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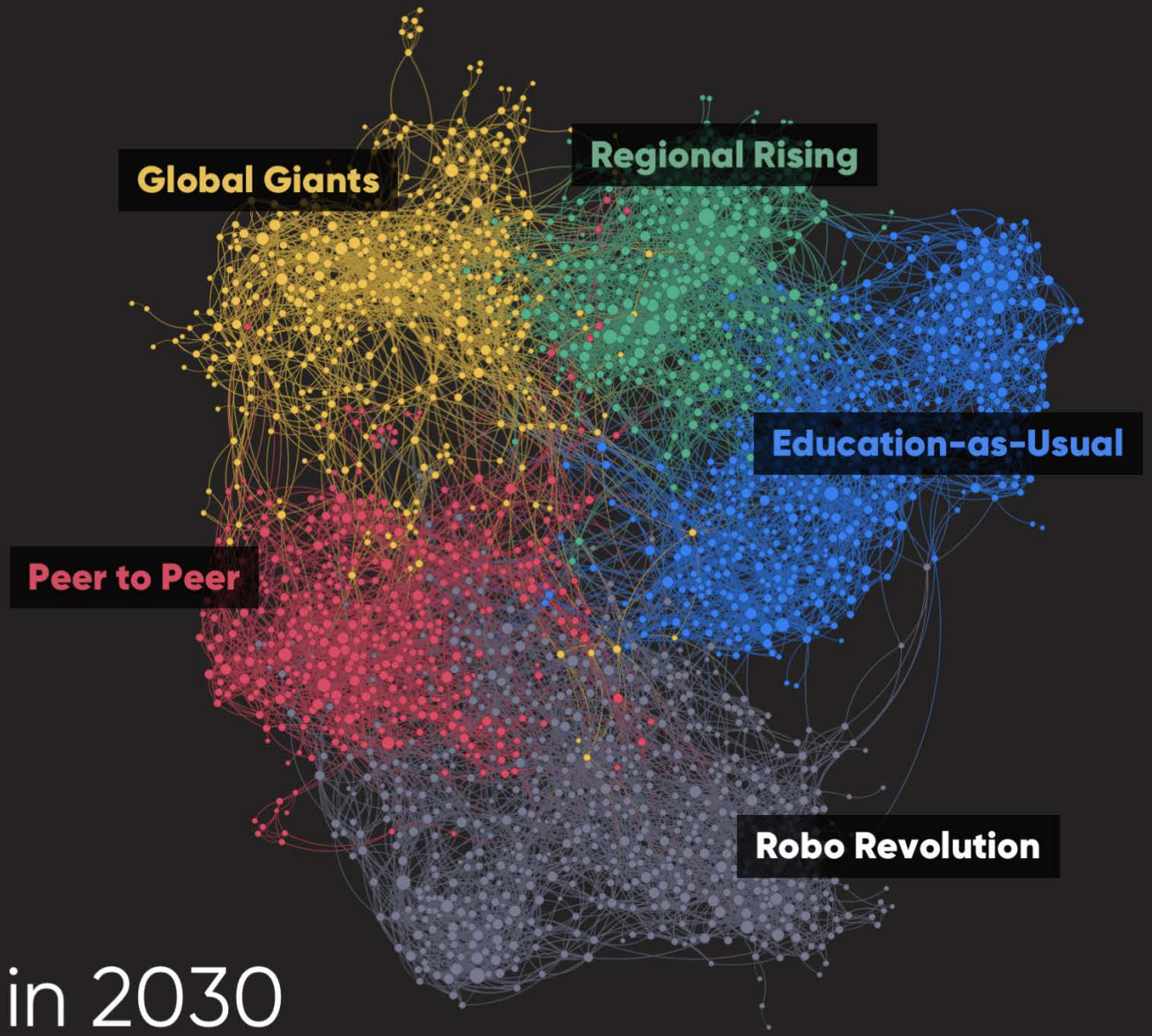

Education in 2030

Five scenarios for the **future of learning and talent.**

in partnership with Quid

Holon IQ

Education in 2030. **Global Scenarios**

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Education-as-Usual

Traditional education institutions remain the trusted source of learning and the most effective vehicle for jobs and prosperity. Higher Education consolidates, global talent platforms emerge and government remains the core source of funding around the world.

Regional Rising

Regional alliances dominate the competitive education landscape, supported by strategic and political cooperation. Cooperative blended delivery and regional talent hubs cross-load labor supply and demand to strengthen regions.

Global Giants

This global free market environment has fostered the emergence of 'mega-organisations' with ubiquitous brand recognition and the scale to achieve significant efficiencies and industry power.

Peer to Peer

Learning online through rich, personalized human to human experiences dominates the post-secondary and skills training sectors. Blockchain technology fundamentally reconfigures credentialing and unlocks the collective creativity and IP of teachers.

Robo Revolution

AI drives a complete reversal in 'who leads learning', with virtual tutors and mentors structuring learning paths, providing assessment tasks, giving feedback, adjusting according to progress and organizing human tutoring when needed.

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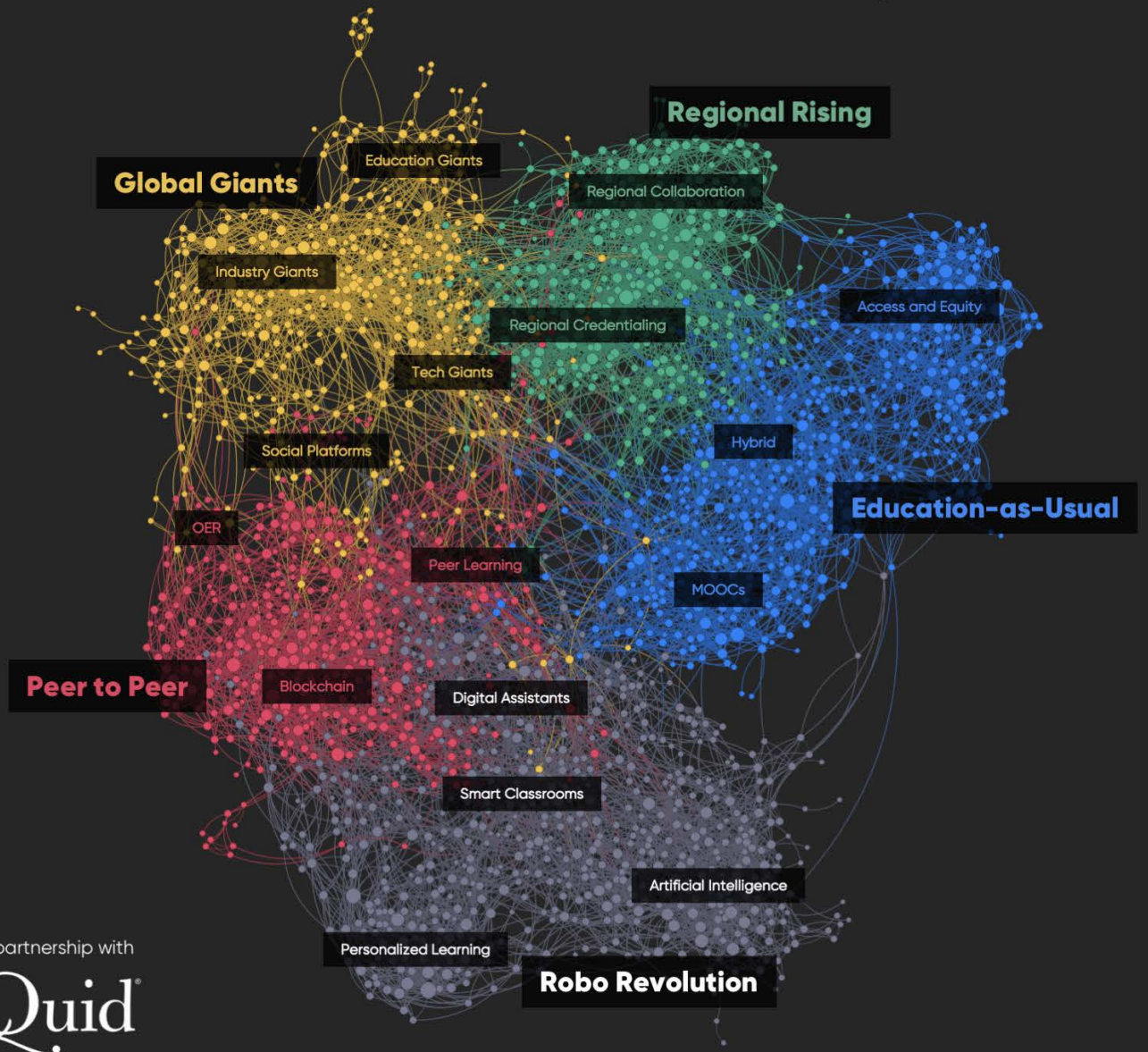

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Contents

Holon (philosophy). ὅλον.

"An evolving and self organizing system. Where each holon is simultaneously a whole and a part of something bigger."

About HolonIQ

HolonIQ is a global education intelligence platform. Our mission is to connect the world with the technology, skills and capital to transform education.

One billion learners at three million schools, colleges and universities around the world are depending on innovation to prepare them for the jobs of the future. However, the overwhelming majority of institutions are unable to innovate fast enough to deliver on this mission.

Through a machine learning platform and global network of partners, we connect the entire learning to work spectrum with the technology, skills and capital to innovate. We help teachers, leaders and entrepreneurs thrive and enable investors to participate in their growth.

The result is significantly more innovation, accelerating the transformation of education and providing dramatically improved access, affordability and outcomes for learners everywhere.

And we're just getting started.

Introduction

In every way that educators, entrepreneurs, investors and governments act and plan, they are making implicit forecasts about the future. So what might education look like in 2030?

While no-one can accurately predict the future, there are some signals which, depending on the direction and speed of progression, could have a profound impact on the size, shape and structure of education and indeed on the very way in which learning occurs. Education and learning is beautifully messy and diverse and while there are no easy answers to its complexity, frameworks such as scenarios can help to simplify complexity by identifying, tracking and structuring underlying influences and creating a common language to prompt discussion and ideas.

What might education and learning look like in 2030?

To answer this question, the 2030 Project sets out to synthesize different perspectives of many stakeholders and build out scenarios of the possible futures for education and learning. To do so, we used the power of the global crowd, augmented by advanced technology, to find out what the world is thinking about the future of education, and overlaid data and analysis from expert sources. Based on this analysis, five possible scenarios were developed as a basis for discussion and further validation. It is important to note that these scenarios are not predictions. Indeed, it is most likely that a combination of scenarios will play out simultaneously in different geographies, age cohorts and socio-economic groups.

'Bottom Up' Approach

The first stage was to gain an initial understanding of the global commentary about the future of education and learning - what is the world saying about the future of education? To answer this question we used machine learning to find, analyse and cluster over 5,000 news articles from trusted sources around the world. Over 15 clusters developed around specific themes describing potential future models, technologies and approaches to education. These clusters formed four to six mega groups, all connected through the various clusters but together telling a different story about the future of education.

'Top Down' Approach

The second stage was to consult data, research and insight from expert sources such as the World Bank, OECD, UNESCO and other globally focused research institutions to draw out key drivers, the combination of which are likely to influence the nature of education and learning in the future. Based on this analysis, four key drivers were identified; Globalization and Economic Growth, Global Population Growth, Future of Work and Skills and Advancements in Technology.

Scenario Building

Finally, with both sets of analysis in hand, we set out to build a handful of plausible scenarios for Education in 2030. Scenarios do not predict the future, but present snapshots of a range of possible futures. They offer a framework for interpreting personal experiences and the volume and complexity of information and opinion generated about the topic and also can raise sensitivity to early signals of emerging underlying trends. The five scenarios presented in this project offer possible outcomes based on how different combinations of key drivers may influence education and learning in the future. When building scenarios, many decisions and compromises must be made in order to achieve relative simplicity, therefore it is quite certain that there are many other ways to configure these (and other) drivers to produce a different set of scenarios. Indeed, as a tool for awareness raising, exploration and focusing thought, the development of alternative scenarios and interpretations is welcomed.

We hope you enjoy Education in 2030 and look forward to your feedback at holoniq.com/2030 or at one of our events around the world through 2018 as we seek to bring together another global dataset on your views and perspectives on the five scenarios for Education in 2030.

Maria Spies
Co Founder and Managing Director
HolonIQ

Patrick Brothers
Co Founder and Managing Director
HolonIQ

Education a $10 Trillion industry by 2030 and five scenarios on where innovation and technology could drive the future of learning & talent

Education-as-Usual. The Momentum Outlook.

- Global Education and Training Expenditure is set to reach at least $10T by 2030 as population growth in developing markets fuels a massive expansion and technology drives unprecedented re-skilling and up-skilling in developed economies.
- The next decade will see an additional 350 million post secondary graduates and nearly 800 million more K12 graduates than today. Asia and Africa are the driving force behind the expansion.
- The world needs to add 1.5 million teachers per year on average, approaching 100 million in total. 50% teach in Pre-K and Primary. Post Secondary teaching will undergo the biggest expansion and change as the role of the teacher represents more of that of a mentor/coach than 'sage on the stage'.

