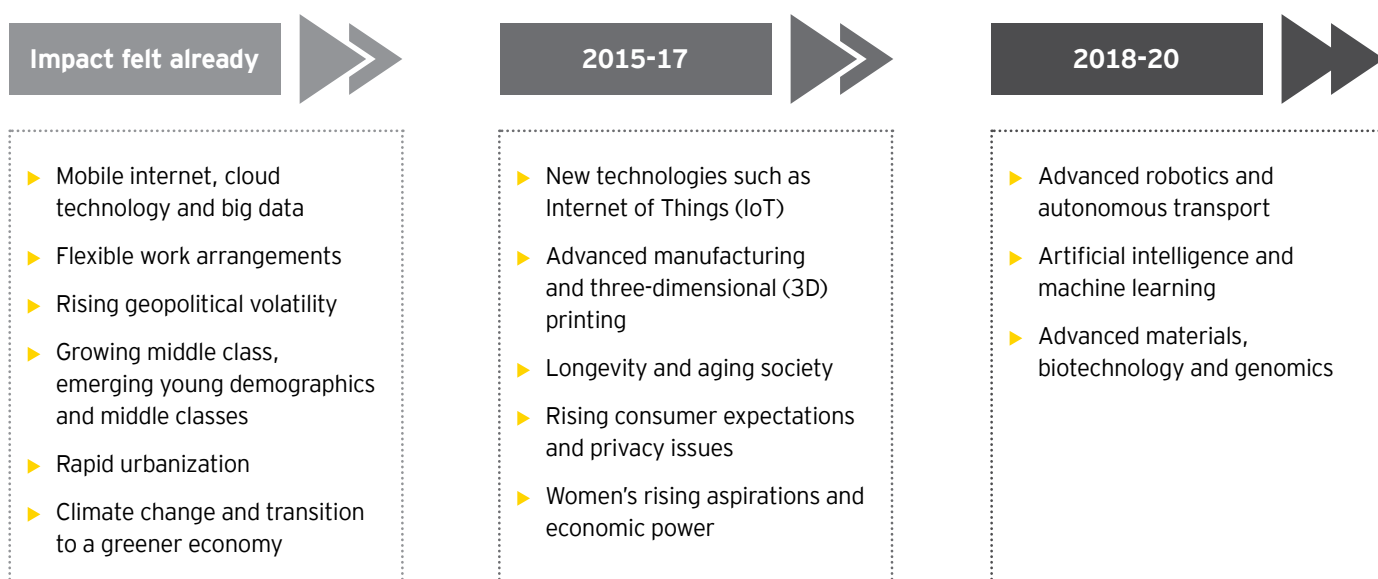


The relentless parade of new technologies is unfolding on many fronts

Highly dynamic socio-economic markets (especially across emerging countries), coupled with technological innovations, have led to disruptions across not just individual lives, but also industries and economies.

Some of these social and technological disruption drivers have already made an impact, while several others are expected to make a significant impact in the years to come.

Expected timeframe of key disruption drivers impacting industries and employment



Case in point 1: UK Government using sensors to provide public services⁽²⁵⁾



Transport for London (TfL) uses Oyster Card ticketing systems and sensors attached to vehicles and traffic signals to collect data such as money in the card, frequency of use, travel routes and types of transport used. This has helped the department achieve 18% reduction in traffic entering the zone during charging period and 30% reduction in delays.

Case in point 2: Dubai using 3D printing for faster construction of government building⁽²⁶⁾



The Dubai Government used a 3D printer to create its office for Dubai Future Foundation, resulting in faster construction and reduction in pollution during the construction phase. It took only 17 days to 3D print the entire building with savings of 50% on normal labor costs.

The changing skill requirements from the industry demands a competency-based learning model than a fixed learning structure

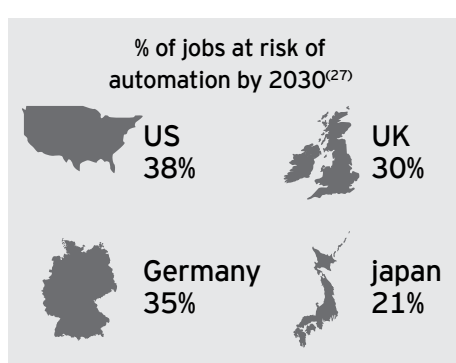
Competency-based learning models are gaining popularity worldwide, as individuals look for ways to improve college affordability and more accurately measure student learning. Competency-based learning is aimed at mastering skills/knowledge regardless of the time it takes. It promotes self-paced learning and caters to students across various levels of learning.

Rising demand for competency-based learning can be attributed to rapid change in industry requirements.

There exists a mismatch between what traditional HE provides and what employers need. As per a recent study by Gallup Consulting, only 11% business leaders agree that graduates have the skills and competencies that their business needs.⁽²⁸⁾ The three factors below reinitiate the need for programs to be aligned to industry demands and the need for alternation of the traditional HE model:

- ▶ Newly emerging job categories and opportunities
- ▶ Evolving work environment and changing nature of work
- ▶ Pressing need for individuals to adapt to organizational change

65% of children joining a primary school in 2016 will eventually end up working in a completely new job that does not even exist today⁽²⁹⁾



74% of the surveyed employees are ready to acquire new skills and completely retrain in order to be relevant and remain employable in the future⁽²⁷⁾



"Competency-based learning allows students to progress at an individual pace. Traditional models hold time constant and make learning variable. But competency-based learning flips this: learning is constant and time is variable."⁽³⁰⁾

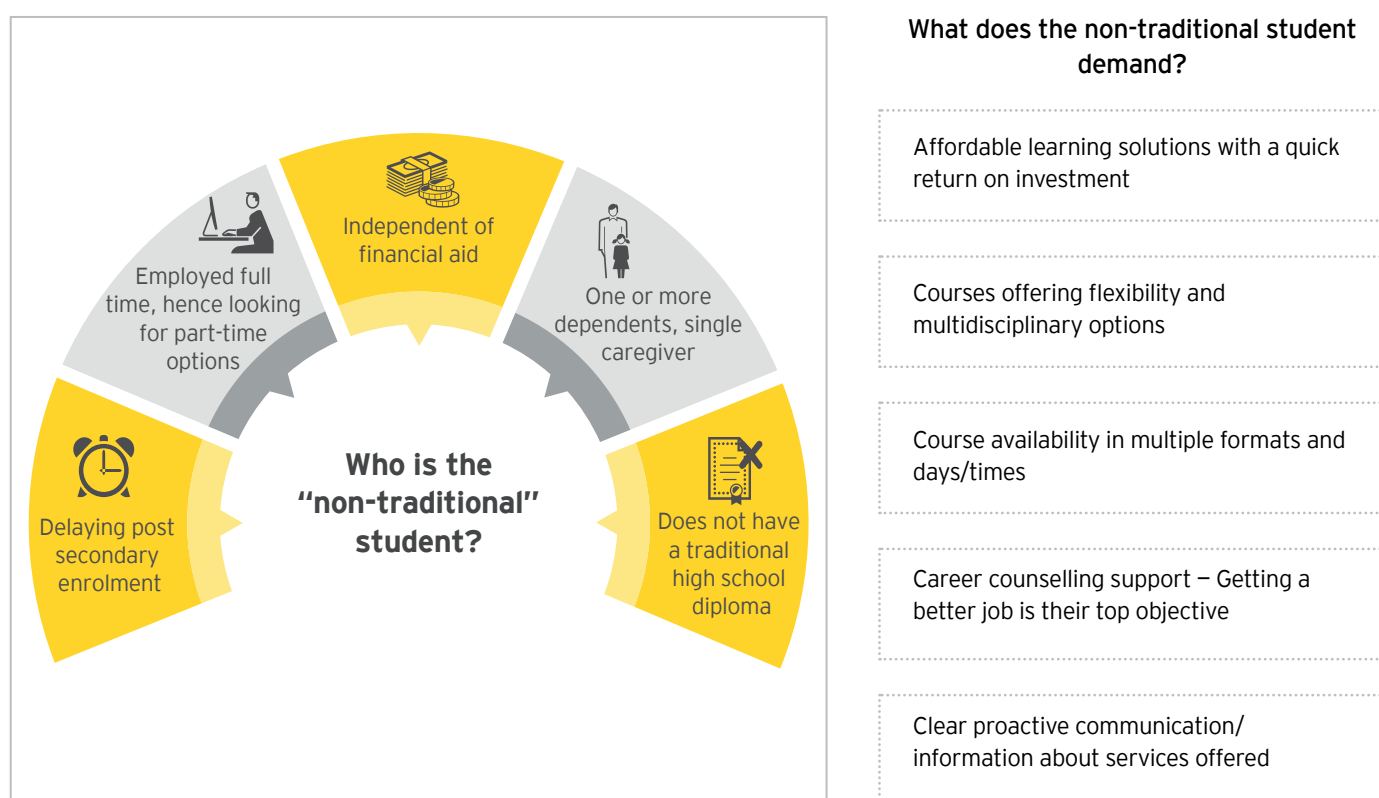


Hence, competency-based approaches offer students with greater opportunities for deep and personalized learning, as students have to work toward achieving competency at their own pace, which subsequently demands increased individual support and greater autonomy.

The changing job scenario – where the nature of future jobs is ever evolving – has led to the growth of the “non-traditional” student

A student ready for college right after high school and enrolled in full-time classes to complete a degree is no longer the norm. Over the years, this “traditional” profile of the learner has been changing. The learner of today does not necessarily fall within a defined age bracket.

The “non-traditional”⁽³¹⁾ student is the new majority, making up nearly 75 % of America’s undergraduate student body.⁽³¹⁾



Enrolment of “non-traditional” students is projected to increase more than twice as fast as traditional students over the next 5 years⁽³³⁾

60% of the non-traditional students have taken an online class as against 46% of traditional students⁽³³⁾

“Personalized learning”: making college more accessible and affordable for non-traditional students

Northern Arizona University provides a self-paced, competency-based degree. It provides 6 months of unlimited access to self paced online modules for a fixed tuition rate focused on key skills that an employer demands.⁽³²⁾

A paradigm shift is inevitable to cater to the needs to this growing target segment of non-traditional students. This new majority demands a greater deal of flexibility and customization, making personalized learning the preferred learning path.

Recent technological innovations are also transforming the HE landscape and filling gaps that exist in present education systems

There has been a transformation from the traditional setting of the lecture hall to integration of new tools and technologies in teaching along with growth of online learning and simulated learning opportunities.

The sector is moving toward democratization of content with broad access to useful qualifications and more opportunities for self-study programs.

To this end, MOOCs have significantly contributed by providing wider access to education irrespective of economic or social status, gender or geography. These programs have given flexibility to the students and have provided them the necessary skills to perform better.

According to a survey by McGraw-Hill Education,

62% students attaining HE in the US agreed that technology helps them in better preparing for classes.⁽³⁷⁾

Convergence of HE with technology

Challenges faced by universities

- ▶ Cohort learning
- ▶ Fixed education structure
- ▶ Single pace of learning

- ▶ Face-to-face knowledge dissemination
- ▶ Limited counselling system

- ▶ Knowledge based in physical libraries, making it the exclusive domain of the university

Need for HE solutions

Emphasis on personalized and adaptive learning and cognitive flexibility to tailor education needs

Focus on differentiated instruction to help teachers assess students interests and strengths

Self-learning encouraging critical thinking and proactive approach of learning for students

Technological invasion improving HE

Use of LMS and ERP solutions allowing customized user interface for every user

Online assessment and data analysis are enabling teachers in understanding student performances

Omni-present knowledge through internet enabling increasing demand for distance learning courses

Dynamic technological advancement has provided the platform to reach the new generation of learners through various channels



Technological advancement has already led to the transformation of multiple industries, and education is no exception.

Increased innovation in teaching and pedagogical methods, demand for an enhanced learning experience and availability of varied learning opportunities supported by technology have been the major impetus for this shift toward personalization



Innovative and interactive teaching methods led to the demand for MOOCs

The education market is influenced by open resources for learning such as MOOCs.

The number of MOOC courses on offer grew at a CAGR of 508.4% from 5 in 2012 to 6,850 in 2016.



Uncertainty around future of jobs led to a new education demand from experienced workforce

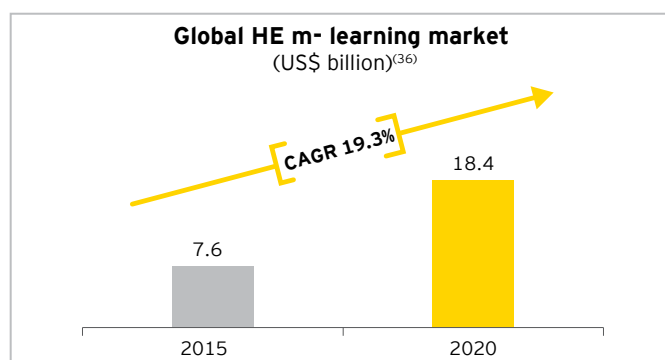
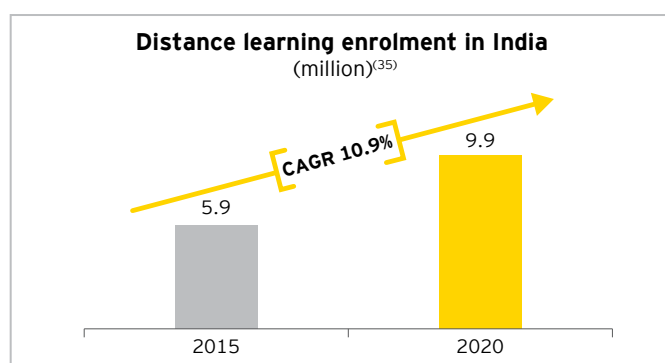
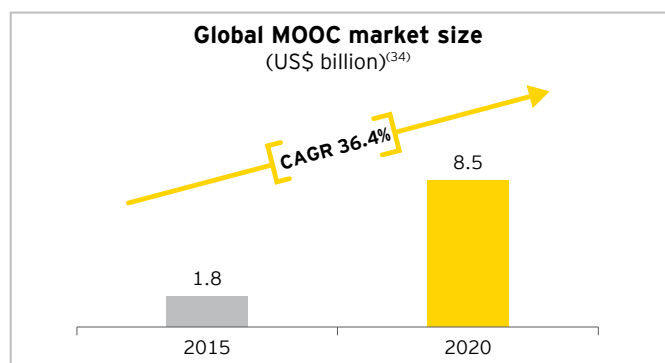
Governments' initiatives in e-learning and rise of digital universities are meeting the increasing demand for distance learning. For instance, India's Indira Gandhi National Open University offers virtual programs in multiple disciplines.



Possibility of education through mobile phones led to growth of m-education

The global m-learning market is led by increasing use of smartphones and tablets for study purposes and emergence of the bring your own device (BYOD) policy in colleges and universities.

Personalized learning thrives in a technology-rich environment. Technology has made personalized learning both approachable and dynamic. It provides learners access to relevant material and empowers facilitators to understand and monitor individual progress.



Without educational technology ranging from digital content to adaptive learning software, it would be extremely difficult and resource intensive to implement personalized learning.

Emerging technologies including social media, mobile, analytics and cloud computing (SMAC) are impacting all areas of HE ...