Five Scenarios

- **Education-as-Usual.** Traditional education institutions remain the trusted source of learning and the most effective vehicle for jobs and prosperity. Higher Education consolidates, global talent platforms emerge and government remains the core source of funding around the world.
- **Regional Rising**. Regional alliances dominate the competitive education landscape, supported by strategic and political cooperation. Cooperative blended delivery and regional talent hubs cross-load labor supply and demand to strengthen regions.
- **Global Giants**. This global free market environment has fostered the emergence of 'mega-organizations' with ubiquitous brand recognition and the scale to achieve significant efficiencies and industry power.
- **Peer-to-Peer**. Learning online through rich, personalized human to human experiences dominates the post-secondary and skills training sectors. Blockchain technology fundamentally reconfigures credentialing and unlocks the collective creativity and IP of teachers.
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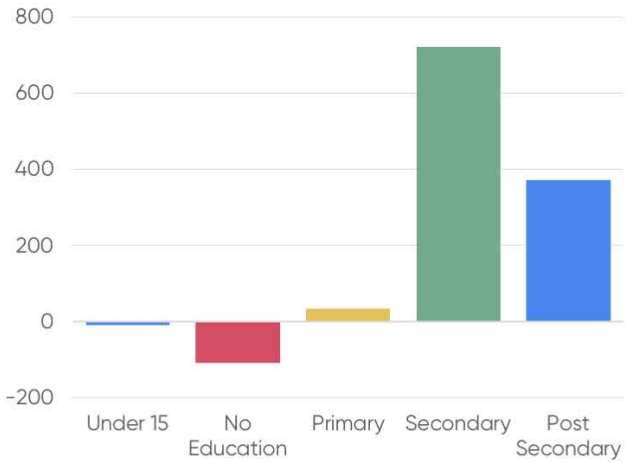
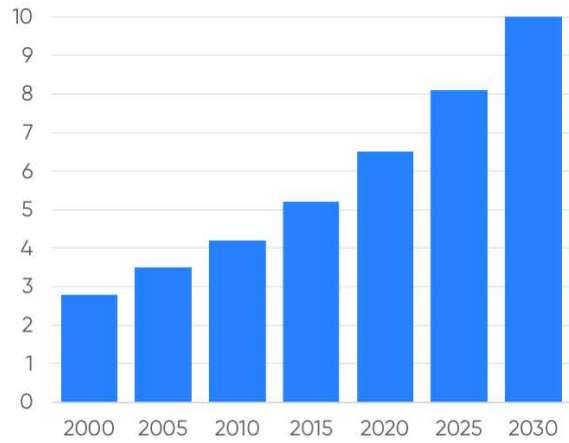
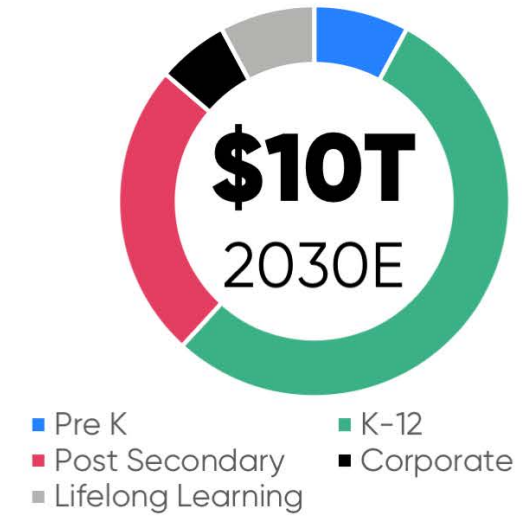
Global Population by Education Attainment. Change from 2015 to 2030. (Millions)



Global Expenditure, Education and Training (Trillion USD)



2030E Global Expenditure, Education and Training (Trillion USD)



Five Scenarios for Education in 2030

In **every way** that educators, entrepreneurs, investors and governments act and plan, they are making **implicit forecasts** about the **future**. So what might education look like in 2030?

Five Scenarios Overview

	Global Environment	Overview	Economics	Regulation	Innovation & Tech
Education as Usual	**Status Quo Akimbo.** The world economy is showing **steady growth**. Demographic trends in developed economies have dampened labor supply but new cohorts of educated workers from **developing countries** now enter the global workforce and are contributing to improved productivity and income equality. The world's skilled workforce has **increased by 20%** since 2018 and all of this growth is attributable to developing economies.	Societies and governments focus on improving their **local situations**. Education sharpens its focus on **job and skills outcomes**, especially in developed economies.	Governments remain **core funding** source. Private **investment stalls** due to lack of innovation. **VC investment** pours into disruptive alternatives. Education remains **high cost**.	**Local regulation dominates** formal education. **Light touch regulation** focuses on job outcomes. Slow pace **hinders** industry innovation.	Education sector remains **under-digitized**; Innovation R&D **inefficient** and high cost; **Fragmented** innovation efforts across the sector.
Regional Rising	**Collaborative Advantage.** Regional alliances dominate competitive global education landscape, supported by government economic and political **cooperation**. Countries form **multilateral accords** to solve unique regional issues, strengthen their competitive position for talent and maintain important aspects of culture.	Regional education systems **cooperate and share resources**. Intra-regional student and teacher circulation fosters **skills exchange**. Curriculum sharing **lowers costs** for regional education systems.	**Cost pressures ease** via efficiencies gained from alignment of frameworks and processes, regional '**buying power**' and improved access to regional expertise. Intra-regional rather than international study options **lowers the overall cost** of education.	Education regulators collaborate to **harmonize regulatory frameworks**, establish mutual recognition conventions and build **regional qualifications frameworks**.	Economic and innovation benefits gained from participating collectively in **regional blended learning**. Regional buying power eases **technical infrastructure** costs. Collaborative approaches to research **fuel innovation**.
Global Giants	**Go Big or Go Home.** Globalization has brought the world closer together in 2030. Multilateral agreements and **free market policies** have removed barriers to international trade and a stable geopolitical environment fosters global competition and growth. **Political** activity has lifted to the **global level** as intergovernmental organizations play a greater role in shaping international law, security, trade and commerce.	Consolidation and emergence of **juggernaut education** institutions with massive global market share. Education and technology **giants partner** to dominate delivery of post secondary learning and ongoing skills training.	Governments enter into agreements with giants to **ensure delivery** of effective skills training, technical infrastructure and data on learning and performance. Cost of education **does not lower** commensurate to delivery at global scale.	Regulators deal with a much **less fragmented** education market Big data on schools, learning, teachers, students, provided by tech giants **feed directly to regulator**. Regulators transformed to **data-driven decision-makers.**	Fully **personalised experiences** belie tech oligopoly. **R&D concentrated** inside tech giants who invest in start-ups and integrate through their value chain.
Peer to Peer	**Trust me, Trust you.** In 2030, the global 'peer-to-peer' economy has gone **mainstream** and is now an accepted way to live, work, learn and earn. Powered by **declining transaction costs** and ubiquitous connectivity, peer to peer exchange of goods and services has meant the **disintermediation** of the 'institution' in most industries.	Learners are **more in control** of what, when and how they learn. Individuals collect **micro credentials** from a high number and broad range of providers. Micro-credentials are stored on the **blockchain** and learners construct their own collection of relevant knowledge, skills and experiences.	Post-secondary **cost collapse**. Diminished need for high cost infrastructure. **Micro-tuition payments** and verification fees become the norm. **Investment surge** as skills and economic outcomes improve.	Regulators **struggle to redefine** their role in the P2P economy. Most professional and skills training occurs outside the purview of traditional education regulators, who **focus their efforts** on the formal schooling sector.	**Ubiquitous smartphone** ownership shapes learning delivery. **Distributed ledger technology** underpins the P2P economy and supports verification of skills.
Robo Revolution	**Who's Teaching who?** The advancement and applications of **artificial intelligence** have delivered significant economic benefits to most countries in the world by 2030. As labor inputs have slowed in advanced economies, the **importance of productivity** in driving overall growth is now critical.	AI applications in education have **automated** aspects of teaching and administration and more complex human activities are **augmented** by artificial intelligence. AI is **managing the design** of learning experiences and incorporating human intervention where required.	**Productivity gains** through automation and augmentation realise **significant cost savings** in education. Generally educational delivery is more **efficient**.	**Data on student learning** and school performance is channelled directly to the regulator. **Security of data** and attention to underlying **algorithms** involved in decision-making are a key focus of education regulators.	The advent of '**no-human-in-the-loop**' technologies has displaced human workers, but also created a **new set of jobs** to build, maintain and manage these technologies.

Five Scenarios Overview

	K12	Post Secondary	Teachers	Skills Training	Work and Jobs
Education as Usual	Structure of K-12 remains as is, with **unequal access** to basic education globally. Surge in school age children from developing countries and a **lack of qualified teachers** puts pressure on education systems.	**Structural reform** as universities struggle to meet rapid changes in learner needs. Rise of **vocational colleges** attempting to cater to new skills needs.	Teachers remain **trusted facilitators** of learning. Increasing pressure for data on student learning, but with **inadequate technical infrastructure**, increasingly takes teacher time away from instruction. Support for teacher	Companies collaborate with education providers to deliver industry specific skills training to **secure their human capital** pipeline. Learners and employers look to **global online** solutions.	**Serious labour shortages** advanced economies. Fierce **competition for talent** cross border and cross industry. **Uneven** global workforce supply and demand. **Biometric technology** used for global verification of personnel and skills.
Regional Rising	Policy and regulatory frameworks allow **sharing of curriculum** and learning resources. Teacher and **student exchange** programs strengthen regional relationships. **Efficiencies gained** through regional approaches to infrastructure and labor.	Regional university alliances, mutual **recognition frameworks**, student and teacher mobility underpin strong regional education systems. **Shrinking of east-west** international student flows negatively impact traditional destination countries.	Alignment of teaching qualification frameworks and registration allow **labor mobility** in the region. **Teacher exchange** and professional development programs support shared **innovation** and learning from experts.	Collaboration between **businesses and academia** to find innovative solutions to regional training needs. Regional industries and employers start to **specialize**.	Few restrictions on **labour mobility** within regions Eases regional labour needs via **sharing of expertise** across borders. Regional **Talent Hubs** emerge.
Global Giants	National K-12 industry **structures retained**. Technology **fully integrated** through K-12 curriculum and learning. **Tech giants** deliver infrastructure, software and digital content. Schools benefit from **rich data** on learning and performance.	Emergence of global public and private **education juggernauts**, which take up massive market share and put further pressure on local institutions. Significant **consolidation** of HE market. A few higher education institutions successfully move from 'exclusive elite' to '**inclusive elite**', using their existing brand recognition to power growth via successfully **scaling quality**.	Technology infrastructure, software and data reporting **eases the manual workload** for teachers. The teaching professional requires a high level of **data and technical proficiency**.	Global **online offerings**. Strong **integrations** between tech giants, education juggernauts and industry to **dominate skills training**.	**Borderless education** has come of age, fueled by the needs of a global, mobile and **tech enabled workforce** and by organizations that require human capital with the right knowledge and skills at the right time in the right place.
Peer to Peer	**Less significant impact** on the K-12 sector, where the structure of the industry remains intact. Overarching **curriculum is still typically mandated** by the state and children attend school and learn in classroom settings.	Institutions re-organize their offerings and delivery to **match market needs**. Individuals **collect micro credentials** from a high number and broad range of providers, **disempowering** large multi-year institutions with bundled offerings.	Contingent faculty make up the **majority of teaching staff** at higher education institutions worldwide. P2P economy has **unlocked the collective creativity** and IP of teachers, allowing the exchange and sharing of massive curriculum content sets.	Skyrocketing demand for effective, flexible, just-in-time, personalized and ongoing skills training is filled by a **global peer-to-peer learning market**. Learning **online, through rich, personalized** and human to human experiences dominates the post-secondary and skills training sectors.	More than half of the global working age population classified as **contingent workers.** On tap, **global resource of knowledge workers** help organizations to mitigate against extreme skills shortfalls.
Robo Revolution	**Digital Teaching Assistants** (DTA) feature in most K-12 classrooms worldwide. Voice activated DTA's **support the teacher**, manage administration and offer **personalized support** to kids.	New breed of **tech-focused vocational training** providers has emerged. Post-secondary institutions provide **adjunct support** for individual learning paths.	The world's **curriculum is fully digitized**, tagged, classified and on-demand. Human teachers focus on **complex** and higher order teaching activities.	A reversal in 'who leads learning', with **virtual tutors, mentors and teachers structuring** learning paths for individuals, providing assessment tasks, giving feedback, adjusting according to progress. Serviced by education providers, **human tutoring** or class attendance organized when needed.	Labor shortages supplemented by an **AI-augmented** labor force. Increasing value of **skills that can't be replicated** by machines - creativity, leadership and emotional intelligence.

Top-Down Methodology

The first stage of Project 2030 was to consult data, research and insight from expert sources such as the World Bank, OECD, UNESCO and other globally focused research institutions to draw out key drivers, the combination of which are likely to influence the nature of education and learning in the future. Based on this analysis, four key drivers were identified as follows.

Globalization and Economic Growth. Emerging markets will continue to be the growth engine of the global economy. As these emerging countries develop their institutions, fostering social stability and strengthening their macroeconomic fundamentals, they will become more appealing places to work and live, further attracting investment and talent.