Four key technologies are driving innovation in the HE sector

| S Social | M Mobile | A Analytics | C Cloud |
|--|---|--|---|
| <p>~45%</p> <p>college students in the US have used social media at least once as a learning tool.⁽⁴⁾</p> <p>Platforms such as Facebook, LinkedIn and Twitter enable face-to-face learning and enhance students' experience.</p> | <p>85%-97%</p> <p>college students in the US use mobile phones for accessing student services.⁽⁴⁾</p> <p>Growing mobile technology and device ownership are emphasizing on enhanced learning practices.</p> | <p>81%</p> <p>college students in the US are using IoT devices.⁽³⁷⁾</p> <p>There is demand for data tracking and analytics and improved communication between student, professor and institutions.</p> | <p>US\$9 billion</p> <p>HE cloud market size, CAGR of 24% during 2015-20⁽³⁸⁾</p> <p>The need for resource sharing and remote learning with the help of video conferencing is growing.</p> |

Case in point 1: Civitas Learning – Predictive analytics tools⁽³⁹⁾



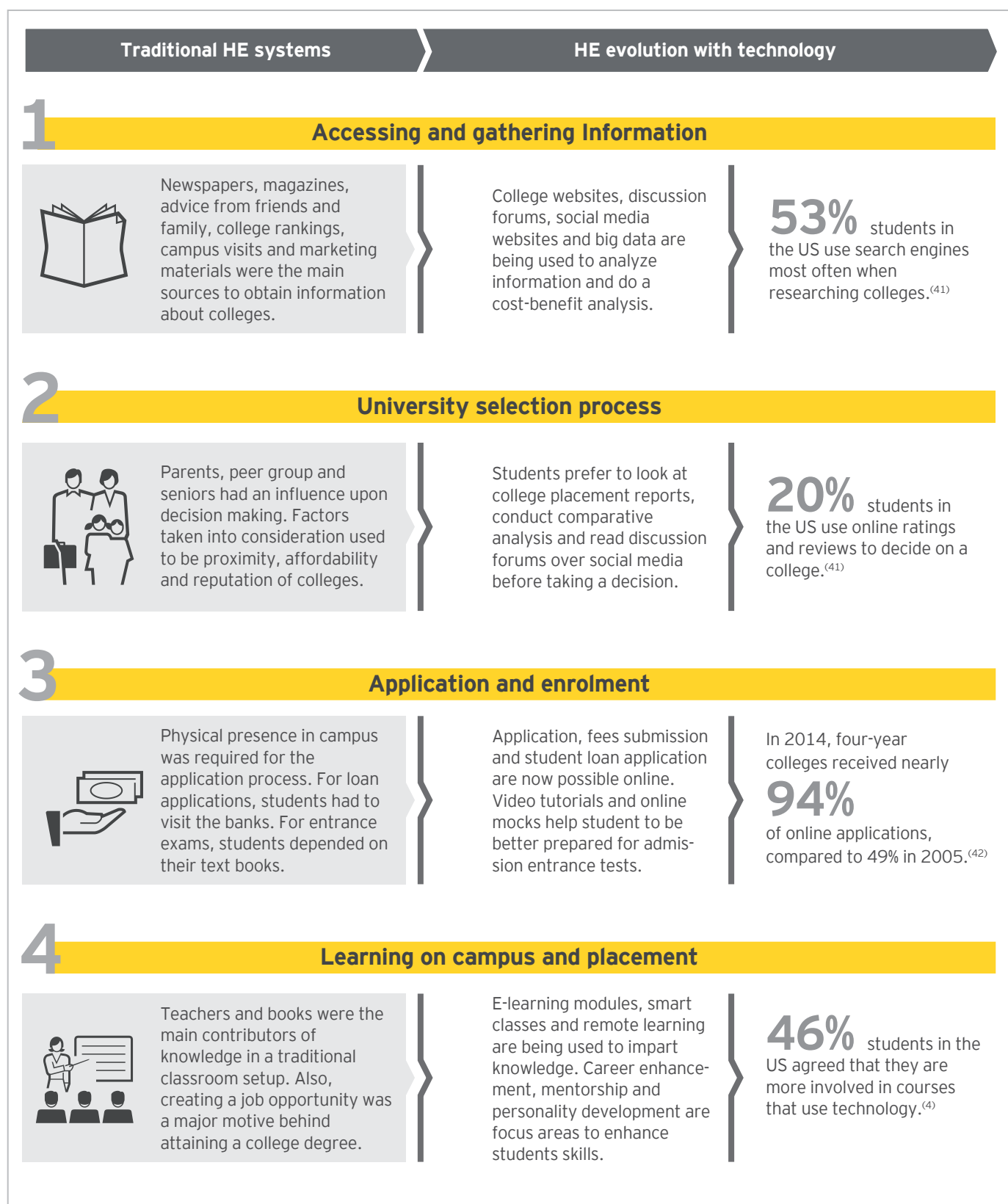
Civitas Learning develops predictive models that help improve outcomes in areas such as student engagement, progression, graduation, retention, satisfaction, employability and overall student experience. For example, it developed a powerful predictive tool, which can predict with 84% accuracy whether a student is likely to drop out, on that student's very first day of university.

Case in point 2: Freshmentors – Online mentoring platform⁽⁴⁰⁾



Freshmentors is a web-based platform that can help prospective college applicants get authentic, relevant and current advice about campus life, courses and finances directly from high-achieving current college students already attending their target universities through various channels such as video chat and online essay reviews.

... ushering in the next wave of transformation in the HE system - The emergence of Education 4.0



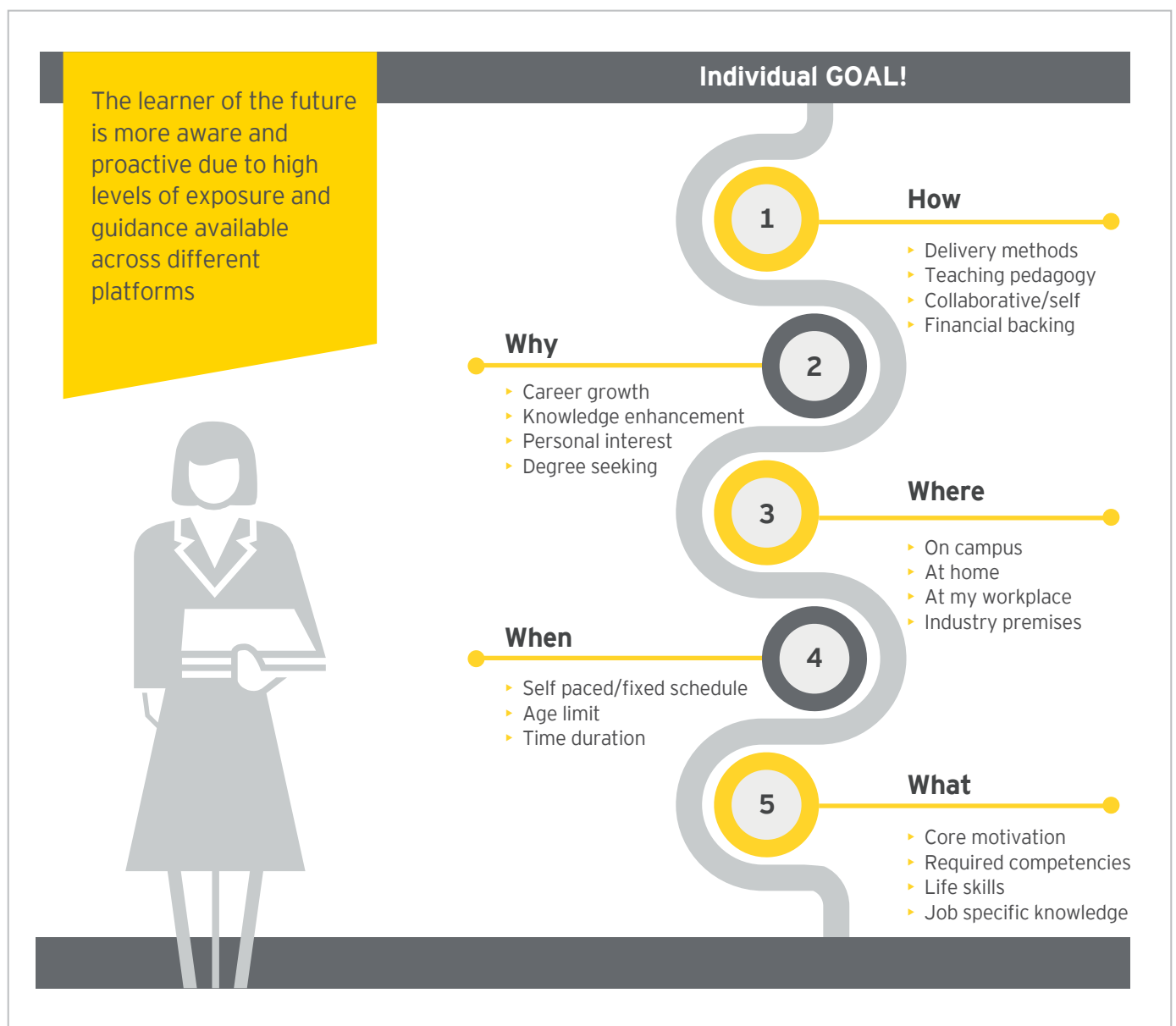
Introducing Education 4.0



Education 4.0 puts the learner at the center of the ecosystem and empowers him or her to structure individual paths keeping in mind the final outcome

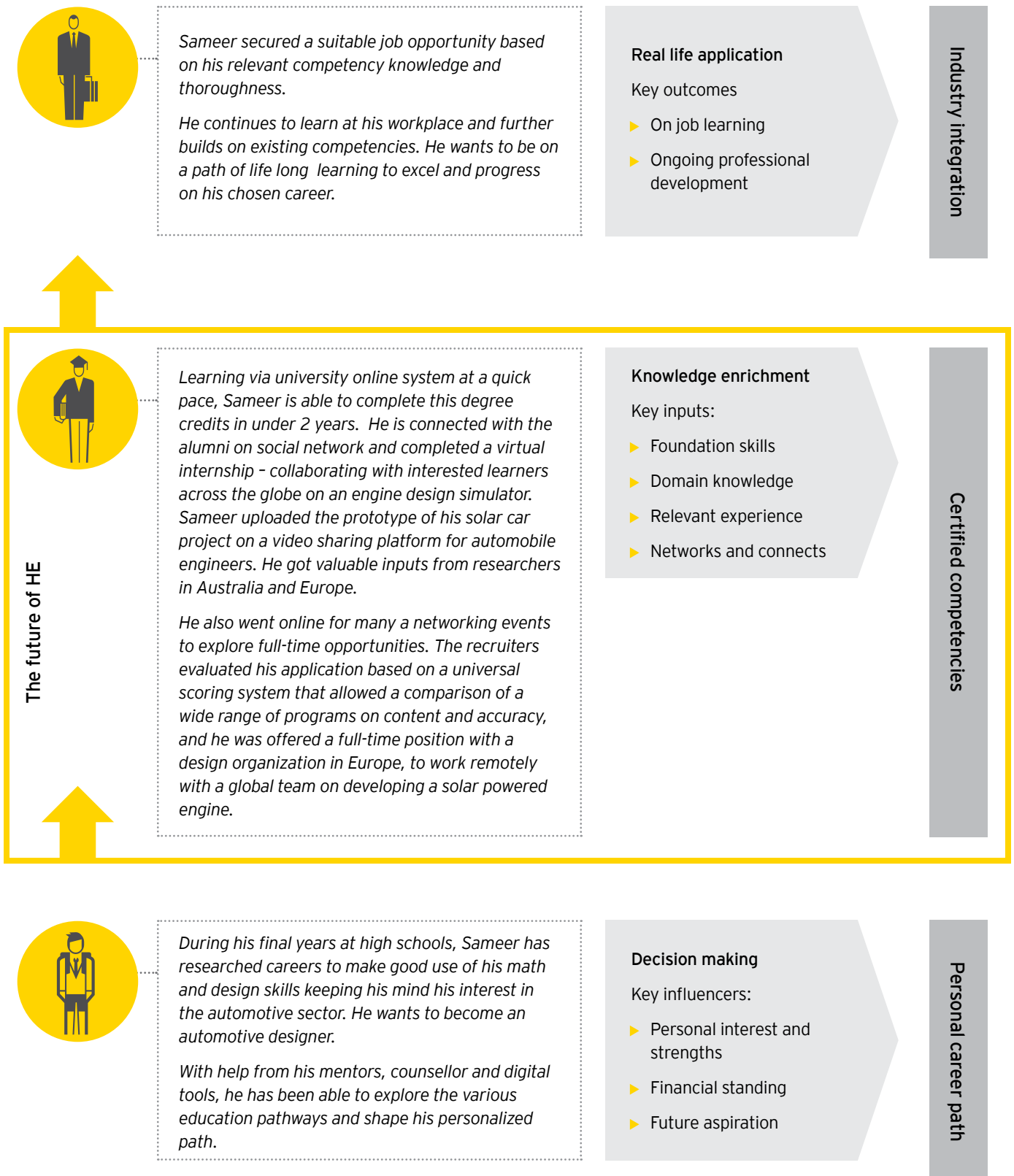
HE has been evolving continuously in response to the internal and external forces. Evolution today is taking place at an accelerated pace as change is now measured in years and not centuries. A privilege to a few is now an expectation for all.

In Education 4.0, learning is connected to the learner, focused on the learner, demonstrated by the learner and led by the learner. It is the learner who is responsible for defining the various dimension of his education path – the what, where, when, how and why while moving up the learning ladder.



Education 4.0 is the **personalization** of the learning process, where the learner has complete flexibility to be the architect of his or her own learning path and has the freedom to **aspire for, approach and achieve** personal goals by choice.

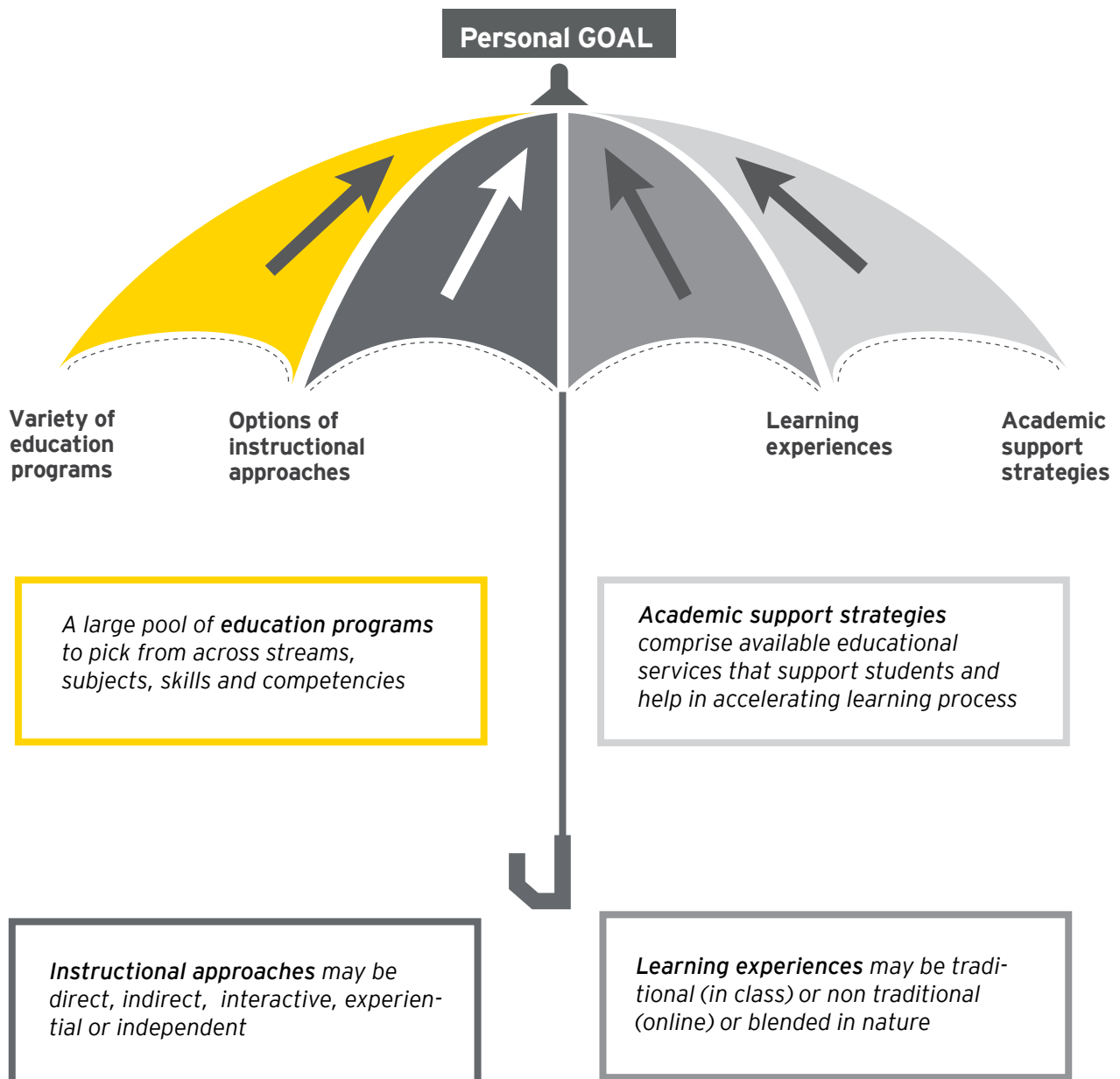
A learner's perspective on Education 4.0