Global Population Growth. Every day the world's population increases by approximately 200,000 people. We will likely add another 1 billion people by 2030 putting enormous pressure on education to scale effectively and sustainability.

Future of Work and Skills. There is great uncertainty about the future of work, the impact of automation and the most effective and efficient ways for society to develop human capital ahead of these impacts.

Advancements in Technology. Artificial intelligence, machine learning and distributed ledger technology represent both threats and opportunities to advancing human potential. The impact of these technologies will fundamentally re-shape major aspects of the education system we know today and perhaps even the way learning occurs.

Measuring Change

In these scenarios, the extent of change to K-12, Post-Secondary and the Jobs / Skills Training sectors have been measured on two dimensions: Industry Structure and Learning Models. Industry Structure refers to the way in which the sector is organized, how institutions or businesses compete, and the underlying business models that dominate the sector. Learning Models refer to the way in which education and learning is delivered or undertaken. Quartile measurement provides guidance on the overall extent of change considered in the scenario, without being too prescriptive.

Holon IQ

KEY DRIVERS

Globalization & Growth

Global Population Changes

Future of Work and Skills

Advancements in Technology

MEASURING CHANGE

STRUCTURE OF INDUSTRY

LEARNING MODELS

Holon IQ

Balance of Power	
Government	Market
Local	Global
Institution	Individual
People	Technology

Economics of Education	
Government Investment	Private Investment
Elite	Mass Access
Public Benefit	Private Good
High Cost	Low Cost

Learning Model	
Theoretical	Practical
On-Campus	On-Line
Group	Individual
Instructor Led	Self-Paced

Role of Technology	
Following	Leading
Computational Power	Intelligence Power
Digital Borders	Borderless Data
Powering Process	Powering Experience

Measuring Scenarios

Scenarios do not predict the future, but present snapshots of a range of possible futures. They should paint a picture of 'what could be' with enough depth to be plausible, but not be too exact.

Each scenario represents the different ways in which key drivers might develop and interact, and so they are not meant to be compared to each other. However, there are common aspects, implied in all scenarios, which help to explain underlying thinking that supported their construction.

Balance of Power. Who or what 'calls the shots' at each level of education and learning are key factors in the way the industry operates and how learning occurs. Government or market forces, for example, are a key dynamic in education supply and demand. Some scenarios might identify a highly globalized education market, where another describes focus on local or national priorities.

Economics of Education. The cost of education, the way it is funded and who pays each have a profound impact on the overall market structure of education and in particular who has access to, and benefits from education. Each of the four elements in this measure illustrate key economic elements present in each scenario.

Learning Model. There are many ways in which learning can occur, from tacit everyday learning through to highly structured formal education, on-campus to online or self managed to expert led models. Each of the five scenarios identify overall trends in the ways in which learning occurs.

Role of Technology. Technology now plays a critical role in the education industry as well as in many learning processes. This set of measures identifies the extent to which technology leads learning processes or is used as an supplement, is focused on information processing or decision-making in learning, the role of technology in learner experiences and the levels of data openness exhibited in each scenario.

Bottom-Up Methodology

Our bottom-up methodology surfaces and clusters the views and opinions of thousands of experts from around the world at a scale not possible without machine learning.

Through partnership with Quid, we have been able to leverage technology and take a fresh approach to mapping the future of learning and talent. Quid has access to millions of news articles, blog posts, company profiles and patents, and runs on natural language processing algorithms that can read and analyze massive amounts of data at one time. Working 'bottom-up', Quid processed our search for news articles, opinion pieces and expert blog posts focused on the future of education.

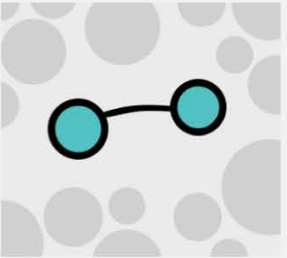
In a bottom-up approach the individual base elements of the system are first specified in great detail, in this instance each news article broken down into concepts, phrases and keywords. These elements are then linked together to form larger subsystems, which in turn are linked, sometimes at many levels, until a complete top-level system is formed.

Once this network is developed, we then examine each cluster, subsystem and the top-level map and thematically identify all of the different parts of the network to simplify the visualization and allow for more intuitive interpretation.

Finally, we connect the top down analysis with the bottom up clusters. It is through the mapping of the 'top down' drivers with the 'bottom up' clusters that the five scenarios are created and identified. Clusters are mapped to each or several of the scenarios enriching our understanding of the concepts underpinning each perspective.

Quid

Quid reads any text to identify key words, phrases, people, companies and institutions.

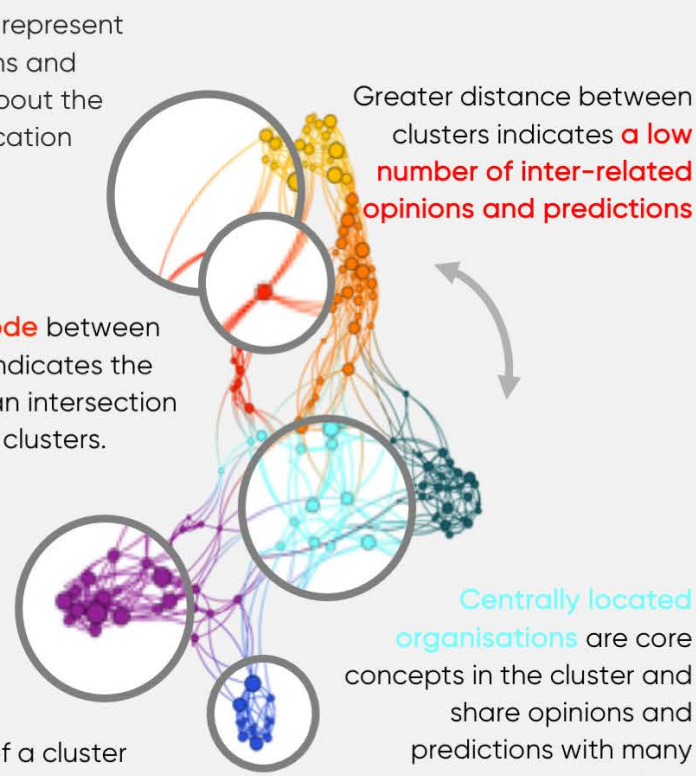


Then Quid compares words from each document to create links between them based on similar language.

Quid repeats the process at immense scale, producing a network that shows how similar all the documents are to one another.

Networks like these help us visualize complex trends. This in turn lets us make comparisons, and reveals multi-dimensional relationships so we can build more accurate frameworks – and make smarter decisions.

Quid



Understanding Networks

Networks are a powerful way to analyze and visualize complex relationships. Networks help us better understand qualitative information like emerging technologies and business models.

Nodes & connections. Each node, or circle, represents a news article or expert opinion on the future of education. Connections represent a strong similarity between the news articles, indicating that they are taking a similar perspective.

Distance & orientation. Each node is like a charged particle that wants to repel all of the other nodes, and the links are springs that keep all of the particles from spreading too far away from each other. The more similarities between two articles, the stronger the connections.

Clusters. A cluster is a set of news articles that group together because many of them are connected due to similar perspectives on the likely outcome of the future of education.

Network density. The more dense a cluster appears, the more similar its nodes. Likewise, the more spread out a cluster appears, the broader its mix of nodes. A dense cluster is quick to interpret: you can assume a central node in a dense cluster will be very representative of its surrounding nodes. This implies that all news articles are defining their view of the future in very similar ways.

Bridging nodes and bridging clusters. Bridging nodes span across portions of the network and are often insightful. For example, it could indicate two groups of concepts coming together to develop new models for the future of education. Similarly, bridging clusters help identify relationships and highlight gaps between specific perspectives.

1 Education-as-Usual

In 2030 the world economy is showing steady growth, following a period of sluggish productivity in the previous ten years. Demographic trends in developed economies have dampened labor supply, however new cohorts of more educated workers from developing countries have now entered the global workforce and are contributing to improved productivity and global income equality. The world's skilled workforce has increased by approximately 20 percent since 2018 and overall, developing countries will contribute most of the additional skilled workers in this period. Because of aging, however, the overall number of skilled workers in advanced economies is projected to decline by 2030.

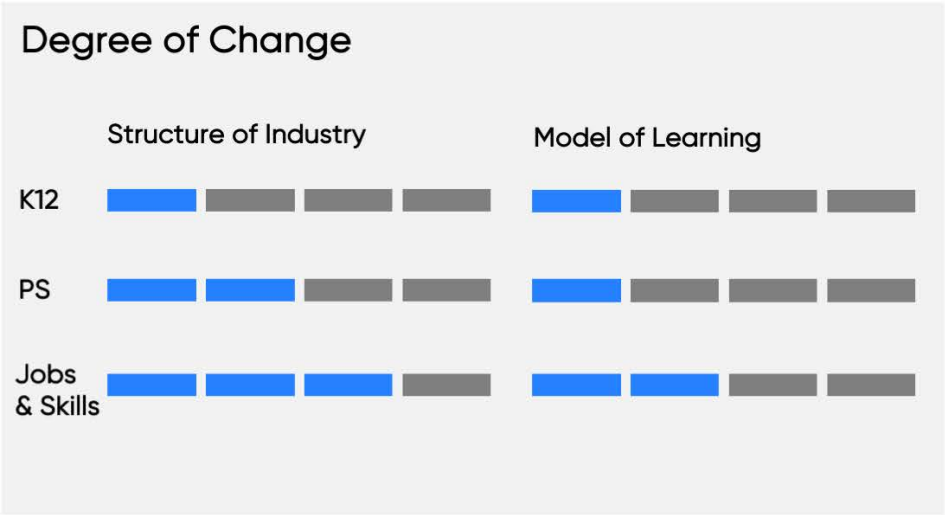
The shift in global economic power away from established advanced economies towards emerging economies has closed global inequality between countries, however the relative importance of inequality within countries has steadily increased. In this environment, governments focus on improving their local situations and solving issues unique to their economic position.

Structuring for tomorrow

Traditional education institutions remain the trusted source of learning and the most effective vehicle for jobs and prosperity. However, chronic skills shortages in advanced economies due to demographic change, automation and changing industry needs, which require the re-skilling of a vast number of displaced workers, has placed enormous pressure on traditional institutions, most of which are neither structured nor able to service these needs to the scale, at the speed, and in the way that learners expect. As a consequence, structural reform in the post secondary sector occurs, including amalgamations and closures of smaller, niche universities, which are unable to keep up with changing learner needs and do not have the infrastructure or breadth to deliver on new skill and disciplinary demands.

In advanced economies, the rise of a new breed of post secondary vocational providers, who are better able to deliver faster and more flexibly for the needs of the 'new vocations', emerge to meet re-skilling needs.

Government funding is flowing to these providers and 'light touch' regulation focuses mainly on job outcomes, rather than internal quality processes. Companies and entire industries collaborate with education providers to deliver industry specific skills training to secure their human capital pipeline.



Education-as-Usual

Global talent flows

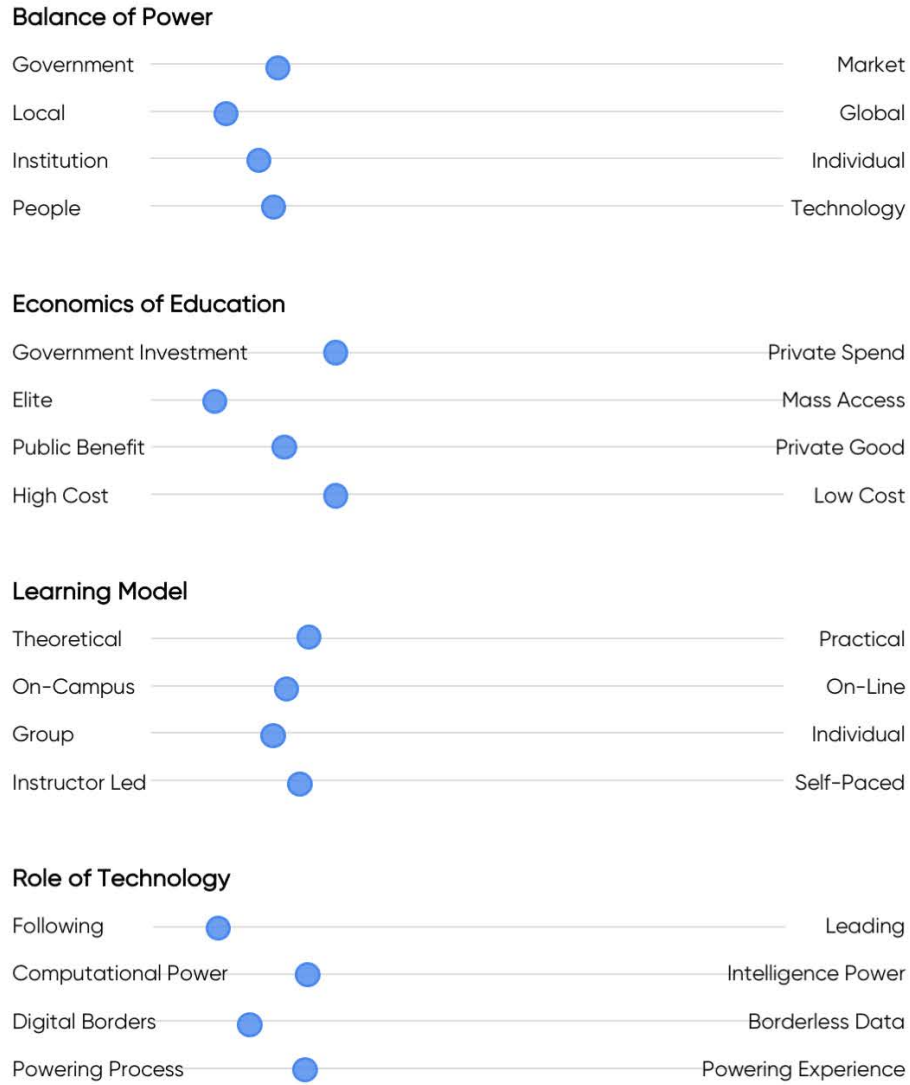
An ‘education wave’ in developing countries now sees millions of skilled workers entering the global workforce. Globalization and technology allows these workers to engage in high value work across borders, while competition for jobs in their own country intensifies. Platforms that aggregate opportunities and match worker skills and availability with employer needs help to mitigate uneven global demand and supply of ‘new’ skills in developed and developing economies. Demand for English language learning remains high in developing countries, where more of their skilled workers are likely to be undertaking work for English-speaking organizations from developed economies.

Verify me, verify my skills

As a global, virtual labor force emerges, issues of authentication, security and verification become paramount. Technology advancement and significant cost reductions have made biometric authentication commonplace for verifying both individuals and their skills. Distributed ledger technology such as blockchain is used widely to provide a trusted record of skills and qualifications.

Investment and innovation

Governments remain the core funding source for K-12 and formal post-secondary education, which retains a high-cost structure. Fragmented efforts have not led to significant innovation in the traditional sector, also hampered by conservative regulatory environments. Private investment and venture capital has turned its focus to new models and disruptive alternatives, which are showing returns based on urgent market needs for scalability, flexibility and relevance, and which result in productive economic outcomes.



2 Regional Rising

In 2030, world economies have become increasingly integrated along regional lines. Significant demographic changes in the 10 years between 2020 - 2030 have impacted countries and regions differently, with developed nations challenged by an aging workforce and tapering economic growth, while developing countries, making up most of the world's working population in 2030, need to enable education and jobs for their burgeoning populations. For each group, regional cooperation provides a way to support economic growth, achieve efficiencies, alleviate under- or over-supply of human capital, which has become a critical strategic asset of the twenty first century, while maintaining unique cultural and national identities.

Collaborative Advantage

In this scenario, regional alliances dominate the competitive global education landscape, supported by strategic government economic and political cooperation. Countries form multilateral accords to solve unique regional issues, benefit from economies of scale, strengthen their competitive position for talent and maintain important aspects of culture. Supported by broader government cooperation in the region, education regulators collaborate to harmonize regulatory frameworks, establish mutual recognition conventions and build regional qualifications frameworks.

Enabled by 'regional friendly' policy and regulatory environments, national education systems cooperate to align aspects of curriculum. School systems initiate sharing of curriculum and learning resources. Regional recognition of teacher qualifications, regional professional development networks and teacher exchange programs emerge. These initiatives ease the pressure of the uneven supply of qualified teachers and academics, primarily brought about by the aging workforce population in western 'developed' nations and the enormous growth in school age population in 'developing' nations.

The growth of emerging economies primarily in Asia, Africa and the Middle East has resulted in substantially improved education outcomes and increased student mobility. To mitigate against 'brain drain' to the west and ensure their powering economies have the right skills and intellectual capital to maintain growth, governments have formed regional alliances to attract and retain their future skilled workforce. Institutional capacity building in these regions has improved the overall quality of education, increasing intra-regional student circulation and attracting foreign students. This trend has led to a significant slowdown of the 'east to west' global student flow.

In this scenario, cost pressures ease on governments through the efficiencies gained from alignment of frameworks and processes, regional 'buying power' and improved access to regional expertise. Intra-regional rather than international study options lowers the cost of education for parents.

Degree of Change

Regional Rising

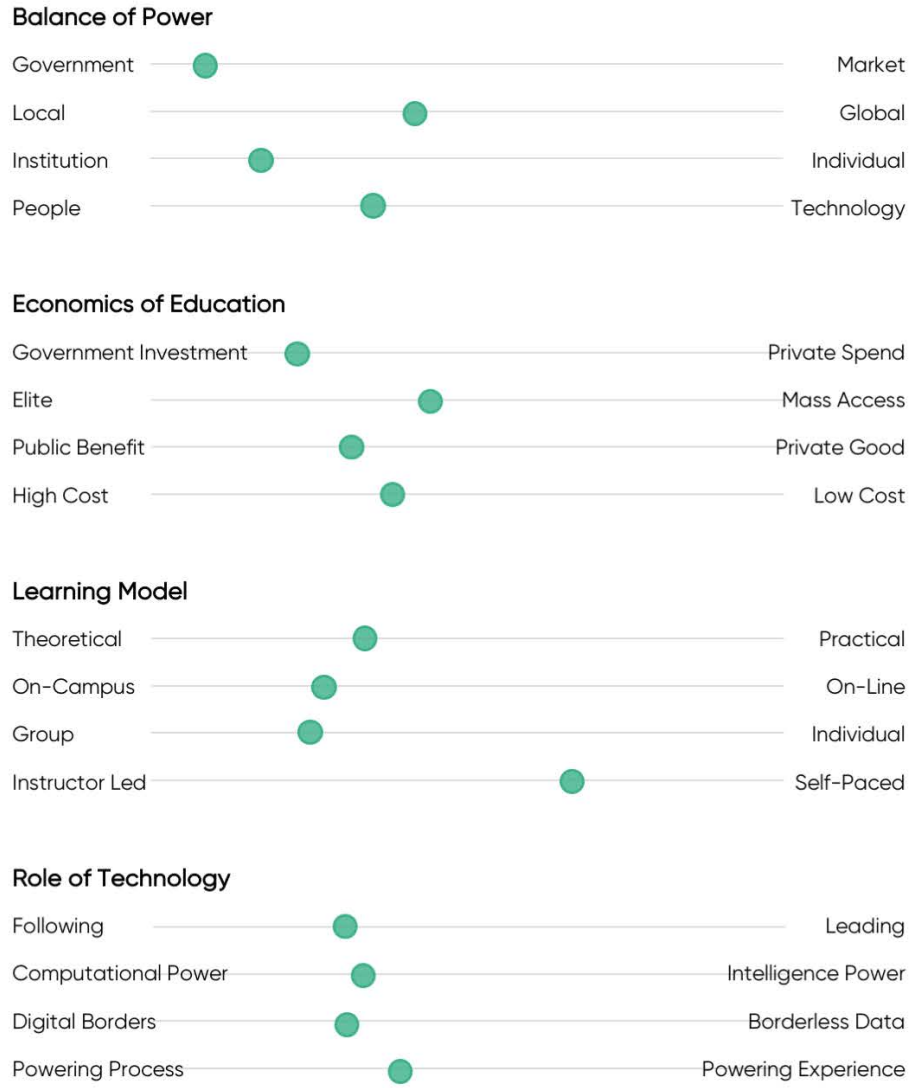
Cooperative Blended Delivery

The regional scenario sees nation states retain their unique K-12 and post-secondary education systems but gain economic and innovation benefits from participating collectively in blended learning across the region. This model allows countries to retain the distinctive elements of their teaching and learning contexts through the maintenance of face to face 'in classroom' delivery.

Technology is used to supplement these important face to face interactions via blended approaches whereby collaborating schools and universities draw on regional experts to deliver content, with students from different countries participating in real-time online sessions.

Regional Talent Hubs Emerge

In an environment of minimal restrictions on labor mobility, favorable work-rights within regions and aligned education systems, sharing of expertise across borders becomes commonplace, easing regional labor needs. Countries with critical skills shortages in specific areas can engage talent from regional partners and those with an oversupply can better manage unemployment rates. Confidence in the ability to draw on labor from across the region leads to specialization within countries and regional talent hubs begin to emerge, aligned with industry strength and research capability.



3 Global Giants

Globalization has brought the world closer together in 2030, through the integration of international trade, technology, investment and human capital. Multilateral agreements and free market policies have removed barriers to international trade and a stable geopolitical environment fosters global competition and growth. Enabled by technology, there is an unprecedented interconnectedness among populations and the exchange of ideas and values among cultures. Political activity has lifted to the global level as intergovernmental organizations play a greater role in shaping international law, security, trade and commerce.

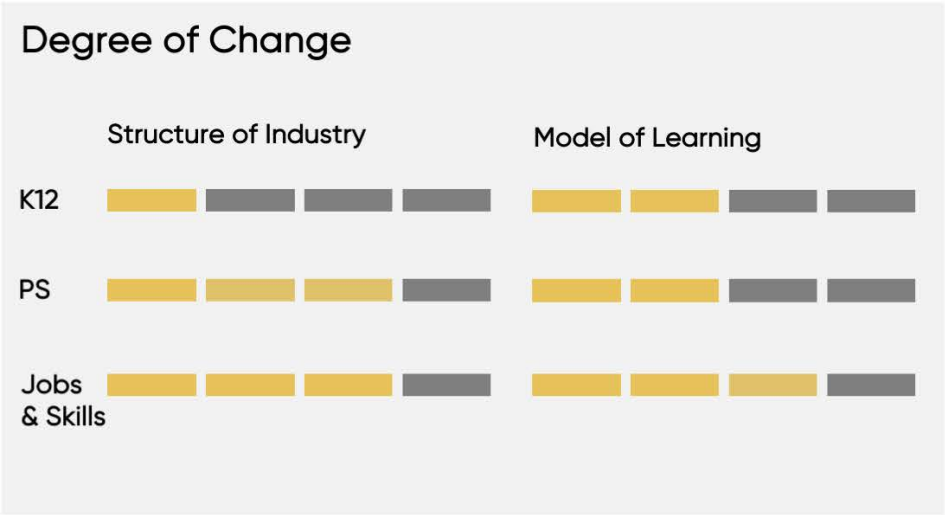
Rise of the titans

This global free market environment has fostered the emergence of 'mega-organizations' with ubiquitous brand recognition and the scale to achieve significant efficiencies and industry power. Smaller organizations struggle to compete in this global market environment. This trend is mirrored in the education industry with substantial consolidation of post secondary education providers and the emergence of global public and private education juggernauts, which take up massive market share and put further pressure on local institutions.

Borderless education has come of age, fueled by the needs of a global, mobile and tech enabled workforce and by organizations that require human capital with the right knowledge and skills at the right time in the right place.

Technology discovers education

Technology giants are now capturing value offered by the $10 trillion global education market and in particular the emerging markets of Asia, Africa and Latin America which rely heavily on smart-phone internet access and which make up the majority of the global education market by number of learners. Through acquisition of EdTech startups across the value chain, these mega-tech's now serve up a full suite of education services including content, analytics, assessment, communication and reporting. To further consolidate their positions, global education, technology and industry giants form alliances to compete in the accredited post secondary space, and dominate professional skills training. The boundary between education and technology organizations continues to blur as the generation and communication of information morph's into learning and knowledge processes.



Global Giants

A new global elite

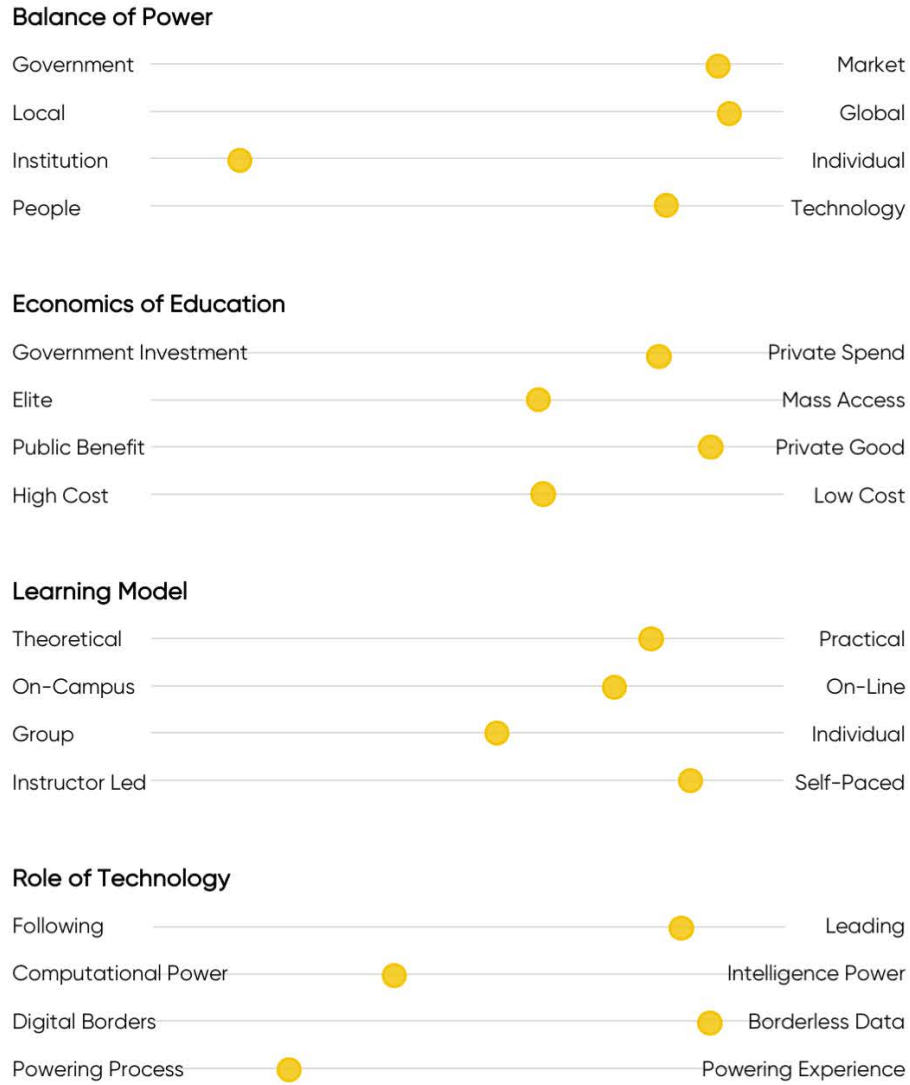
In this competitive globalized environment, regular universities lose the ability to compete for the delivery of education as a pathway to professional employment and we see a consolidation of some universities, while others develop niche local offerings and yet others return to their research origins. Meanwhile a few innovative higher education institutions successfully take the leap from 'exclusive elite' to 'inclusive elite', using their existing brand recognition to power growth through successfully scaling quality and building a network of global alumni who further reinforce the brand and support physical presence in most countries.