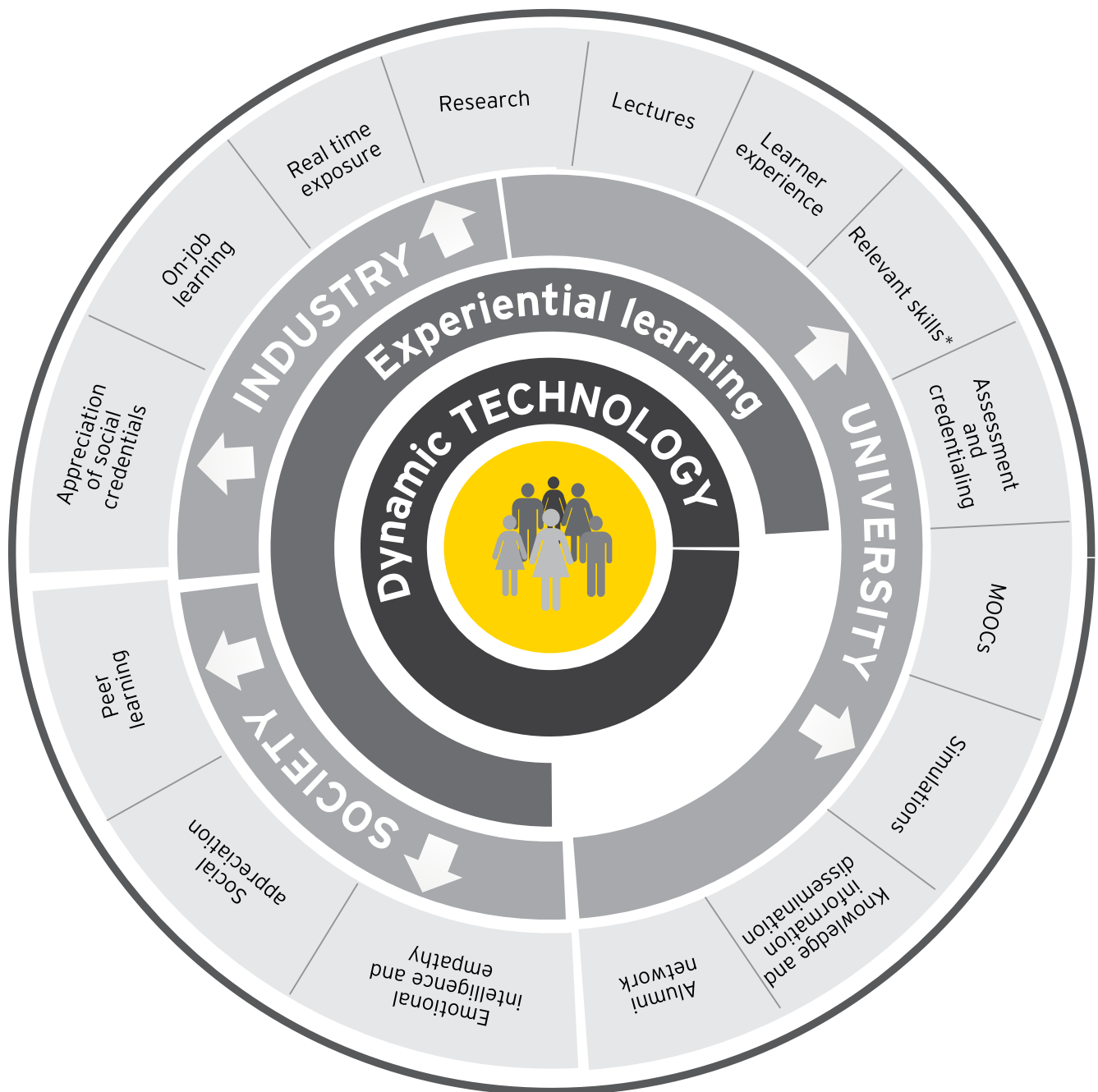
What is personalized learning?

The umbrella of personalization – The individual's personal goal and his or her drivers are the only constant through the journey of education

Personalized learning focuses on addressing an individual's goal by choosing from a variety of educational programs, instructional approaches, learning experiences and academic support strategies while keeping in mind the learner's distinct needs, aspirations and interests



In Education 4.0, the learner will always be at the center of the education ecosystem, learning at the university as also from peers, industry and society at large



* Analytical/problem solving/creative skills

While technology delivers the content and cognitive learning, the need for experiential learning is magnified – absorbed through the interpersonal experiences with all stakeholders

Education 4.0 - The HE ecosystem

The focus of Education 4.0 is around “experiential learning” by the individual - the instructional theory and foundations are delivered across technology-enabled platforms - and a tighter integration with the Industry and society provide a robust platform for learning from the peers, social interactions and real-world issues.

Key stakeholders

- **Learner:** Demands greater flexibility and looks out for affordable alternatives that can be customized as per his or her individual aspirations
- **University:** Aims to be the prime education provider at the forefront of knowledge creation and dissemination with a sustainable business model
- **Industry:** Looks out for industry-ready personal with problem-solving skills, creativity and analytical thinking capabilities; also looks to the HE ecosystem for collaborative research opportunities and solution development
- **Society:** Expects the ecosystem to create individuals with high emotional quotient (EQ) and who are empathetic and work toward solving community challenges collectively

Mediums of delivery

Dynamic technology: Dynamic technology envelops the learner and provides options for the learner's core decisions of what, where, when, how and why to study. The technology layer could deliver the cognitive learning parts - instructional delivery, content and remote learning.

Experiential learning: Interactions with all the stakeholders - either in person, across groups through peers or social learning - supported by technology only to an extent. The real world experiences and the life skills that prepare the learner for the future of jobs would be learned through social interactions, physical world learning by doing and interpersonal experiences.



The university-driven
HE model is undergoing
a rapid shift with the
advent of Education 4.0



The changes are evident in the student lifecycle

The advent of Education 4.0 has the potential to revolutionize the way we look at HE providers today. The way the various stakeholders interact with the providers – for learning, knowledge creation and research – and the way they utilize the end product of the HE system need to change and some of these changes are evident today in their small yet finite ways.

The university's transactions with stakeholders have undergone a sea change due to the innovations in technology and

communications and the need for more practical life skills among the learners. The appreciation of these changes would lead to the university being more agile and responsive to the changing times.

The various functions of the university as we know today – the teaching lifecycle and the research – are being transformed in a big way.



The following section looks at the change upon the HE system in this lifecycle.



Enrolments in the university model are being limited by various infrastructure and design constraints

HE has been the privilege of a few till now. Globally, less than 50% of the people coming out of the school education system get into the HE ecosystem.

Many of the people out of the formal HE system could be attributed to the mismatch of the needs and expectations of these learners and the design of the HE system.

Infrastructural constraints

Supply constraints at universities



Enrolments at many of the established universities have remained static over the years due to limitations of infrastructure and faculty, as also due to the “exclusivity” behavior of institutes.

Education design constraints

Preparing the learner for a job and career



Most people coming out of HE system are not ready for the jobs of today. As per an Aspiring Minds report, only 20% of graduates of Indian engineering colleges are job-ready.⁽⁴³⁾

Such limited linkages to job-oriented learning pushes many potential learners to join a job after schooling itself.

Lack of flexibility in learning structure



Program structures offer limited flexibility for learners to choose their areas of focus. Programs are usually of a fixed durations and need minimum credit structures, which force the focused learner to study programs and courses outside of his or her area of interest.

Further, most of the existing programs do not offer flexibility in time or location-agnostic study options, which many students desire due to a variety of reasons such as jobs, locations, personal conflicts and travel needs.

Incompatibility among cohorts

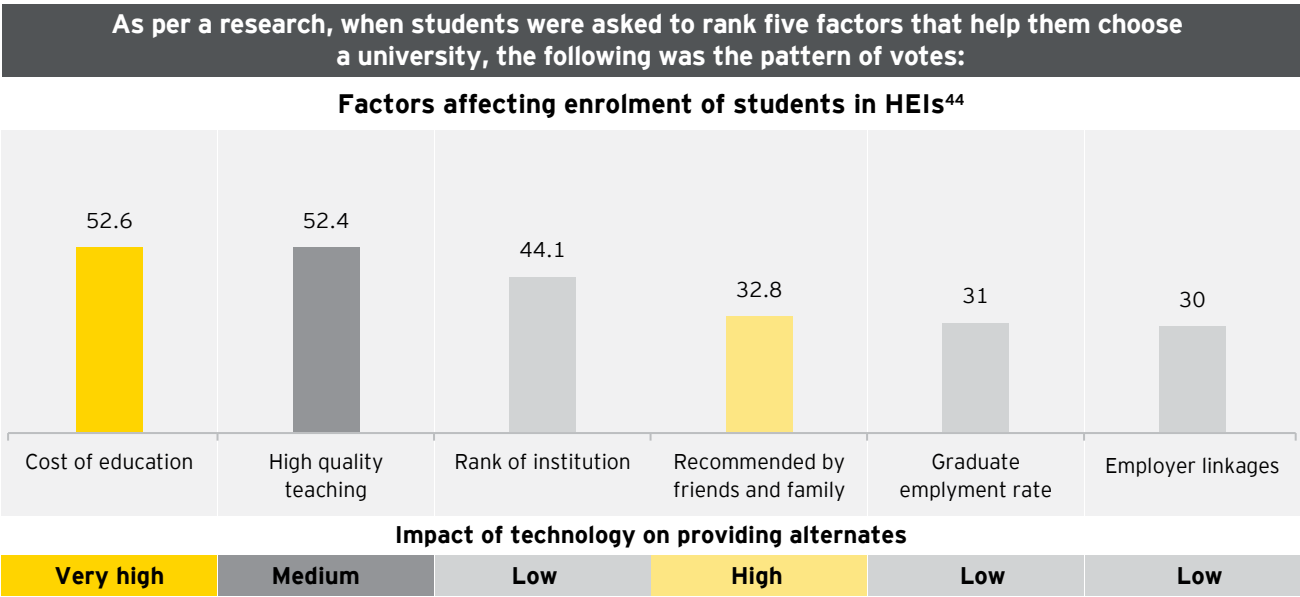


The existing system of teaching delivery relies on the cohort system. The cohort could be made up of dissimilar individuals with varied needs and learning levels, and the absorption of information and learning also varies

Flexible enrolments and technology-driven online programs could help universities overcome these constraints

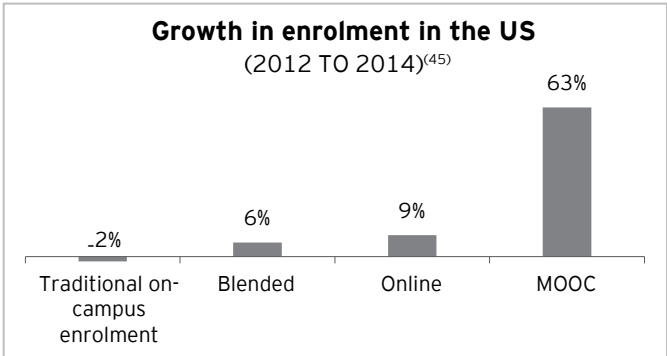
Technology-driven online education mechanisms can alleviate these drawbacks. They offer flexible anytime anywhere learning paradigms, at a fraction of the costs of a brick-and-mortar university, and allow universities to overcome the infrastructural constraints by leveraging their existing resources to a larger audience using technology channels.

The drivers for the target student to enrol in a course are highly varied, and the advent of technology-driven learning tools can impact them in multiple ways



Students and employers are opening up to the idea of non-traditional means of learning.

Alternate program offerings are being created that offer a learning blended with student experience - challenging the next level of education. This is clearly visible in the shift in the enrolment patterns across the variety of learning methods - where the traditional on-campus enrolments are decreasing in the US, while self-driven MOOCs and online courses see a strong growth.



With HE costs becoming unaffordable, learners are questioning the return on investment of current models of education

Economic constraints

Increasing costs of education

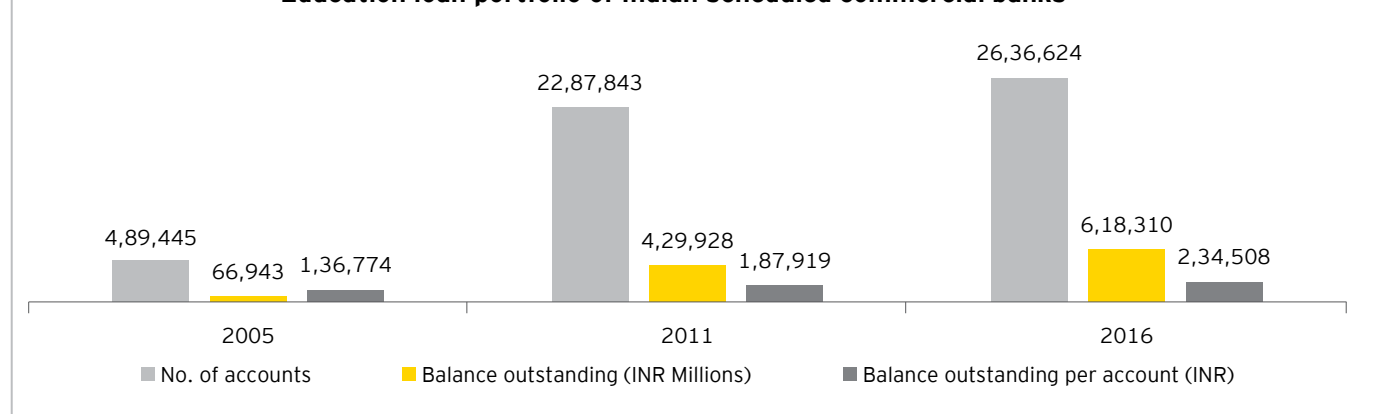


The costs of quality HE has been increasing due to lowering of grants and funds from governments globally.

The high costs coupled with limited job worthiness at the end of the program could be seen through the worsening quality of student loans in most large education sectors including the US and India.

The education loan portfolio of Indian banks clearly points to this trend. The total loans outstanding for the education sector continue to increase as does the average loan per student. At the same time, the portfolio is under stress due to non payment of loans.

Education loan portfolio of Indian scheduled commercial banks⁽⁴⁶⁾



“Non-performing assets (NPA) within education loan book ballooned 21% in the reporting year, spiking the NPA ratio to 10.2 per cent as of March 2017.” Crif High Mark

“Reasons for defaults could be that students are not getting placed or they are not getting placed in jobs that they thought they would get placed in.” Rituparna Chakraborty, President, Indian Staffing Federation

NPA in education⁽⁴⁶⁾

| Period | NPAs as a % of total loans |
|----------|----------------------------|
| Mar 2013 | 5.4% |
| Mar 2014 | 5.75% |
| Mar 2015 | 5.44% |
| Mar 2016 | 7.35% |
| Dec 2016 | 8.76% |

Universities are using MOOCs to develop personalized learning paths in their program designs, while developing strong industry linkages for experiential learning and keeping costs subdued

From being an inquisitive add-on program to broadening the understanding of the subject, MOOCs are changing into self-paced learning platforms with clearly defined program pathways.

“The range of features and experiences that were once free have dramatically shrunk over the last couple years, raising the question of how ‘open’ MOOCs truly are. Taking the course simultaneously with thousands of learners is no longer a selling point of MOOCs (from a course providers perspective).

There's been a decisive shift to focus on 'professional' learners who are taking these courses for career-related outcomes, over the dabblers and lifelong learners who take courses just for curiosity's sake.” Dhawal Shah, Founder, ClassCentral.com

MOOCs are not competition by the universities but can instead can be used as a branding and student marketing tool. Universities can offer MOOCs to provide prospective students an experience of their offerings and market their best courses and best professors to attract students to their full-time courses.

Case study: Minerva School at KGI⁽⁴⁷⁾

What started as a completely informal education program in 2012, Project Minerva has evolved into the most selective program in the US in under 5 years of operations.

It is a school with no classrooms. Online seminars provide the basic of the courses, while the rest of the life skill imparting learning is done through international stints across the globe, industry internships and internship projects.

Project Minerva partnered with Keck Graduate Institute (KGI) in 2013 for the award of degrees - underlining the importance of a formal standardized credential at end of the program. It is now an accredited university with a completely online and experiential learning paradigm.

In 2017, the school had a 2% acceptance rate for its undergraduate program - lower than most of the Ivy League institutions in the US.

Case study: Uncollege⁽⁴⁸⁾

Founded in 2010, Uncollege provides resources for students who wish to define their own educational paths, whether in or outside of traditional HE models. It works on the concept of a Gap Year and a Gap Semester - splitting it into 3 learning units of similar durations - international exposure, mentoring and team building and finally an industry internship.

Interestingly, almost a quarter of the 6,000 applications for the Gap Year project in 2016 were from Ivy League students looking to explore the concept!

With growing traction for online education, HEIs need to create environments where learners can both learn and apply concepts

Universities have practiced a monopoly in knowledge creation and dissemination, creating an exclusivity for the people who passed through them. Classrooms were relatively isolated and collaboration usually happened within the confines of the classrooms.

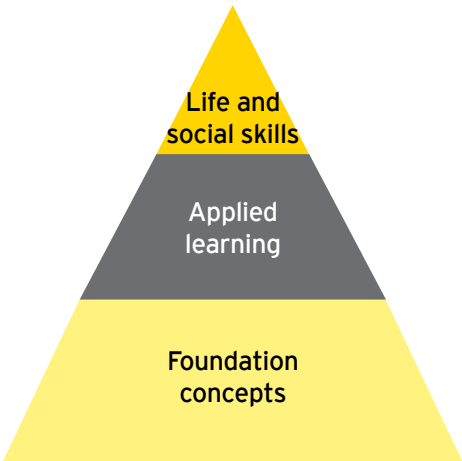
In their quest for pure knowledge, they have distanced research from the society around them and the industry, which was the consumer for the knowledge being generated. As a result, the curricula became more complex around the theoretical and foundational aspect without preparing a workforce for

the industry or tangible research output that could be quickly commercialised by the industry.

Students emerging from a rote learning system have great foundation and depth in the subjects of their study but lack real-world application knowledge or the creative skills that are sought by employers in rapidly changing industries today. With technology greatly impacting learning of these foundation concepts, universities need to augment their curriculum to address these life skills to remain relevant

| Top 10 skills sought by employers in 2020 ⁽²⁹⁾ | | |
|---|---|---|
| <ul style="list-style-type: none"> ▶ Complex problem solving ▶ Critical thinking ▶ Creativity ▶ People management | <ul style="list-style-type: none"> ▶ Coordinating with others ▶ Emotional intelligence ▶ Judgement and decision making | <ul style="list-style-type: none"> ▶ Service orientation ▶ Negotiation ▶ Cognitive flexibility |

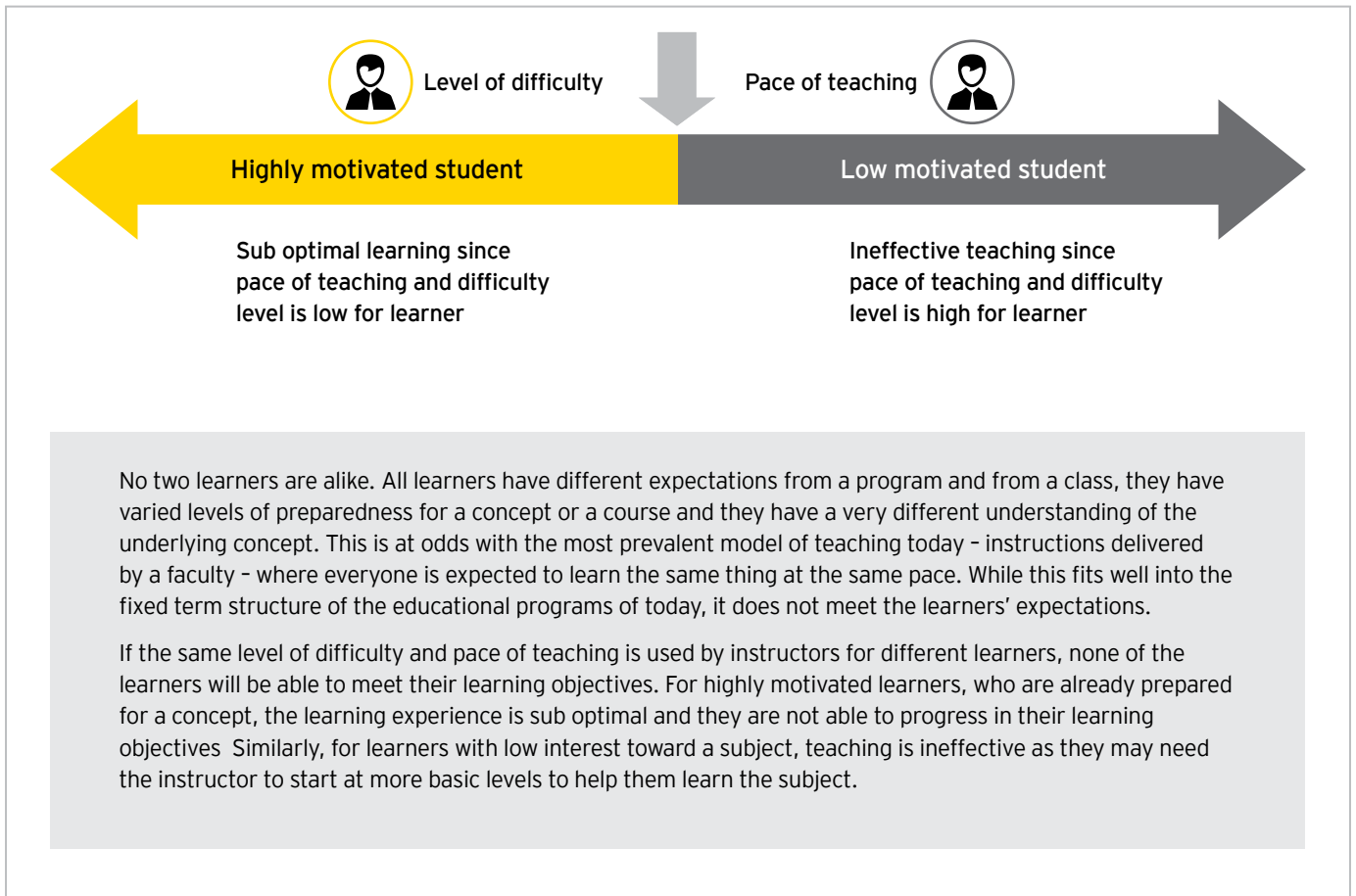
*Based on a survey of chief human resource officers and other senior talent and strategy executives

| Learning pyramid | Current state | Impact of technology |
|---|---|--|
|  | Extremely select HEIs focus on imparting skills such as strong problem solving, creativity and critical thinking abilities. | Life skills can only be developed via “learn by doing” and engaging with other. |
| | Some HEIs provide opportunities to students to apply concepts learned in real scenarios through internships and live projects | Technologies such as virtual reality may impact experiential real life learning but only to an extent. |
| | HEIs have traditionally delivered strongly on imparting conceptual knowledge through text and literature. | Standardized content can be delivered in the form of video lectures via online channels. |

HEIs need to respect complexities and variances in learner behavior and move away from cohort-based classes

The lack of flexibility in the time and place of study was further exuberated by almost no changes in the instruction delivery.

While this process of teaching ensured that HE became mainstream by reaching out to a large learner pool, it needed a complete overhaul due to the complexity of learning behaviors.



Technology has transformed the learning process by utilizing analytics to develop adaptive learning paths ...

Technology has reshaped the core product of the HE system itself – the learning process. Innovations and the application of technology are driving the “personalization” of learning.

Complete flexibility to learner

The learner today is spoilt for choice – the courses and programs taught in class are available online in as video lectures, MOOCs and structured online programs. The student is able to pick and choose the modules, programs, space and pace of learning, without being bound by the constraints of time and location.

Adaptive assessments

The traditional means of assessment at the end of a program are passé.

Real time adaptive assessment methods are providing students a learning path specific to their needs – unlike the traditional post facto assessment methods where the scores at the end of the program tested the reception of knowledge. Adaptive learning courses provide real time feedback to the learner along with the required course correction. The learner is free to learn in alignment with his or her own strengths and weaknesses, instead of following a fixed structure.

Artificial intelligence building upon learning analytics

The advent of online analytics is allowing course developers and teachers to identify the best learning path based on the real time assessment of the learner behavior.

Such analytics allows them to design programs that further strengthen the individual learning paths of students with different levels of academic intellect and learning motivations. Unlike the cohorts of yesteryears where student diversity was lauded, the learning systems of today enable students to learn from peers of their own choosing, while allowing them to learn from disparate group of learners at the same time.

Australia's Deakin University used IBM Watson to create a virtual student advisory service that was available 24-hours a day, seven days a week. Watson's virtual advisors fielded more than 30,000 questions in the first trimester, freeing up the actual advisors to handle more advanced issues.⁽⁴⁹⁾

... and change the role of a teacher from that of a mere instructor to a facilitator and coach

Changing role of a teacher

The role of a teacher is changing from that of an educator to a facilitator, coach and mentor.

Classrooms designed for a teacher to be at the front of the room may now need to concurrently support environments where self-directed students work on their personal devices as well as interact with other learners in collaborative projects. Classrooms become places where knowledge and ideas get generated through collaboration and debate with the teacher acting as a facilitator.

Digital technology is enabling teachers to create more interactive, engaging and flexible learning materials in a range of digital and multimedia formats and make them available to students online. These changes are enabling educators to have a more diverse set of pedagogical approaches to support their learners, which means that they can be more inclusive in their teaching methods.

Virtual experiential learning

Augmented and virtual reality (VR) technologies are allowing learners to experience the theory first-hand. These worlds allow teachers to “take” students to otherwise impossible locations. From taking a guided tour of the Great Wall of China, to examining world-renowned art in a museum halfway around the globe, these micro experiences are able to shape student learning far more than an in-class lecture.

Such technologies have led to a reduction in costs for material and spaces without compromising on the learning outcomes. But in an effort to harness the potential of VR, institutions will need to think beyond the initial “wow” factor for students and determine how to capitalize on building knowledge. Standards will also need to be determined in managing how students navigate between the physical and virtual world in relationship to coursework and communication via instructors and fellow students.

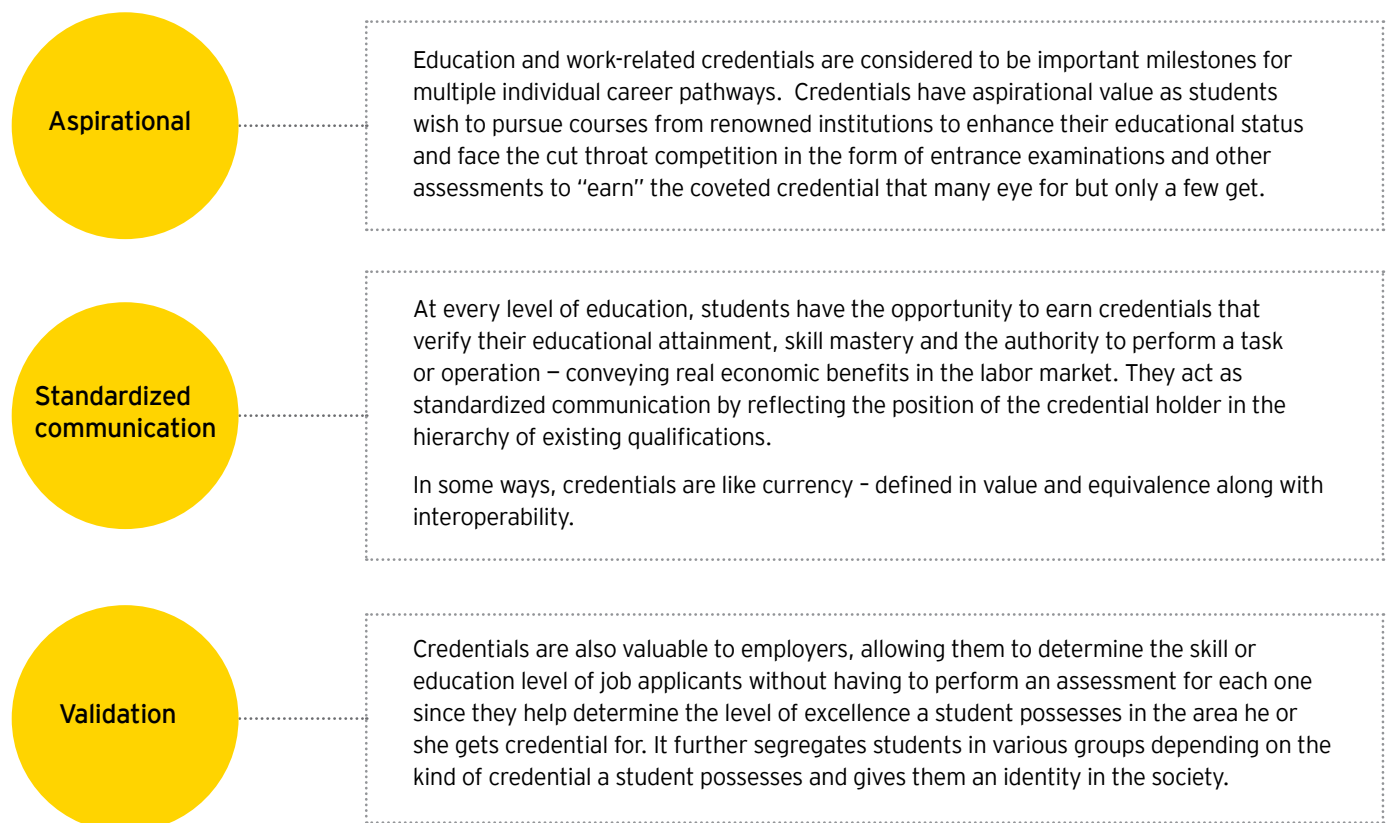
Unimersiv is a company focusing on bringing virtual education to the masses. It provides different virtual reality education experiences such as “International Space Station,” “Inside of human body” or “History tour through Wiltshire, England.”⁽⁵⁰⁾

Delightex, has created a pair of apps called Cospaces through which anyone can create VR spaces and explore them in VR. Users can also explore spaces created by others.⁽⁵¹⁾

Degrees and other credentials have been one of the most visible and tangible outputs of the university system

Credentials such as degrees, diplomas and certificates are the currency of the HE system segmenting the population into “haves” and “have nots.”