Data Driven K-12 learning

Despite the disruption occurring in the post-secondary and career skills sector, K-12 school systems, supported by strong government policies, remain largely focused on fulfilling national priorities. In 2030, learning processes in schools are significantly enhanced by technology and enable personalization of learning. This data rich environment allows the capture of information from most learning activities. Real-time analysis and reporting to teachers and parents provides the opportunity for timely intervention and support, while aggregated data feeds back to the technology provider to enhance product development, and school systems for benchmarking and reporting. The integrated technology ecosystems provided by tech-giants offer significant benefits to schools and the promise of enhanced outcomes for learners.

Regulatory innovation

Consolidation has eased pressure on regulators who now deal with a much less fragmented education market. Agreements with tech-giants allow big data on schools, learning activity, assessment, teachers and students to feed directly to the regulator, which has transformed into a data-driven decision maker. No longer impeded by the historical information lag, regulators are able to use insights from data to proactively shape policy and support innovation. Regulatory bodies form their own global alliances in order to better understand the implications of global providers and in particular collaborate on data security issues.



4 Peer to Peer

In 2030, the global 'peer-to-peer' economy has gone mainstream and is now an accepted way to live, work, learn and earn. Powered by declining transaction costs and ubiquitous connectivity, peer to peer exchange of goods and services has meant the disintermediation of the 'institution' in most industries. Rules governing the 'old economy' where efficiencies were gained through standardization and economies of scale no longer apply. Consumer confidence in major institutions is low and the decentralized network trades on trust and reliability. This 'power shift' from centralized to distributed models is underpinned by technology that supports trust based end-to-end transactions and changes in the role of citizens from consumers, to producers and creators.

Regulators in all industries have struggled to redefine their role in the peer-to-peer economy as old regulatory frameworks have not been able to offer solutions presented by new P2P business models. By 2030, most professional and skills training occurs in the 'alternative accreditation' space where peer market rating systems dominate and which are outside the purview of traditional education regulators, who focus their efforts on the formal schooling sector.

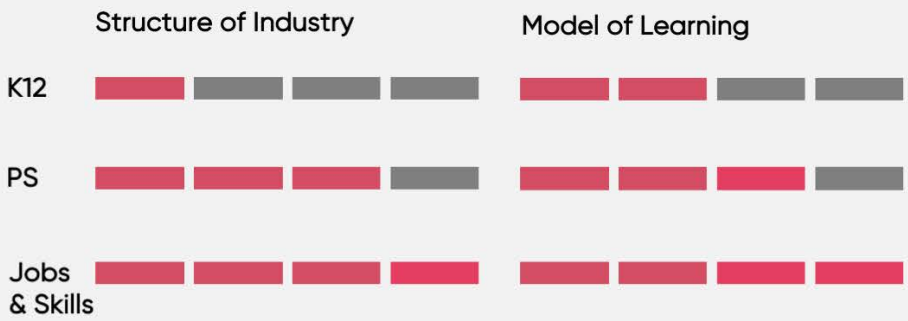
Tech to the people

Smartphone ownership, a strong launchpad for sharing services, has reached over 80% global penetration in 2030 and distributed ledger technology, such as blockchain, underpin the peer to peer exchange economy, which now provides the global economy with a stable and mature alternative to centralized systems. Learning online, through rich, personalized and human to human experiences dominates the post-secondary and skills training sectors. Mobile and 'micro' first approaches enable learning to be integrated into learners daily routines, rather than considered as a separate activity.

Varied impact to formal education

Changes to education in this scenario are less significant in the K-12 sector, where the structure of the industry remains intact, overarching curriculum is still typically mandated by the state and children attend school and learn in classroom settings. However, the peer-to-peer economy has unlocked the collective creativity and IP of teachers, allowing the exchange and sharing of massive curriculum content sets including lesson plans, activities, quizzes, tests, solutions and the like, across all digital formats. Global platforms with deep search, recommendation, ratings and translation capability, have resulted in significant efficiencies across the global teaching workforce and in many cases welcome additional income.

Degree of Change



Peer to Peer

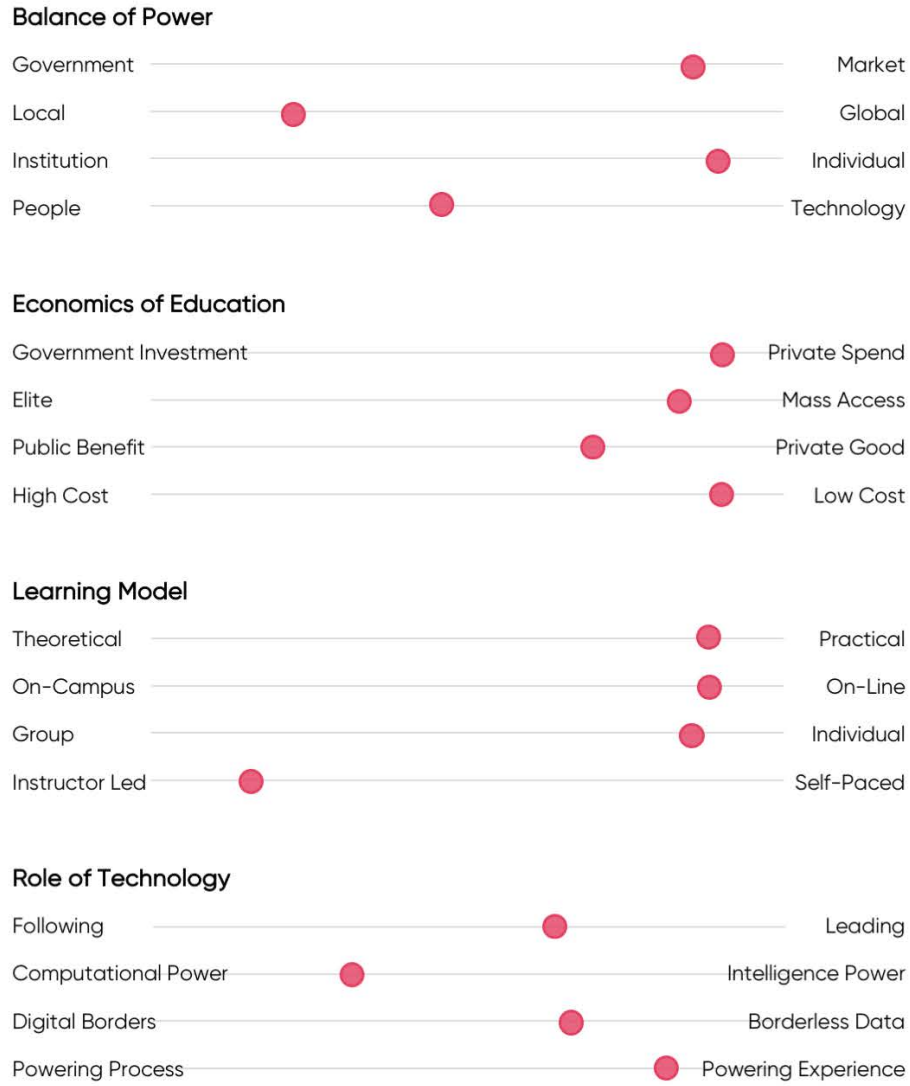
Changes to post-secondary education are more pronounced as brand power moves from institutional to individual. Learners are more in control of what, when and how they learn, forcing institutions to reorganize their offerings and delivery to match market needs. Individuals collect micro credentials from a high number and broad range of providers, disempowering large multi-year institutions with bundled offerings. Rather than mediated by institutional brand as a mark of quality, students can also gain verification of knowledge from global experts in specific fields, including industry experts and professors. Micro-credentials are stored on the blockchain and learners construct their own collection of relevant knowledge, skills and experiences.

Jobs and skills - who do you trust?

The 'gig economy' is in full swing with more than half of the global working age population classified as contingent workers. This on tap, global resource of knowledge workers help organizations to mitigate against extreme skills shortfalls and provides the ability to adjust to rapidly changing requirements. The contingent workforce also needs to constantly upskill and the skyrocketing demand for effective, flexible, just-in-time, personalized and ongoing skills training is filled by a global peer-to-peer learning market, much of which is serviced by contingent faculty, who make up the majority of teaching staff at higher education institutions worldwide. Sharing assets, including knowledge and expertise, is easier and cheaper than ever. Platforms match learners with experts, social networks provide a way of building trust, payment systems handle billing and back-to-back ratings system regulate behavior.

Investment surge, cost collapse

In this environment, cost collapses in the post-secondary and ongoing skills training market, fueling further global demand. A diminished need for high cost infrastructure associated with central institutional models, and the re-definition of scale sees 'micro-tuition' payments and verification fees becoming the norm. Investment in education soars as innovation continues to produce both financial and education outcomes.



5 Robo Revolution

The advancement and applications of artificial intelligence have delivered significant economic benefits to most countries in the world by 2030. As labor inputs have slowed in advanced economies, the importance of productivity in driving overall growth is now critical.

Countries with skills and labor shortages have deployed AI technologies deeply into many industries, automating routine tasks and freeing human capital for more value adding activities. The resulting productivity gains from process automation, an AI-augmented labor force, and increased consumer demand for AI-enhanced products and services has contributed trillions of dollars to the global economy.

AI applications in education have automated aspects of teaching and administration and more complex human activities are augmented by artificial intelligence. Increasingly, AI is managing the overall design of learning experiences and incorporating human intervention where required.

Who's teaching who?

By 2030, there is almost a complete reversal in 'who leads learning', with virtual tutors, mentors and teachers structuring learning paths for individuals, providing assessment tasks, giving feedback, adjusting according to progress and organizing human tutoring or class attendance when needed. Most adult learners have this 'omnipresent' coach who organizes, curates, recommends, manages, records and continually adjusts learning activities based on progress, preferences and learning goals.

Post-secondary institutions play a vital role as adjunct support to thousands of individual learning paths by providing hands-on experiences, social interaction and disciplinary expertise on demand.

Hey, teacher...

Digital Teaching Assistants (TA's) are a feature of most K-12 classrooms worldwide. Specialists in the curriculum, familiar with all the kids in their class, including their learning progress, areas of difficulty and learning preferences, these voice activated Digital TA's actively participate in, and sometimes lead, class learning activities. Supporting the teacher with various administrative tasks Digital TA's have assumed responsibility for managing records such as attendance, grades, individual student progress and providing suggestions for learning support interventions. Having mastered natural language processing, Digital TA's work with students on their reading development, adjusting texts to ability levels, providing feedback and encouragement, as well as communicating real-time information to teachers and parents about progress.