The HE system had an almost unsurmountable monopoly on the credentials - allowing the learners to aim for the social capital surrounding a credential. A credential truly served the following purpose:



Over the years, the pace of the education system to provide industry-ready professionals led to industries looking at other means of credentialing. One of the most evolving sectors – IT – developed its own industry accepted credentials to counter the lack of agility in the HE system. CISCO and Microsoft certifications are well renowned in the IT industry, underlining the need of skill certification more than a generic credential awarded at the end of the educational programs.

These credentials, however, are under threat, with the underlying learning losing its touch with the needs of the industry and society

The online revolution is further challenging this citadel of HE. Micro credentials and badges from the MOOC platforms are being more acceptable in the industry.

EY, PwC and Clifford Chance remove the need of a degree for job applications in the UK

Clifford Chance has adopted a radical new approach to recruiting graduates – introducing a “CV-blind” approach. It meant interviewers would not be given any information about which university candidates had attended or whether they had come from state or independent schools.

PwC relaxed the A level Grade requirement for recruitment in UK in May 2015. EY removed the requirement of a degree to apply for a job for its coveted ranks in the UK in August 2015. While the degree and the performance in it would be considered as a criteria for selection, it is not mandatory to apply.⁽⁵²⁾

This industry trend of looking at capabilities independent of credentials allows different student sets to opt for alternate credentials.

| Type of learner | Emphasis on formal credentialing | | Target for alternate credentialing |
|------------------|----------------------------------|---|------------------------------------|
| Career seekers | Limited | Focus more on ROI of program and credential | High |
| Degree seekers | High | Need for social acceptance | Low |
| Career advancers | Limited | Need flexible programs | High |

With the industry and society becoming more open toward these badges/micro credentials, the degree grant shops (universities and institutes with low investments in quality of learning and outcomes) are bound to get extinct.

Universities would also need to develop varied channels and products to cater to the needs of the different target groups.

Case study: Master's program in Computer Science at Georgia Tech⁽⁵³⁾

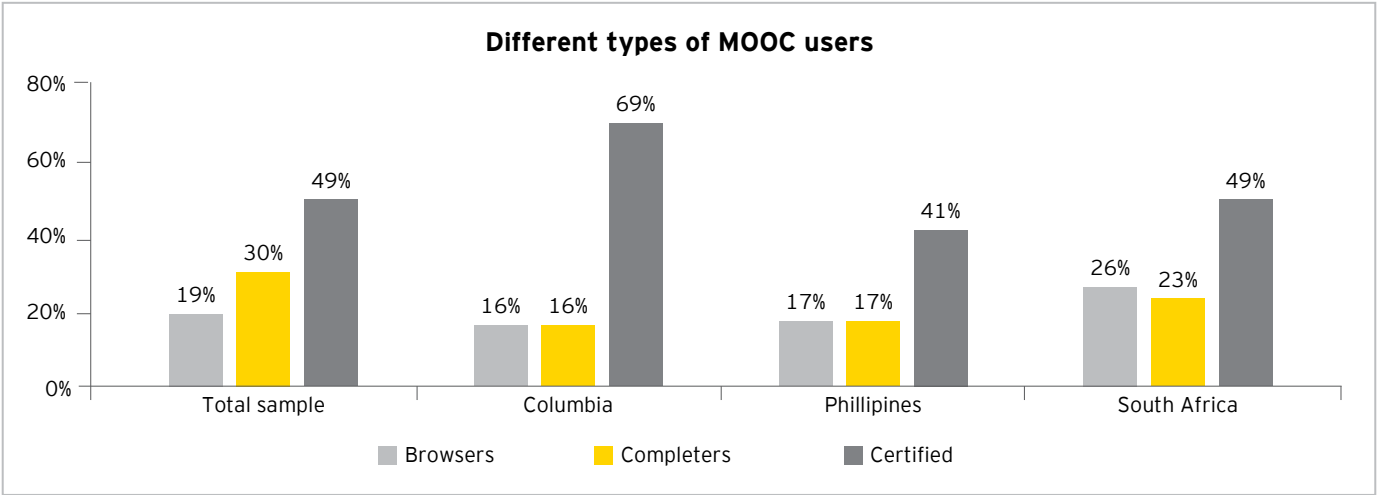
Georgia Tech offers the Master's program in Computer Science in different formats – a full-time on campus program, a completely online program and individual course as MOOCs. While the degree seekers can choose the first two modes, others can learn the same program freely without any credentials at the end of it

Micro credentials and badges from MOOC platforms are gaining acceptance in developing countries as well

Apart from being popular in developed nations such as the US, MOOCs are gaining huge traction in developing countries. The perception that MOOC usage is largely inhibited in developing economies by underdeveloped technological infrastructure is no longer true.

According to a recent study conducted on gauging the impact of MOOCs on education in three developing nations (Columbia, the Philippines and South Africa):⁽⁷²⁾

Completion and certification rates of MOOC users across these three countries far supersede those reported for users in more developed countries. Almost half (49%) of MOOC users surveyed had received certification for at least one course. Nearly 80% of all MOOC users said they had completed at least one course.



Gaining specific skills to perform better in their job, obtaining professional certification, preparing for additional education and finding a new job are the top motivations of young people to engage with MOOCs.



The existing process of knowledge creation and research at universities has not integrated with the industry needs

Research has been one of the cornerstones of the university/HE systems worldwide.

A large amount of funding and intellectual time and energy is spent on promoting research - both academic and applied.

However, still in many of the education systems around the world, some common elements have remained unchanged for many years:

Research is often “inquisition driven” by the researcher, and is delinked to the “need,” thus resulting in a lot of academic research and limited applied research.

A lot of this is also driven by design - Faculty and researchers are tenured and promoted based on the number of papers published than the practical impact. This in turn is driven by the various rankings of global universities that are swayed by the number of research papers. The research thus is used for credentialing the researcher and the institute, than creating real world impact.

Research ecosystems have traditionally been rigid with research being driven by academic rigour rather than real problem solving

A PhD has multiple years of in class teaching systems, and a stringent mechanism of problem definition, data collection and thesis writing than providing flexibility in rerouting and restarting as needed when situations and changing time demands.

Long time lags between research outputs from university and commercial outcomes

The time span between university research outputs and commercial outcomes is too long, which makes a lot of innovations obsolete in today's dynamic environment even before they become commercially available.

With the advent and mainstreaming of internet technologies, research is gradually changing ...

The "CONNECTED UNIVERSITY" research



Research platforms to propagate quick findings

Researchers now can publish their insights and research findings over social media, blogs, discussion forums and online publishing sites such as ResearchGate, Google Scholar and Academia, instead of the "exclusivity of the research journals."

While journals still have better visibility and impact factors, free research publishers are gaining on the number of users and publications rapidly.

Virtual research and discussion groups

Virtual research groups are becoming preferred modes of idea dissemination and informal peer reviews and ideation. They allow interim findings to be propagated to interested researcher pools and crowdsourcing of related ideas and course corrections if needed.

... from a physical realm of the laboratory to a global peer-driven enterprise

Presence of massive open data

Availability of massive open data from multiple sources – academic, government, sensors and satellite – and the tools to analyze them is reducing the cycle time for data analysis and research validations.

Online and social data collection channels

Online data collection channels today ensure that the data sets are more representative as researchers can now reach out and collect data from a global audience in a short span of time and at a low cost.

With increasing use of collaborative communication technologies, there is no need for an army of research assistants administering surveys to a limited audience.

For example, a US-based company has over 1,300 universities globally that use its product suite for data collection and analysis in research. Almost 90 of the top 100 business schools use the tool for data collection and analysis of big pools of data for science and social sciences research problems.

Enhanced computing driving better analytics and research

The advent of strong analytics tools has made possible analysis of huge data sets and reduction in the cycle times in data collection, validation and inferences.

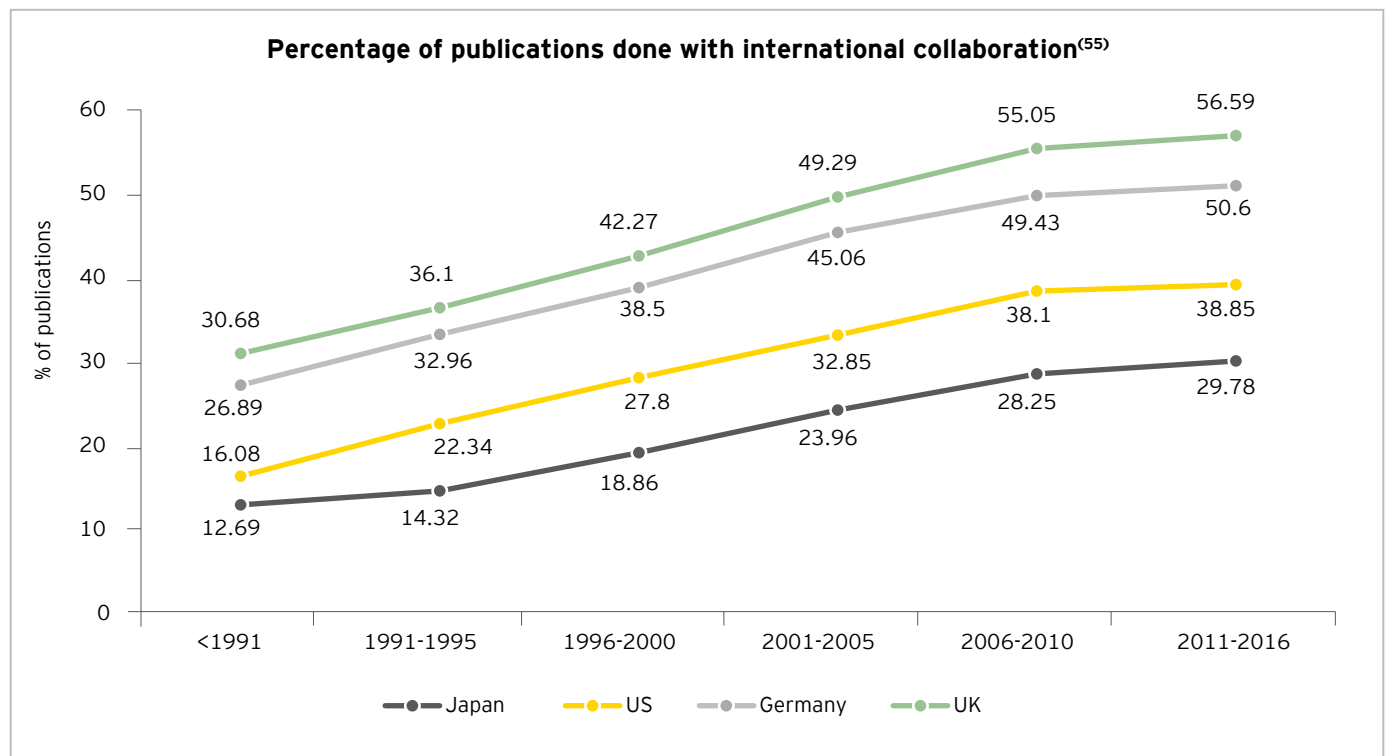
For example, the Epic System developed by Corning for drug discovery and compound research could analyze the responses to 100,000 compounds in an eight-hour period – something that would have taken over a year around 10 years back using a manual method of compound reactions.

Increasing use of technology for communication and collaboration has made research more democratic and global in nature, with many more countries publishing in academic journals

As science grows more global and, in many instances, more expensive, collaboration among authors and institutions across different nations has become a central feature of research.

A main driver of this trend is technology, with its constant provision of new and refined means for communicating and sharing materials, even at international distances. This sweeping onslaught of technology changes has led to shortening of several of the steps involved in the research process.

- ▶ This is evident in the growth of number of papers with international collaborations, which more than doubled during 1990-2015.⁽⁵⁴⁾
- ▶ Only 15% of papers published today across journals captured by Web of Science in 2000 listed authors from more than one nation. By 2014, the share of internationally authored papers had grown to nearly 23%.⁽⁵⁴⁾



The advent of an internet-based research ecosystem has enabled more international collaborations due to:

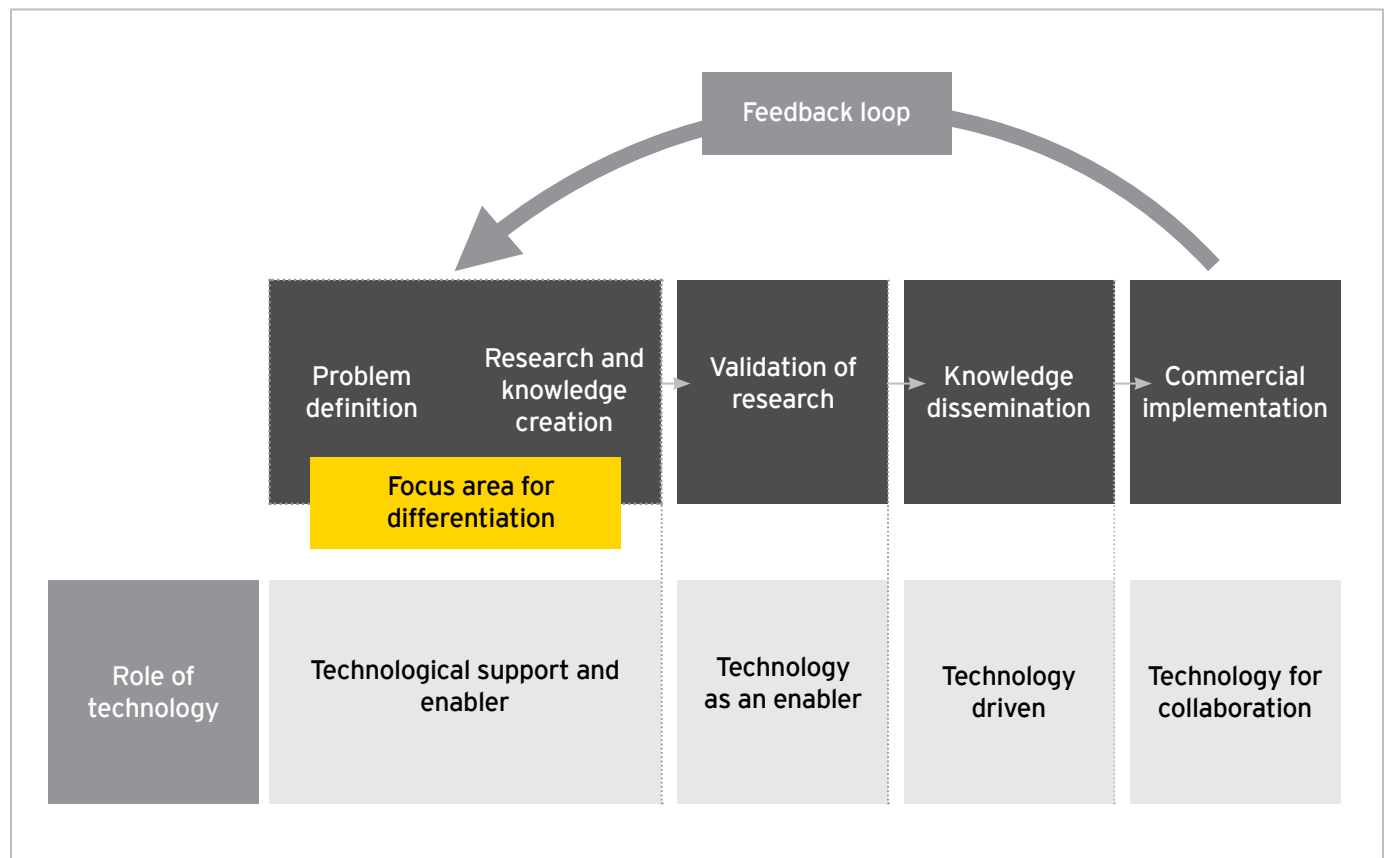
- ▶ Improved access to best collaborators irrespective of location
- ▶ Increased efficiencies in joint knowledge sharing
- ▶ Access to data from different regions on a real time basis

Universities have to focus primarily on knowledge creation in research in a timely and cost effective manner

With a dynamic and constant change driven by omnipresent knowledge and information, and shrinking funding support from governments and industry for academic research, the role of the university as the creator and disseminator of knowledge is poised for a fundamental shift.

- ▶ While the role of knowledge creation would remain in the realms of the university ecosystem, dissemination of knowledge would be driven completely by technology, which would ensure that the dissemination is global and democratic in nature.

This paradigm, however, needs the university to be tightly integrated with the industry and society, who are prime users of the applied knowledge created.



Competition and co-operations for diminishing research funds are set to grow. As research becomes democratized, the research dollar would need to be spent in the most optimal manner.

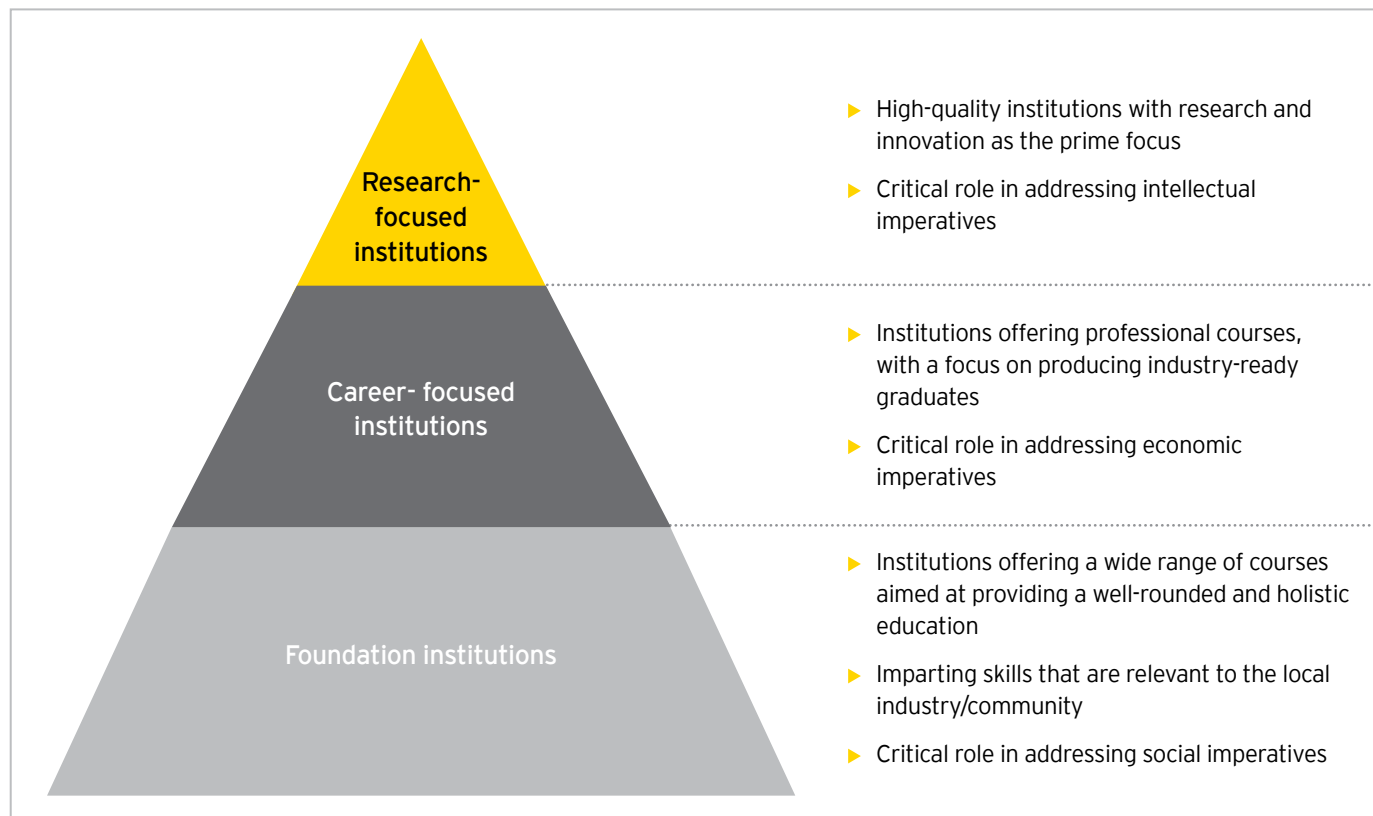
- ▶ This would require universities to build project management capabilities around research to ensure quick turnarounds, reduce cost and schedule overruns and better collaborations with low cost research systems such as in developing countries.

The need for information protection is also increasing with increase in openly available information.

- ▶ There is a need to have clearly defined information rights management policies and tools in universities to allow them to protect their intellectual property (IP) assets against IP piracy and plagiarism, while promoting their creation of knowledge as the differentiator at the same time.

HEIs across India have different levels of preparedness toward Education 4.0

In our earlier report “Higher Education in India: Vision 2030,” we had categorized HEIs across India into the below-mentioned categories. These different types of institutions have fundamentally different focus and outcomes and are at present at different levels of preparedness to address the challenges of Education 4.0



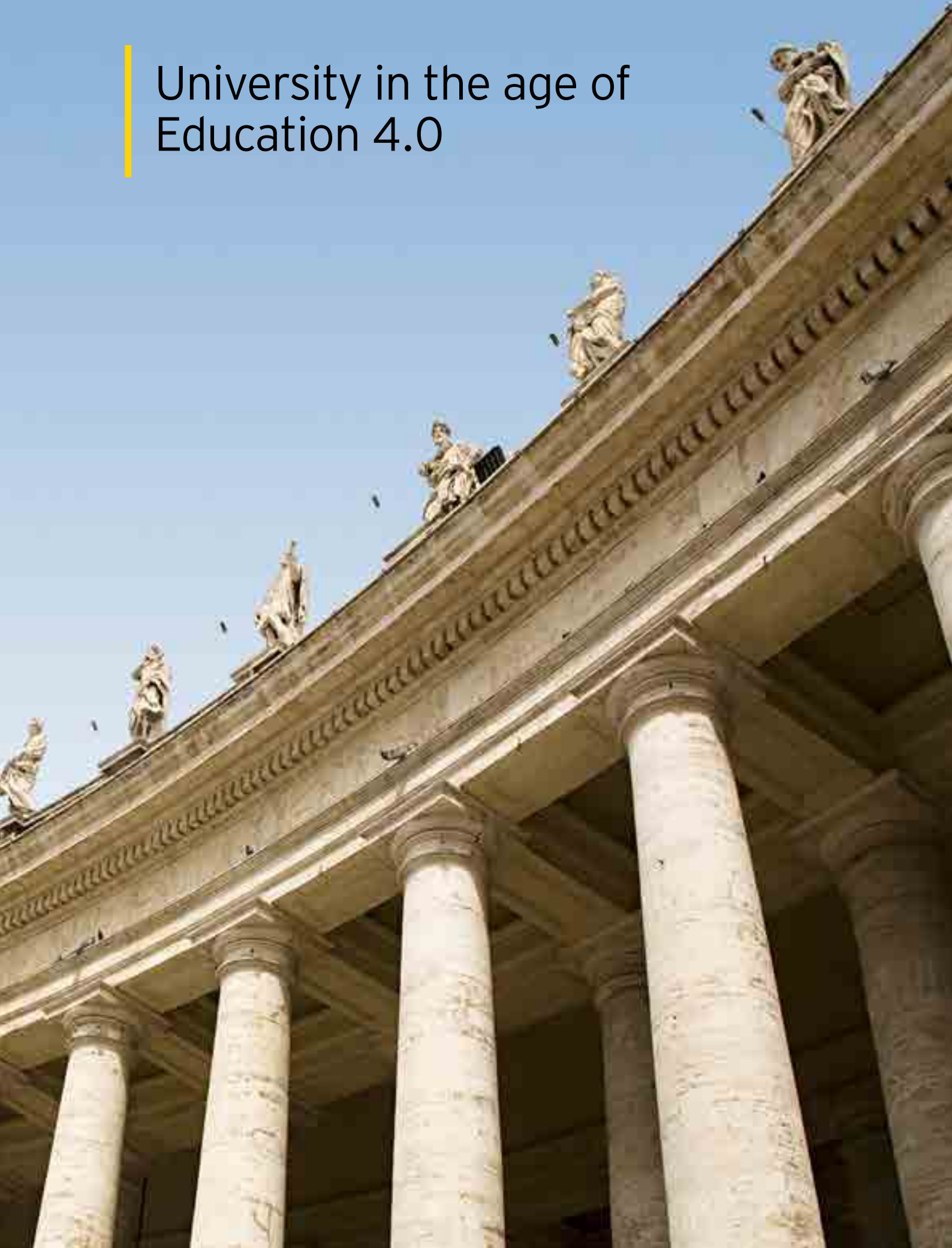
With students moving toward affordable online education options, foundation institutions would be the most impacted by changes in Education 4.0. Many of the foundation institutions in India are not at present technologically equipped to offer students personalized learning experiences. They also need to swiftly adapt themselves to changing employability scenarios, aligning their curriculums with changing industry requirements and providing students opportunities to learn in real life scenarios.

While some career-focused institutions are evolving to changes in Education 4.0, many of them still need to work towards ensure industry interaction at all operational levels through industry advisory boards, immersion programs, internships, live projects, alumni mentorship programs etc. They would need to change their overall program design

where there is less control over hours to be spent on campus, providing students with the flexibility to engage with the industry and learn experientially out of classroom as well.

With increasing democratization of knowledge, research-focused institutions would need to change the “ways of doing” research. Universities need to focus on conducting applied research that can create real world impact. They need to utilize technology at all stages of research to reduce the time span between university research outputs and commercial outcomes.

University in the age of Education 4.0

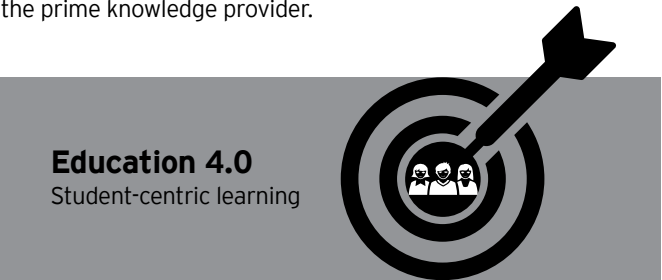


Universities need to provide unrivalled student experience and be at forefront of knowledge creation to remain relevant in the age of Education 4.0

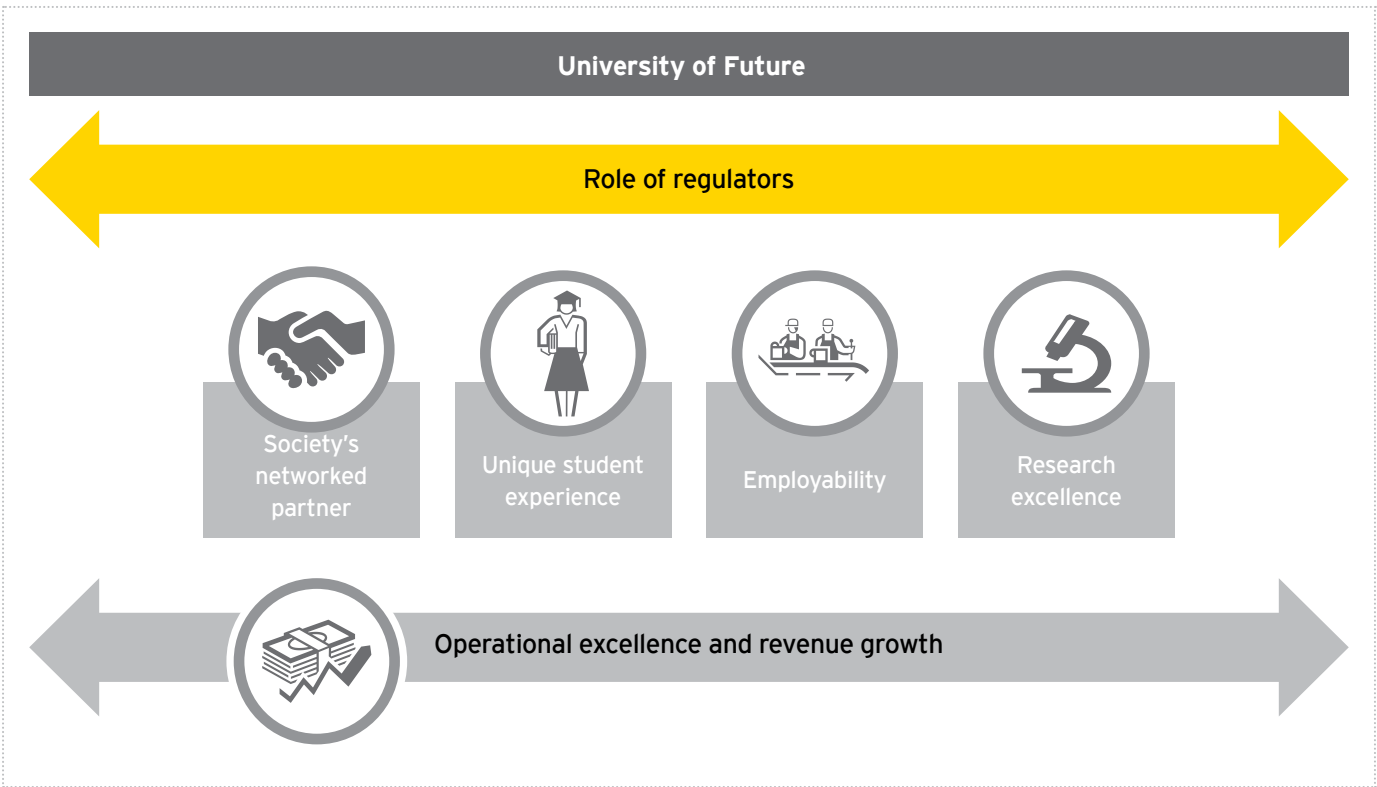
This transition from one paradigm to the other is uneven and how fast universities adapt to this change and continue to evolve will determine their future. Education 4.0 evolves around the student. Consequently, in this changing paradigm, it is crucial for universities to focus on enriching student experience and aligning to individual needs across the student life cycle.

Technological advancement has enclosed the student and access and affordability have never been more important. These three factors lay the foundation for the next generation university.

The student-centric shift has challenged the current enrolment models, teaching and learning processes, assessment and credentialing systems and also the image of the university as the prime knowledge provider.



At this juncture, universities have a critical decision to make: embrace new opportunities and succeed or make the wrong choice and perish. Thus, making the wrong choice is not an option. The following section explores how the current university model might evolve to keep pace with the changing paradigm and advent of Education 4.0 in the near future.



Universities would need to focus on collaborative ways of learning and build flexible program structures ...



Unique student experience

Student experience refers to a student's overall experience of university life and focuses on meeting individual expectations right across the student life cycle. The larger and more diverse student population of today has an increased range of expectations, which largely fall under the ambit of the university.

The student today is more liable to evaluate the experience, complain if unsatisfactory and in return influence decisions of other students, causing a ripple effect and putting the university under immense pressure.

Student experience is a function of not only teaching and learning but also other aspects that impact core teaching and learning that takes place in the university. As universities are no more the only knowledge providers, they will need to invest in providing a distinct experience and complete flexibility at every stage to appeal to prospective students.

Flexible program structures

The present educational ecosystem is dominated by a concentrated learning model emphasizing on fixed duration courses. However, with technological advancements there is a possibility to provide increased flexibility across the learner's life cycle.