Degree of Change

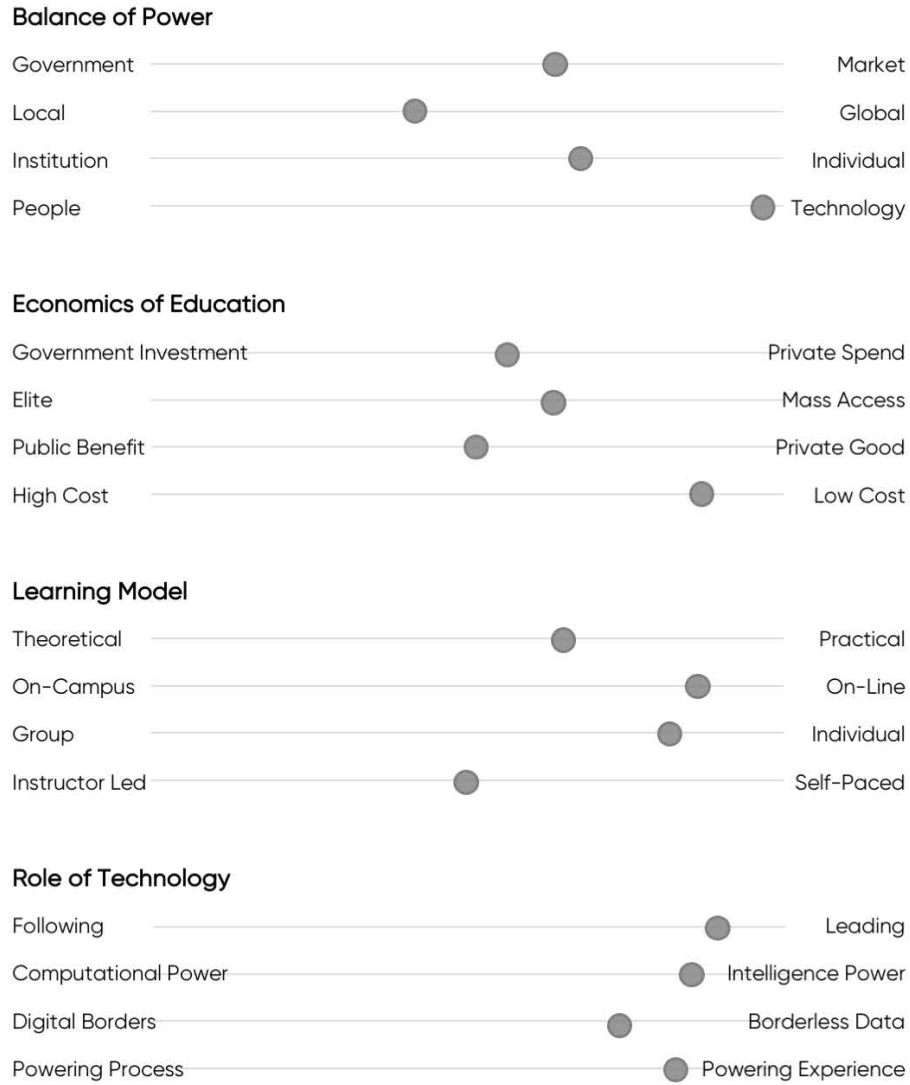
Robo Revolution

Curriculum. On demand.

Teachers and schools no longer spend time finding, filtering and curating learning content for their curriculum. The world's information is highly digitized, tagged, classified and on-demand. With a few parameters identified, such as country, year group and subject area, a range of appropriately designed curriculums are offered to select from, including content, media, learning activities and resources, assessment, grading sheets and lesson plans, all explicitly linked to the mandated curriculum and student learning outcomes.

New skills. Now please.

AI is transforming every walk of life and facilitating significant changes to the nature of work. The advent of 'no-human-in-the-loop' technologies has displaced human workers, but also created a new set of jobs to build, maintain and manage these technologies. Training for the rapidly evolving needs of the 2030 worker is delivered on demand and via individually tailored learning programs. A new breed of tech-focused vocational training providers has emerged to support the ongoing development of skills. As adoption of AI gathers pace, the value of skills that can't be replicated by machines is also increasing, including creativity, leadership and emotional intelligence.



Globalization and Economic Growth

Emerging markets will continue to be the **growth engine** of the global economy. As these emerging countries develop their institutions, fostering social stability and strengthening their macroeconomic fundamentals, they will become more appealing places to work and live, further **attracting investment and talent**.

The global economic growth outlook has a profound influence on where, how and to whom we deliver learning.

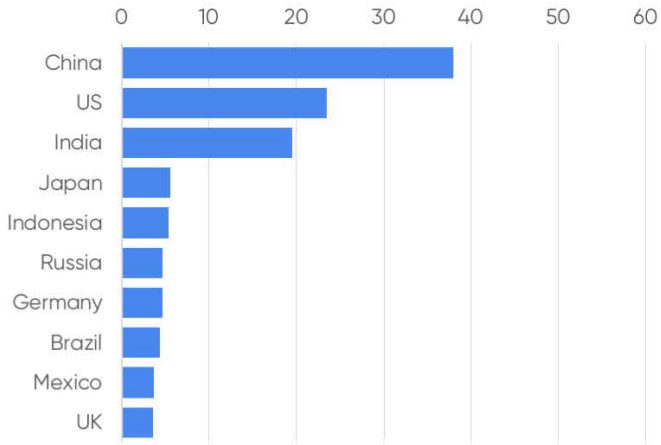
The world economy could more than double in size by 2050.

Emerging markets will continue to be the growth engine of the global economy.

By 2050, the E7 economies could have increased their share of world GDP from around 35% to almost 50%.

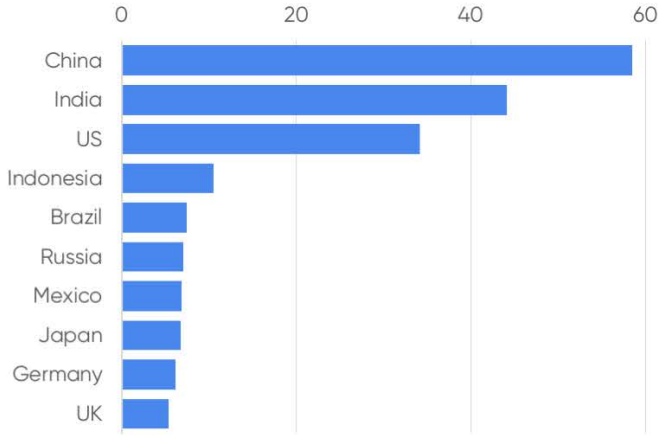
China may be the largest economy in the world, accounting for 20% of world GDP in 2050, with India second, followed by the USA and Indonesia in fourth place (based on GDP at PPPs).

Forecast 2030 GDP at PPP
(constant 2016 $Trillion USD)



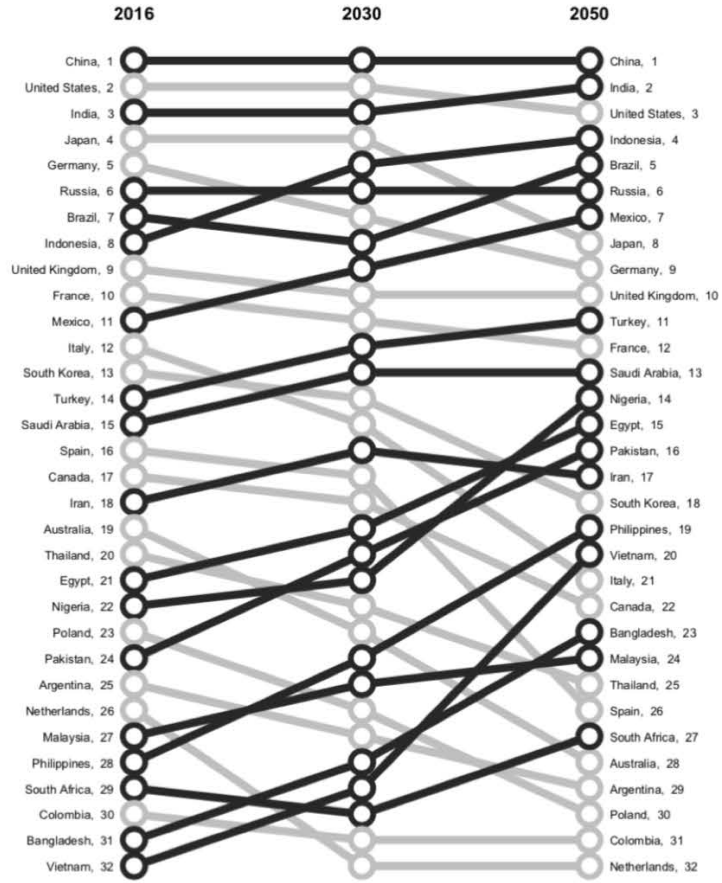
Source: PwC - The World in 2050

Forecast 2050 GDP at PPP
(constant 2016 $Trillion USD)



Source: PwC - The World in 2050

Projected GDP Rankings in 2030 and 2050 at PPP



Source: PwC - The World in 2050

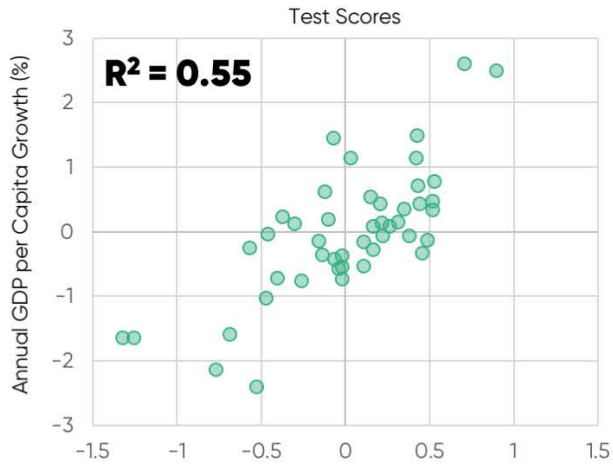
Measuring ‘learning’, as distinct from ‘education’ could yield massive economic upside.

In the past, most empirical research equated education with schooling—whether measured by school enrolment, number of years of schooling, or degrees acquired—in part because of lack of other good measures of education.

As the focus on learning has grown, some studies have explored the effects of the skills that students acquire.

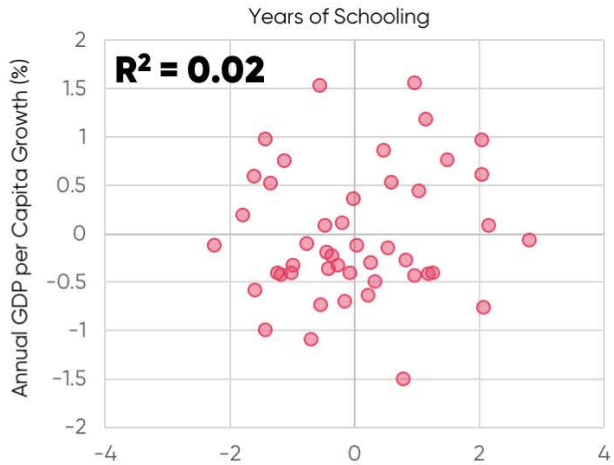
What matters less is the years of education completed than the knowledge that students acquire while in school. The results confirm the intuition: skills matter.

Test scores and growth (conditional on initial GDP per capita and years of schooling)



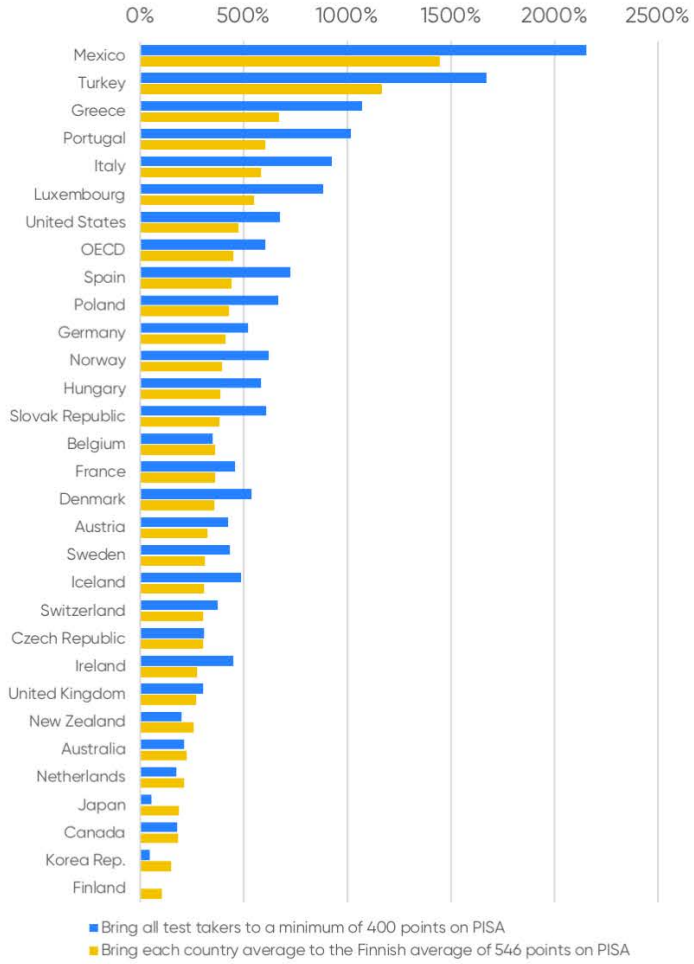
Source: World Bank – World Development Report 2018

Years of school and growth (conditional on initial GDP per capita and years of schooling)



Source: World Bank – World Development Report 2018

Simulated additional GDP between 2015 and 2090 attributable to increased learning (percent of GDP relative to current GDP), by scenario, selected countries



Source: World Bank – World Development Report 2018

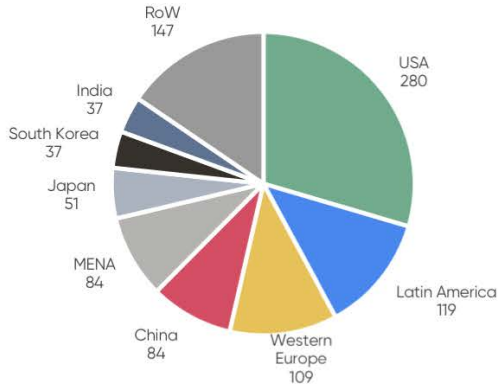
Consumers and Enterprises together spend nearly $1.5T on education and training.