Programs should focus on enrolling learners for a lifetime with the flexibility to come back and attend more courses over a duration of, say, 10 or 20 years as per their convenience and learning needs. In essence, the programs should be designed in a manner that there are no alumni – only students enrolled for perpetuity.

Boston University: Accommodating offerings⁽⁵⁶⁾

The Department of Dermatology offers multiple exits in their Master of Science and Doctorate of Science degrees wherein a Diploma is equivalent to the first year and a Master's degree is equivalent to two years of the four-year doctorate degree.

Peer-to-peer learning

Peer-to-peer learning enhances the learning experience of students by helping them gain insights from the experiences of others. Direct interaction with peers promotes active learning and students feel more comfortable in opening up and interacting with their peers. Universities should be able to make imaginative use of this omnipresent knowledge among peers so as to enrich the learning and also reduce the cost of content and knowledge creation.



.. that enable lifelong learning and provide learners with multiple entry and exit options

Lifelong learning

The learner today has lifelong learning needs, which can only be met by having multiple entry and exit points throughout the working life cycle of the learner. The university system will have to evolve to cater to these changing needs and allow the student to come back to the education ecosystem to reskill and upskill themselves throughout their working lives. Therefore, admission/enrollment should be for a lifetime and not a fixed time duration.

Open loop university: Stanford⁽⁵⁷⁾

The open loop university has age-blind admission criteria for learners, and allows students to study up to six years over a lifetime instead of a four-year front-loaded degree model. The learners, termed “populi” instead of “alumni,” could pace their learning, coming back to the university to upskill or reskill themselves, getting credit for their learning on the job, and gaining currency credits for giving back to the university.

Blended learning

Blended learning has resulted from the growing accessibility of eLearning and the continuing importance of in person interaction throughout the student learning process. It offers flexibility, brings down the cost of delivery and at the same time allows universities to engage with a larger audience spread across multiple spaces and time. Universities need to develop programs in the blended learning mode with differentiated online and offline ratios to cater to the different variety of students



The Babson blended learning master's program⁽⁵⁸⁾

This program combines online classes, face-to-face sessions at Babson with opportunities for virtual collaboration so that students can make the most of their time and investment. The program is delivered through a blended format over a period of 21 months. Students attend face-to-face sessions every seven weeks and undertake 20 hours of online learning activities every week. These include readings, case preparation, real-time discussions and active participation in team-based exercises and projects.



84%

students witnessed an improvement in test scores and comprehension by using blended and hybrid models.⁽⁵⁹⁾

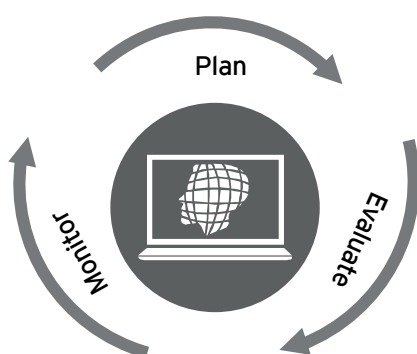
Universities need to provide learners with predictable schedules and personalized learning paths suited to their level of competency

Use of analytics

Millennials are familiar with tracking of health and fitness data and also receiving personalized shopping recommendations based on it. This displays their comfort with the idea of the use of analytics even on the education front to enhance and personalize the learning experience. Universities may look at providing personalized learning paths to students based on the analytics around their strengths and weaknesses.

76%

of students believe drop rates would improve if lecturers use analytics to see how they were engaging with course material.⁽⁶⁰⁾



Adaptive learning

Unlike traditional learning formats where an entire group starts the process of learning at the same time irrespective of current levels of understanding, adaptive learning uses analytics to structure learning paths based on a learner's current level of understanding and predicts best suited content that the learner may require through the program.

As per a recent research, the completion rate for students who used adaptive learning was 15% more than that of students who used a traditional online course.⁽⁶¹⁾ Moreover, predictive modelling can assist in customizing the learning experience for individuals and also identify students who may require extra support at any specific time.

Flexible predictable schedules

With the “non-traditional” student becoming the majority, catering to their needs becomes critical. Less control over hours to be spent on campus and flexible, predictable schedules allow them to strike a balance and decrease the likelihood of them dropping out. Universities need to build this into their program design. Block scheduling is one such practice that allows for longer periods (2-3 hours) dedicated to one subject. Students have less information to deal with in the same day and more time for collaborative activities and teacher interaction, which are often easier to manage for students with off campus obligations.

Experience One: University of Montana Western (block scheduling)⁽⁶²⁾

Students part of Experience One (X1) take one class at a time, three hours each day for 18 days before moving on to the next class. In between, they enjoy a four-day break to relax and recharge. Then students move on to the next class. Taking four-day classes or “blocks” during the semester, students earn the same number of credits they would have earned under traditional multi-class systems.

Universities need to equip learners with problem solving and decision making skills ...



Employability

Graduate employability is a key challenge for universities around the world. There exists a mismatch between university education and industry needs. The university of the future will have to address this challenge by providing the required employability skills and integrating with the industry to provide greater exposure to students right through their university experience. As per a World Economic Forum (WEF) report, five years from now over one-third of skills that are considered important in today's workforce will have changed.⁽²⁹⁾

Focus on imparting judgement driven skills

Currently, individuals are falling behind due to the inability of educational institutions in maintaining pace with the rapidly evolving technology. The major focus in addition to technical subject knowledge should be on the ability of the institutions to transform individuals into innovative and dynamic learners with the capability of quickly adapting to the changing environmental conditions.

The focus of education institutes needs to change from just providing employability-enhancement skills to enabling development of thinkers, complex problem solvers, decision makers among others. These skills will help individuals in being better prepared for their race with technology and reduce their rate of obsolescence. There is a need to equip learners with increasingly complex analytical skills to prepare them for a broad range of jobs across sectors, and allow them fungibility across changing scenarios.

Mentoring

Industry mentors help students understand and learn about the realities of a workplace and the intended profession. Mentoring as a strategy to address employability has its roots in business discipline faculties where it has long been a part of practice in conjunction with work-integrated learning activities.

Mentors/coaches support learners to finalize goals, be motivated and counter roadblocks, consequently having a positive impact on the entire learner experience. They provide the required support to align everyday activities to short- and long-term goals focused at identifying and achieving educational, professional and personal success within the context of the college experience.



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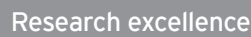
Industry engagement

Industry engagement would be the development of competency-based programs specific for the industry partner. There would also be a much larger industry connect in developing curriculum and program delivery. As students could learn on their own without even applying for a credential, universities could be the assessors of the competency of individuals. There would be platforms where industry partners would offer programs to partner universities – designed, developed and delivered by the industry – where learners would be able to learn from industry experts, get assessed by them directly and earn credits from the enrolled university.

BITS Pilani: Positive outcomes of industry-academia collaborations impact the global standing of an institution⁽⁶³⁾

- ▶ There is an industry immersion scheme for faculty members to enhance knowledge in emerging fields with full funding.
- ▶ WILP integrates learning with work environment, enabling participants to enhance academic qualification without taking a career break.
- ▶ There is a Technology Business Incubator in all campuses to promote the development of technology-enabled ventures and support entrepreneurial leadership.
- ▶ An industry day is organized to establish and enhance collaborations with industries and promote a research culture on real life problems.

Universities need to strive to be the nucleus for all research collaborations in academia and industry ...



Universities are known to act as the centers of innovation and creation of knowledge. As they attract academically brilliant students and stellar faculty, they are tasked with the responsibility of being the forerunner for research and innovation in the country. However, as put forward by former president APJ Abdul Kalam, India is still lurking behind developed nations due to the lack of a research culture at HEIs.

Research cannot be limited to theory getting published in global journals. Applied and fundamental research that tackles real world problems is essential for Indian institutions to compete globally and attract the right kind of talent. Global integration and technological advancement have had a transformational effect on research. Universities must evolve and support this transformation to remain at the forefront of research activities.

Co-locating industry and university

Co-locating in the same or adjacent space facilitates shorter turnaround time from ideation to commercialization. It can enable both parties to make the most of the collaboration. Co-location activities are known to accelerate the research culmination process and create maximum business impact, by overcoming any communication or cultural barriers. Joint use of space for mutual benefit facilitates more spontaneous interactions and access to high end facilities on cost-sharing basis.

HEARing Cooperative Research Centre (CRC):
Macquarie University⁽⁶⁴⁾

Co-located at the Macquarie University campus, with four university and over 10 industry partners, the HEARing CRC is an integrated, cooperative research program focused on prevention and mitigation of hearing loss. As part of this joint effort, four research programs are underway at the center alongside a Commercialisation Program, which includes clinical trials and research development. This is managed by a team of professional researchers supported by other outstanding Macquarie University academics and students.

International research collaborations

Improved communication resulting from better broadband networks and cheaper travel options has helped remove existing physical boundaries. Researchers look out for the best collaborators regardless of location.



... and look at alternate sources of funding for their innovations

Moreover, collaborations expand the capacity and scope of research teams and allow the most suited individuals to take on the task at hand without any compromise on quality.

Researchers have open access to a range of digital resources (for example, online communities and sites such as ResearchGate, Piirus, NanoHub and VIVO) to share knowledge and seek collaborators.

43%

of all papers published in the past five years were written by international research teams.⁽⁵⁴⁾

Open access mega journals are an emerging publishing trend and have the potential to reshape the way researchers share their findings, remoulding the academic publishing market and radically changing the nature and reach of scholarship.

Open sources such as mega journal, blogs and online publications allow researchers to go through multiple feedback cycles and unlimited peer reviews, gaining a wider perspective on their work in a very short time period.

Alternate sources of funding

Crowdfunding is being used to fund academic pursuits for individual and institutions, particularly those with a wide public appeal. Given the unique model of using technology to reach out to the crowd, the platform has the potential to be adopted at a larger scale and to be used as the prime source of funding research.

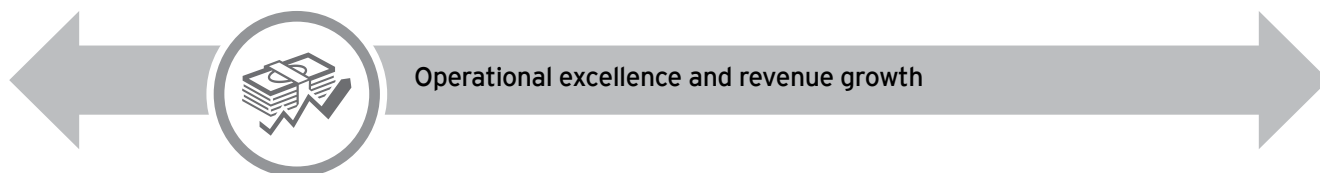
USEED⁽⁶⁵⁾

USEED partners with educational institutions to raise support for meaningful causes by leveraging a digital funding platform and providing program and campaign advising support. It has completed 400+ campaigns and engaged 33,000+ donors.

Bootstrapping is another alternative to traditional funding sources where researchers generate funding by using their expertise and performing fee-for-service work for other researchers.



Universities could use technology to move to seamless, paperless and efficient operations ...



Technology offers HEIs new opportunities to better and redefine the university experience for all involved stakeholders.

Institutions are under immense pressure to provide more services despite reducing budgets and resources. Technology integrated activities ease processes and enable individuals.

Imagine a complete digital model of a university, where every activity right from enrolments to credentialing can be facilitated by technology with little or no human intervention. A student enrolls online in MOOCs, completes all requirements, undertakes collaborative sessions with faculty and peers, receives a credential after completion of an online assessment and is now part of this alumni network that connects individuals who have never physically met from around the globe. Seamless student experience with minimal human intervention is now a reality.

Strategic use of technological solutions to streamline all functions of the university to enhance teaching and learning, assessment, research and collaborations is the need of the hour. It is expected that over time, the most desirable students will be attracted to the institutions that are able to embrace the digital age. Their ability to harness new technology trends to achieve enhanced outcomes will become their key differentiator.

Liaison: Centralized Application Service⁽⁶⁶⁾

It is a cloud-based recruiting and admissions solution for HEIs looking to grow and shape enrolment while reducing overall effort and costs for the institution and applicant.

Helps institutions to unify admissions processes across schools and programs for a better applicant experience and to conduct trend analyses for benchmarking/forecasting purposes

Helps students to apply to multiple programs through a single, centralized application form and one set of supporting documentation and benefit from responsive application support, proactive communications and real-time application status updates

MicroStrategy: Enrolment Optimization⁽⁶⁷⁾

Problem: 70% of Americans study at a four-year college, but no more than one-third graduate.

Solution: MicroStrategy helps academic institutions maintain enrolment levels by using historic data to identify students at risk of dropping out. Schools can provide identified students with additional support to help reduce dropout rates and boost long-term student satisfaction.

... and harness their potential by developing innovative enrollment models that utilize its resources optimally

Student loan debt is the second highest consumer debt category. In the US alone, there are 44 million borrowers with US\$1.3 trillion in student debt ⁽⁶⁸⁾

At the same time, majority of the universities have weak financial statements, with growing liabilities, increasing expenses and higher debt service. In the past, universities have passed on this financial burden to the student, resulting in annual tuition fee increasing several times the rate of inflation.

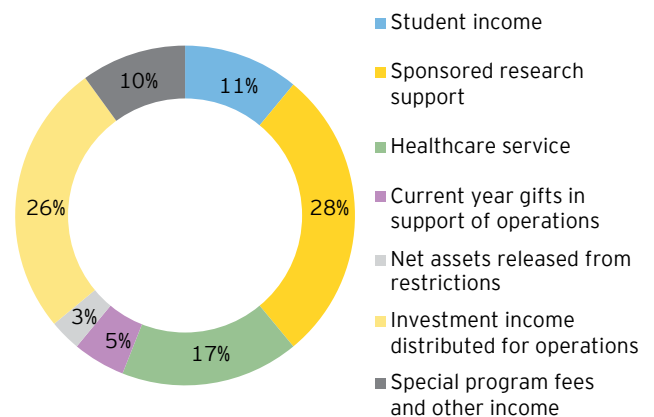
But now, the price-sensitive student is turning to alternative affordable education sources such as MOOCs. Universities would need to find ways to deal with the upcoming financial crisis without increasing tuition fees substantially.

Hence, universities will need to diversify their revenue stream and explore sustainable business models to continue operations. They will have to ensure that resources are optimally aligned with financial stability at the core. Institutions may look at the following options:

- ▶ Automation and technology integration to reduce support and administrative costs
- ▶ Better management of physical assets by partnering with third parties in the form of lease arrangements or outsourced service contracts
- ▶ Monetization of intellectual property by partnering with private intellectual property companies
- ▶ Strategically investing in innovative models to engage quality faculty and students

Case study: Stanford University⁽⁶⁹⁾

Generation of additional income through alternative sources contributes to balancing the income structure of the institutions. Endowments and research revenues are the largest revenue sources for established universities. Revenue from tuition accounts for only 11% of the total revenue for Stanford.



... while working toward developing talent and capabilities in addressing Education 4.0

Develop skills of teachers, administrators and institution leaders

The leaders of today are not digital natives. They are adopted technology users, and thus it is important to work toward capability development of the teachers, educators and leaders for the Education 4.0 ecosystem. The teaching staff needs skills in both digital pedagogy and discipline specific digital competences. Authorities and institutions should prioritize flexible approaches that allow context and discipline-specific responses rather than one-size-fits-all solutions

Case study: Poland University⁽⁷⁰⁾

Poland University enhances the quality of teaching by strengthening HR and teachers' skills. Pedagogical development is supported by competitive projects, such as Academic Creativity Centres, which transfer innovative pedagogies into schools with the help of teacher training students. New competitive projects are planned to boost pedagogical, digital or language skills of 7,000 staff. Some of these competitions focussed on MOOCs will help develop MOOCs for Poland's Open EDX platform.