The US remains the largest market for private consumer expenditure on education however future growth is expected to be driven by Asia.

Growth in the price of education and college tuition has out paced every other segment of the US economy over the past 20 years.

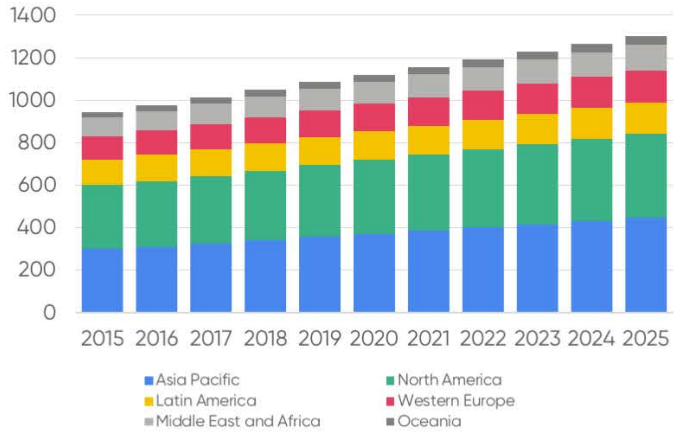
Global spend on training by enterprises is approaching $400B however this is a highly fragmented sector that is likely to be much higher overall.

Global Consumer expenditure on education, $USD Billion 2015



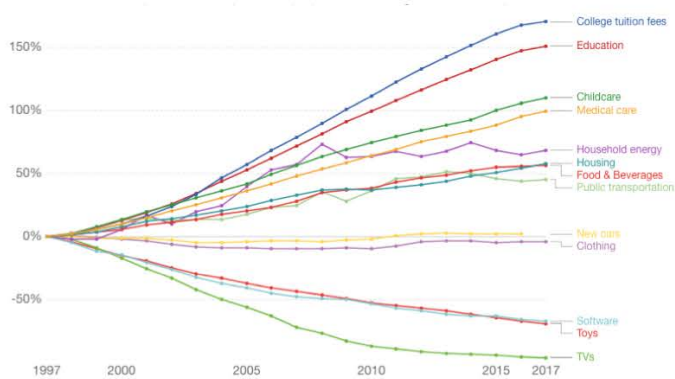
Source: Euromonitor

Consumer expenditure on education by region over time (US$bn)



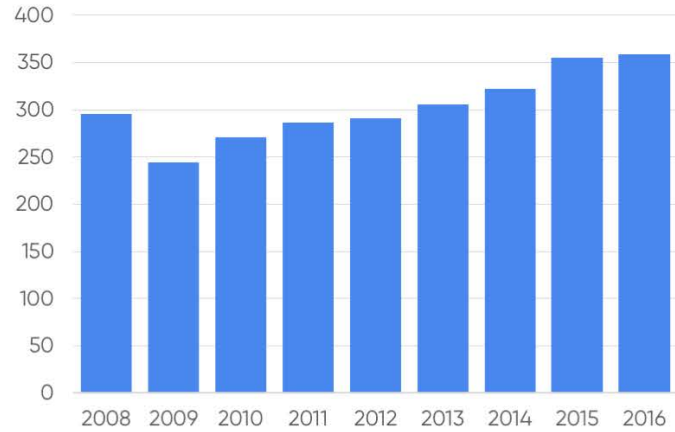
Source: Euromonitor

Price changes in consumer goods and services in USA, 1997-2017



Source: United States Bureau of Labor

Global Training Spend $US Billion



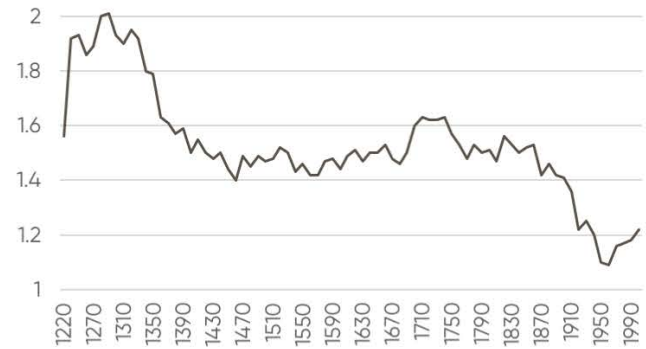
Source: Trainingindustry.com

Measuring the ‘skills premium’ or ROI for investing in skills has been a work in progress for centuries. Much work is required in this area.

The skill premium for craftsmen (carpenters) relative to labourer's in construction remained stable at around 1.5 between the end of the Black Death and the end of the Industrial Revolution when the relationship started to breakdown.

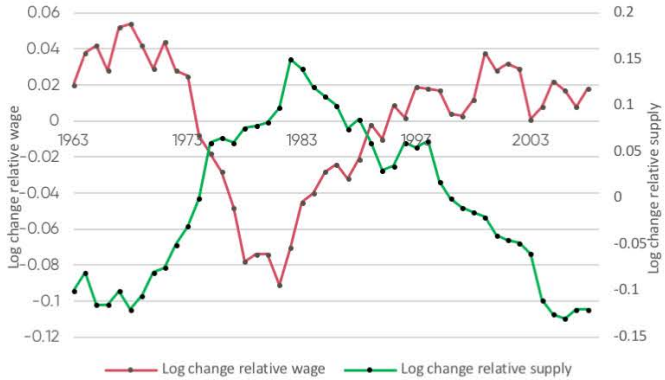
There is a strong association between the relative supply of skilled to unskilled workers and the skill premium. It should come as no surprise that an increase in the supply of skilled workers, all other things being equal, should depress the wages of skilled workers, and hence lower the skill premium.

Wage of craftsmen relative to that of laborers in England, 1200-2000



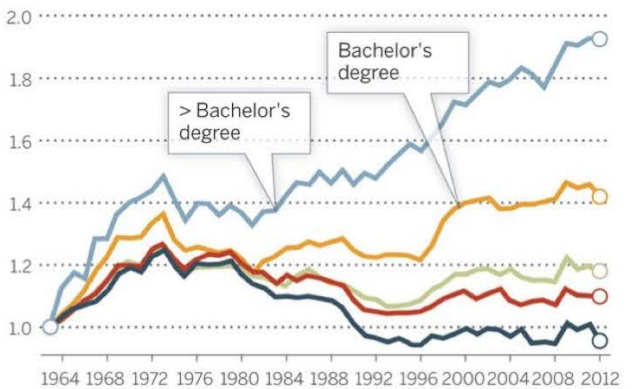
Source: Clark (2005) The Condition of the Working Class in England, 1209–2004. Journal of Political Economy, Vol. 113, No. 6, pp. 1307-1340.

Change in college-high school relative supply and relative wage



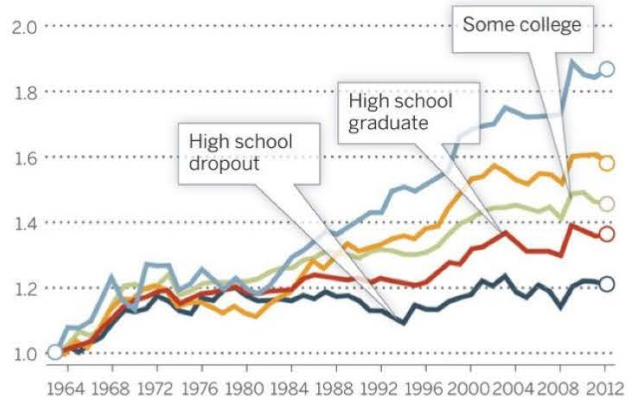
Source: Detrended Changes in College–High School Relative Supply and Relative Wages for the US, 1963-2008 - Acemoglu and Aut

Change in Real wage levels of full time US Workers 1963-2012 (Men)



Source: Real wages indexed at 1963 by education and gender, 1963-2013 - Autor (20

Change in Real wage levels of full time US Works 1963-2012 (Women)



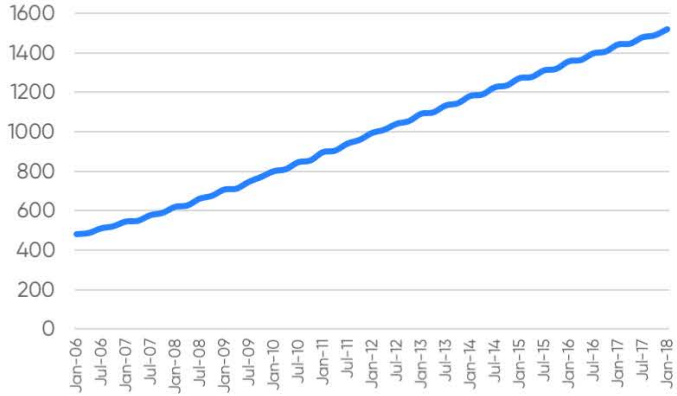
Student debt is a serious global issue representing ~$1.5T in the US alone.

Americans owe over $1.48 trillion in student loan debt, spread out among about 44 million borrowers. That's about $620 billion more than the total U.S. credit card debt.

The US Student loan delinquency rate is 11.2% (90+ days delinquent or in default).

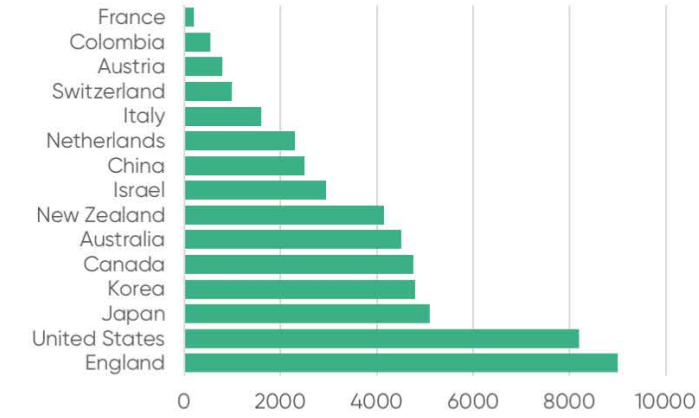
The Average monthly student loan payment (for borrower aged 20 to 30 years) is $351. Median monthly student loan payment (for borrower aged 20 to 30 years) is $203.

Student Loans Owned and Securitized, Outstanding (USD Billions)



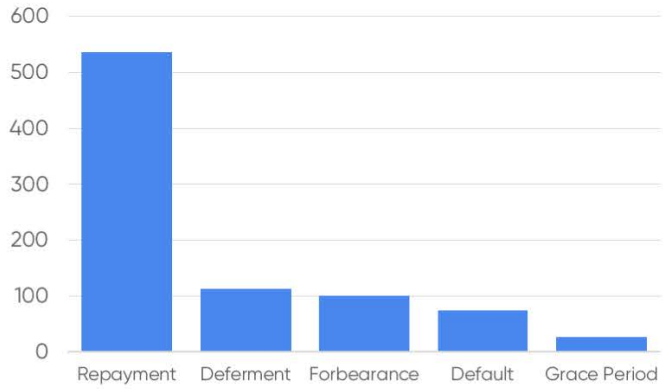
Source: Board of Governors of the Federal Reserve System (US)

Average Annual Tuition in US$, Select Nations



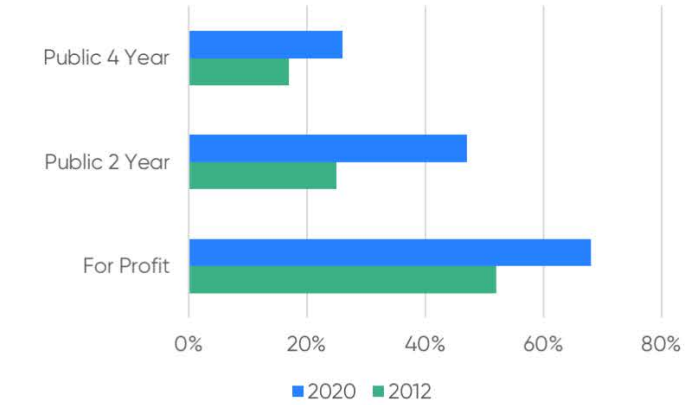
Source: OECD

US Student Loan Debt by Loan Type (USD Billions)



Source: Studentaid.ed.gov

Cumulative Default Rates by Entry Sector – 2003-04 Entrants (Borrowers Only)



Source: Brookings Institute, Board of Governors of the Federal Reserve System (US)

Population Growth

The world population grows by **200,000** people every day. We will likely add **another 1 billion people by 2030** putting enormous pressure on education to scale effectively and sustainability

The next decade will see an additional 350 million post secondary graduates and nearly 800 million more K12 graduates than today.

The IIASA and Wittgenstein Centre modelled three 'Shared Socioeconomic Pathway' scenarios with projections to 2100.