Encourage collaborations in multi disciplinary and impact research

Governments across the world are looking at developing lasting and cost-efficient solutions to social issues. Universities with their research systems are at the forefront of these solutions. The regulators need to support encourage multi-disciplinary and impact research, by easing and fostering international and industry collaborations.

There is a case for giving more flexibility to universities to get into such collaborations, both in person and through technology-driven mediums, and to be able to raise funds for research. Regulators could provide better access through a favorable regulatory regime for these.



There is a case for equivalence across online and offline mediums of delivery, and the concept of information privacy and protection

Appreciate online as a viable medium of learning and develop a framework for adoption of technology in education

Many regulators are still not amenable to providing credit for purely online or blended programs. This acts as an impediment, as a lot of reusable content that is available freely is not being mainstreamed into the formal education system. Regulators need to be open to playing a quality control role instead of being gatekeepers of technology adoption by the HE system.

The first draft policy on use of online resources for HE was released in India in 2017. However, at this time India already had over 2 million registered users on the two main MOOC platforms: Coursera and EdX.

Maintain privacy of learners' behavior

With more information and behaviors being captured at every click of a button, the big challenge of ensuring that the learning, assessments and information of the learner are protected is high on the agenda of the regulators. Clear guidelines and processes need to be defined for collection and sharing of such data.

Illustration: An online education provider collects metadata about student activity, including time spent online, desktop vs. mobile access, success rates and keystroke information. The provider can then sell/use this information to develop new personalized learning products and services; however, it would be required to remove all references to the learner directly, ensuring anonymity.

Counter plagiarism and online piracy

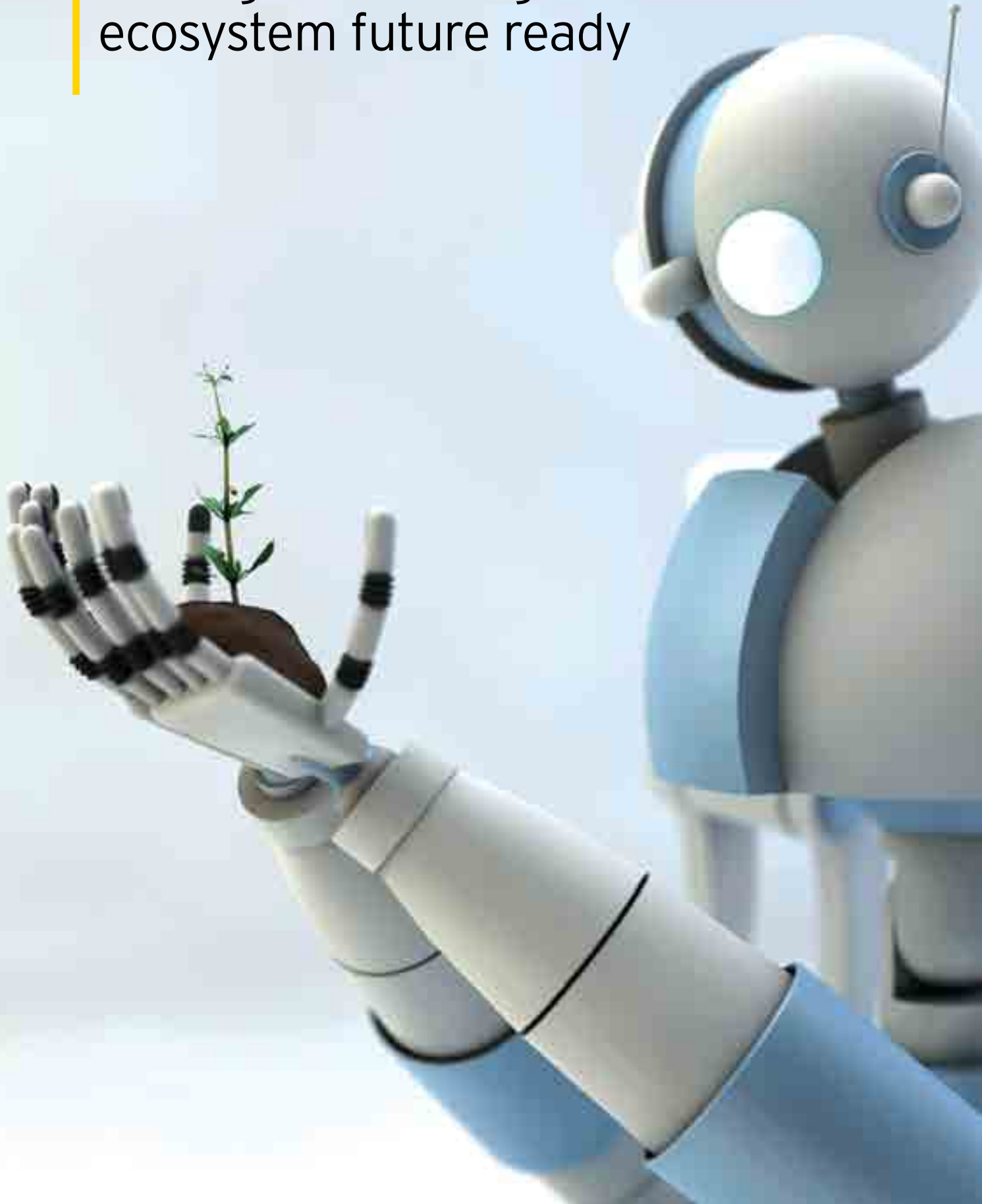
Universities create a lot of knowledge, and a technology-driven open system makes it prone to IP violations. The regulators need to work with HEIs to promote a culture of zero tolerance toward such activities.

Case study: Norwegian Agency for Digital Learning in Higher Education⁽⁷¹⁾

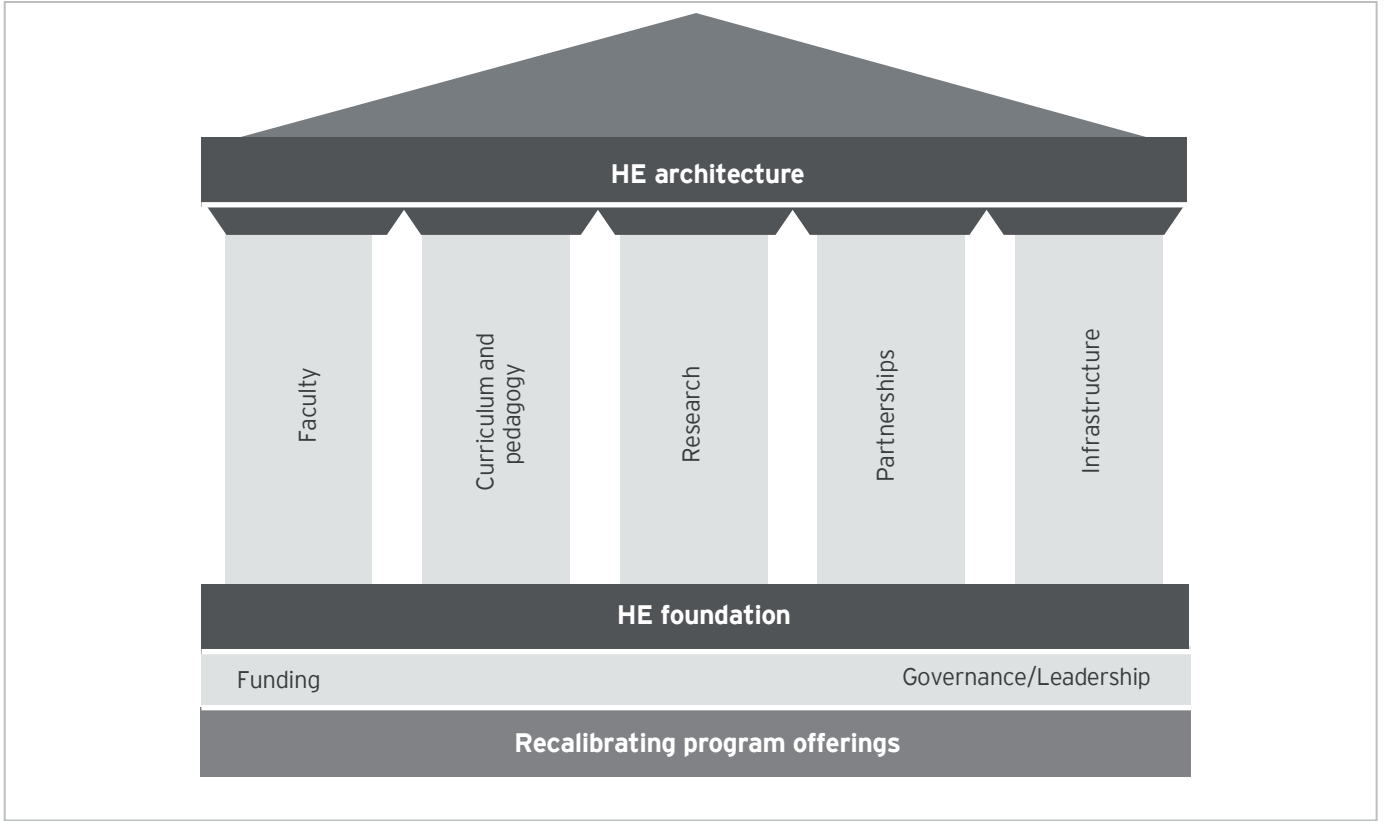
The Norwegian Agency for Digital Learning in Higher Education was established and funded by the Ministry of Education and Research to work with and for all universities.

Some of its responsibilities include supporting the development of educational practices through digital technology, monitoring the progress of digitalization in HE and maintaining a portal DelRett.no, a free online advisory service on copyright issues for HE practitioners.

Recommendations Making the existing HEI ecosystem future ready



Indian and global universities would have to recalibrate their strategies across all the levers for HE to remain relevant in the age of Education 4.0^(1/4)



Indian and global Universities would have to recalibrate their strategies across all the levers for HE to remain relevant in the age of Education 4.0^(2/4)

Curricula and pedagogy

- ▶ Design curriculum with strong linkages and exposure to real world learning methods delivered as student experience and in class learning while the conceptual program delivery is through blended/online methods
- ▶ Develop flexible learning programs with multiple entry and exit points
- ▶ Invest in technology-driven flexible curriculum feedback and redesign the model for real time learning validation and course correction suited to individual learner
- ▶ Recognize out-of-class learnings done through certifications, work experience and experiential learning at the time of entry
- ▶ Develop blended learning models and advanced credit systems including credits for MOOC completions
- ▶ Integrate life skills into the curriculum through integration with real world stakeholders such as industry, society and entrepreneur networks
- ▶ Offer digital media-based collaboration and peer-to-peer learning tools as part of the curriculum, for social learning and life skill development

Partnerships

- ▶ Partner with industry and local society across all aspects of the education value chain, from curricula and faculty to infrastructure, research, study experience and placements
- ▶ Develop curriculum, teaching, MOOC and faculty partnerships with global universities to develop offerings for liberal curriculum programs
- ▶ Invest in professional development platforms that foster partnerships with individuals and alumni who could act as mentors and facilitators for industry-academia linkages
- ▶ Develop innovative models to partner with digital and social media platforms to enrich the learning process through peer and social learning methods
- ▶ Co-opt industry trainings and in situ programs that can be designed by industry and delivered by universities

Research

- ▶ Foster collaborative models with global experts from academia and industry for research
- ▶ Develop multi-disciplinary and applied research capabilities through adjunct and industry faculty tracks
- ▶ Promote universities as local community-focused centers of research with tight linkages with local industry and society in the region
- ▶ Offer in-site joint research opportunity for small and medium enterprises with limited research infrastructure

Faculty

- ▶ Invest in faculty training focused toward developing facilitator mindset and pedagogy
- ▶ Develop continuing professional development (CPD) programs to support the development of digital literacy skills among academicians and staff
- ▶ Build a group of champion academicians coming from different department who are leading the way in the development of digital skills or new innovative teaching techniques utilizing technology
- ▶ Train faculty for adopting technology as a medium of teaching design and delivery, including refresher training in trends such as flip classroom, synchronous video lecture and chat rooms
- ▶ Develop learning analytics solutions and facilitate faculty to use them for curriculum development and updating

Indian and global universities would have to recalibrate their strategies across all the levers for HE to remain relevant in the age of Education 4.0^(3/4)

Infrastructure

- ▶ Prepare a technology-led strategy where technology drives not only the student lifecycle but also the entire functioning of the university
- ▶ Develop off campus learning centers to provide global exposure to learners and partnership development for academic enrichment
- ▶ Invest in a modern, high-performance network, including campus backbone, improved wireless connectivity and a managed network service for departments and colleges.
- ▶ Make access to information and systems as open and accessible as possible so that data can be consumed in new and innovative ways
- ▶ Revisit existing policies and procedures to encourage innovative use of technology by staff, students and academicians

Governance and leadership

- ▶ Work with regulators to create policy interventions for flexible programs, online anytime anywhere education, blended programs etc.
- ▶ Provide a thrust to internationalization of leadership to promote networking across boundaries
- ▶ Build leadership in the form of chief technology/digital officer to implement the strategic roadmap for use of technology in the university
- ▶ Build social media leaders in the university to establish an interwoven communication network to influence conversations, expand their social power and build trust
- ▶ Develop a digital media strategy to attract the various stakeholders across their lifecycles and to promote the university leadership

Funding

- ▶ Develop a technology driven university strategy - building in low cost models of outreach, delivery, student acquisition, industry engagement and alumni connect
- ▶ Create delivery models to monetize innovative technology assets
- ▶ Explore use of freemium models for knowledge assets and programs of the university
- ▶ Look for research-based funding from local society and industry to develop solutions that solve local issues and challenges

Recalibrating program offerings to remain relevant

- ▶ Get horses for courses: Expand the program and product mix to suit the varied stakeholders
- ▶ Develop innovative learning lifecycles and programs that span over 10-20 years to support lifelong learning and enrolments
- ▶ Roll out a framework for competency-based admission systems to create education pathways for lateral entries
- ▶ Develop views on the markets that the university plans to serve, and understand their drivers and the best means to reach them



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FICCI Higher Education

FICCI has been playing a proactive role in the Higher Education sector supported by the Higher Education Committee, comprising key representatives from leading Higher Education Institutions/Universities, Industry and the Government with Prof Rajan Saxena, Vice Chancellor, NMIMS University as the Chair and Dr Vinod Bhat, Vice Chancellor, Manipal 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 the Government both Centre and States 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 the 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.
- ▶ FICCI has signed an MoU with Andhra Pradesh Government to set up ""Centre of Excellence on Grass root initiatives and development"" in the state
- ▶ 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, seminars, focused one-to-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.

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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:

| Pre-entry | Establishment | Growth | Stability |
|---|--|---|--|
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Glossary

| | | | |
|--------|--|------|---|
| 3D | Three Dimensional | IP | Intellectual Property |
| AI | Artificial Intelligence | LMS | Learning Management System |
| BYOD | Bring Your Own Device | MOOC | Massive Open Online Course |
| CAGR | Compound Annual Growth Rate | NPA | Non Performing Assets |
| CERN | Conseil Européen pour la Recherche Nucléaire | PhD | Doctor of Philosophy |
| CPD | Continuing Professional Development | SMAC | Social Media, Mobile, Analytics and Cloud Computing |
| CRC | Cooperative Research Centre | STEM | Science, Technology, Engineering and Mathematics |
| EdTech | Education Technology | UK | United Kingdom |
| EQ | Emotional Quotient | US | United States of America |
| ERP | Enterprise Resource Planning | VET | Vocational Education and Training |
| HE | Higher Education | VR | Virtual Reality |
| HEI | Higher Education Institution | WEF | World Economic Forum |
| HR | Human Resource | WILP | Work Integrated Learning Program |
| IoT | Internet of Things | | |

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