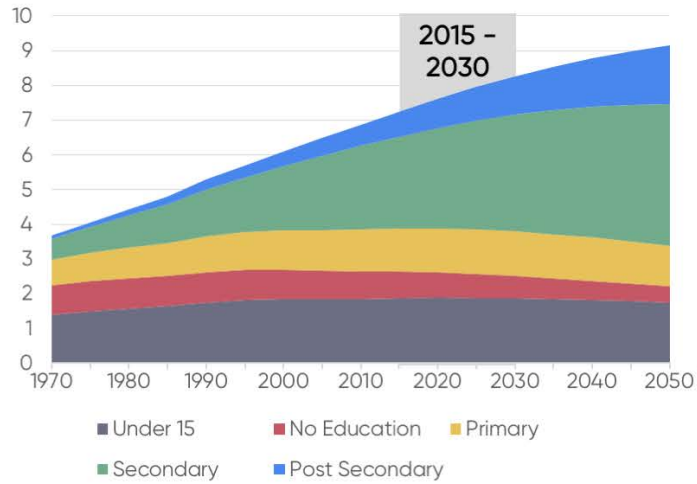
SSP2, considered the most likely, delivers 100 million less people with no education at all, has a moderate net impact on primary schooling attainment and suggests an enormous scaling of secondary and post-secondary education.

It is not clear how current education systems and models will scale to support this scenario, meeting the challenges we find in today's environment whilst scaling to meet these opportunities.

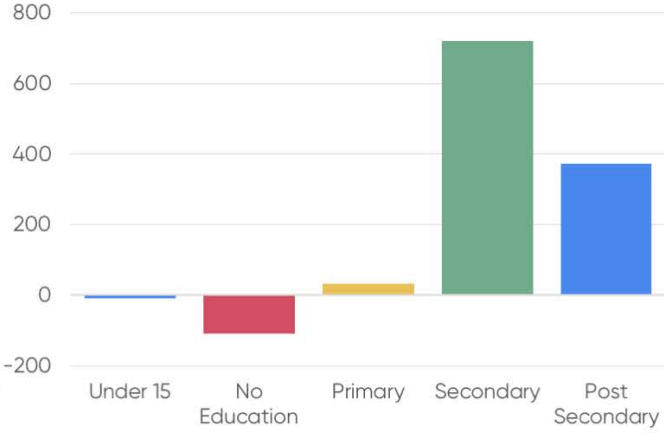
Shared Socioeconomic Pathway' Scenarios

- **SSP1 (Sustainability/Rapid Social Development):** This scenario assumes a future that is moving toward a more sustainable path, with educational and health investments accelerating the demographic transition, leading to a relatively low world population. The emphasis is on strengthening human wellbeing.
- **SSP2 (Continuation/Medium Population Scenario):** This is the middle-of-the-road scenario in which trends typical of recent decades continue, with some progress toward achieving development goals, reductions in resource and energy intensity, and slowly decreasing fossil fuel dependency. Development of low income countries is uneven, with some countries making good progress, while others make less.
- **SSP3 (Fragmentation/Stalled Social Development):** This scenario portrays a world separated into regions characterized by extreme poverty, pockets of moderate wealth, and many countries struggling to maintain living standards for rapidly growing populations. The emphasis is on security at the expense of international development.

Global Population by Education Attainment Scenario SSP2 (Billions)



Global Population by Education Attainment 2030 difference to 2015 SSP2 (Millions)



Source: IIASA and Wittgenstein Centre

Asia and Africa are likely to drive the biggest changes in education attainment over the next decade.

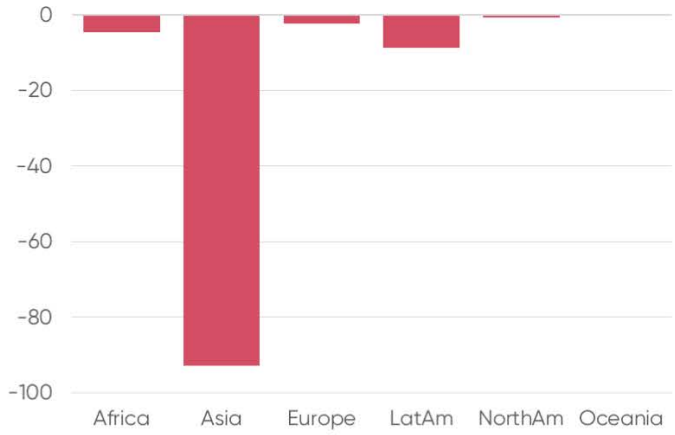
90 million less people in Asia will be without an education by 2030. Latin America will have nearly 10 million less.

Africa delivers nearly 90 million more primary educated people through to 2030.

Asia, Africa and Latin America deliver over 700 million more secondary educated people through to 2030.

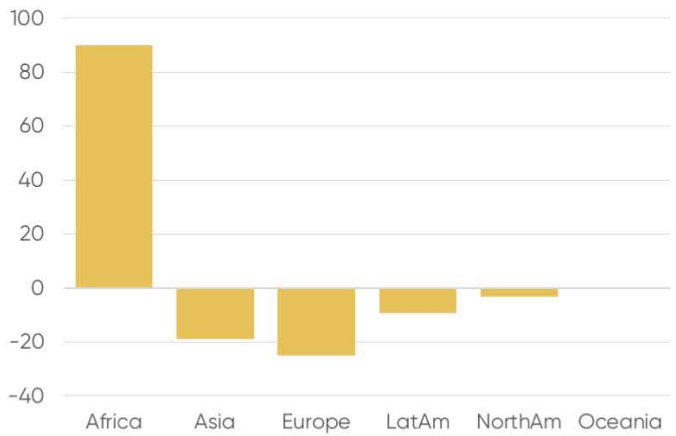
Asia brings online over 200 million more post secondary graduates with each of the major markets delivering another 30-40 million more through to 2030.

Change in Population with No Education 2015-2030 (Millions)



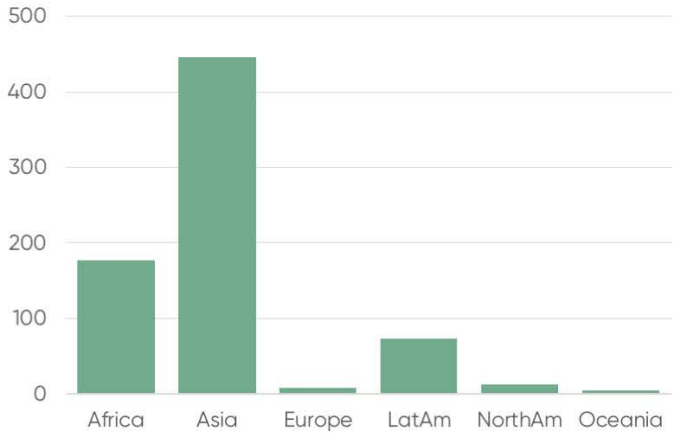
Source: IIASA and Wittgenstein Centre

Change in Population with Primary Education Only 2015-2030 (Millions)



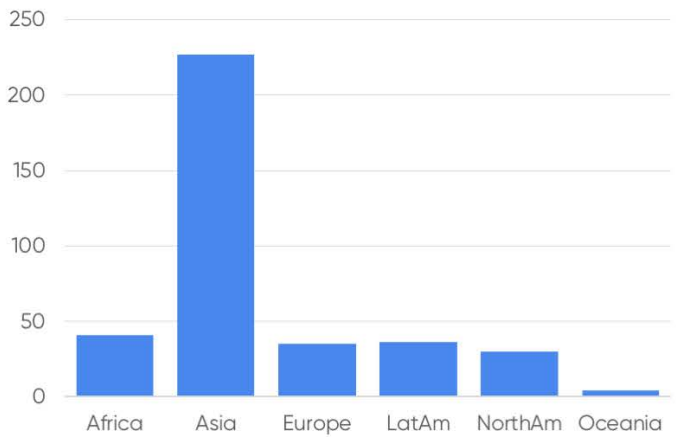
Source: IIASA and Wittgenstein Centre

Change in Population with Secondary Education Only 2015-2030 (Millions)



Source: IIASA and Wittgenstein Centre

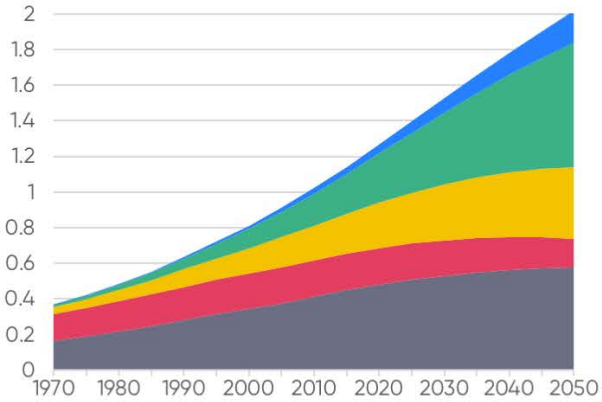
Change in Population with Post Secondary Education 2015-2030 (Millions)



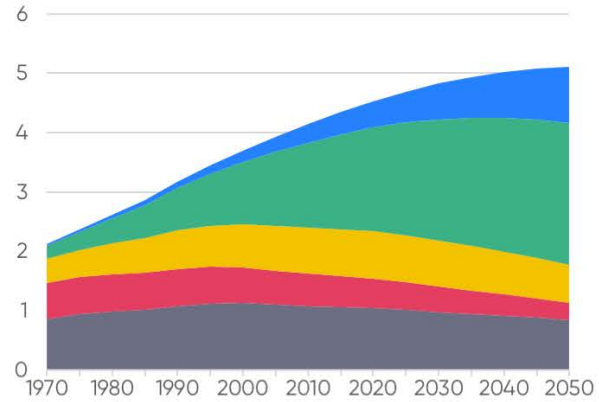
Source: IIASA and Wittgenstein Centre

By 2050, we have 2.4 billion more secondary and post secondary graduates. On average, ~60 million from Asia and Africa per year.

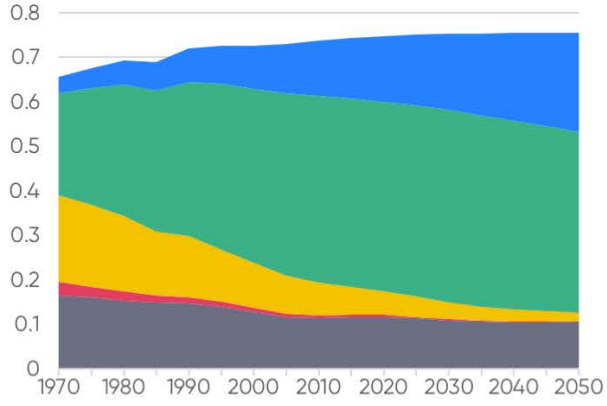
Africa Population by Education Attainment 1970-2050 (Billions)



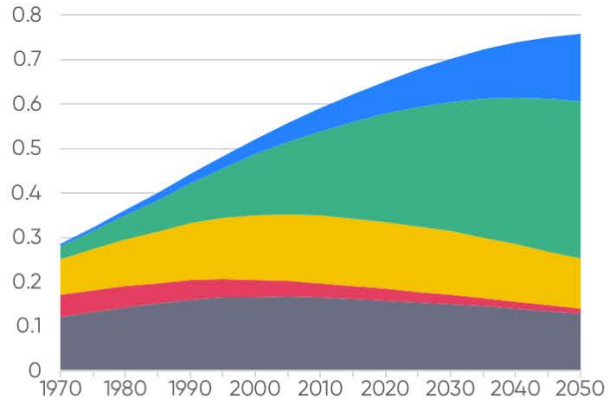
Asia Population by Education Attainment 1970-2050 (Billions)



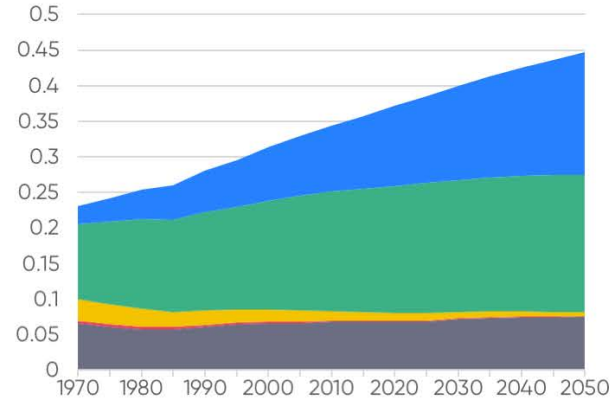
Europe Population by Education Attainment 1970-2050 (Billions)



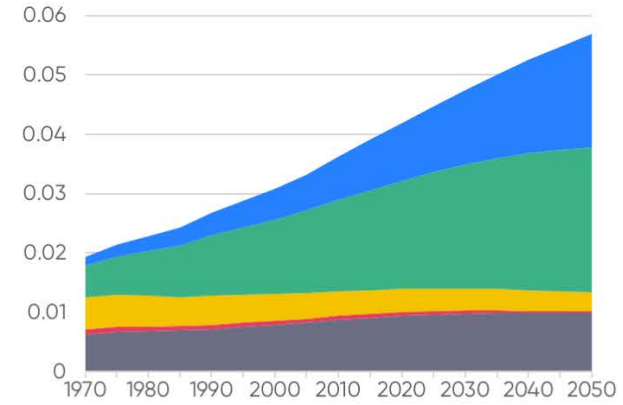
Latin America Population by Education Attainment 1970-2050 (Billions)



North America Population by Education Attainment 1970-2050 (Billions)



Oceania Population by Education Attainment 1970-2050 (Billions)



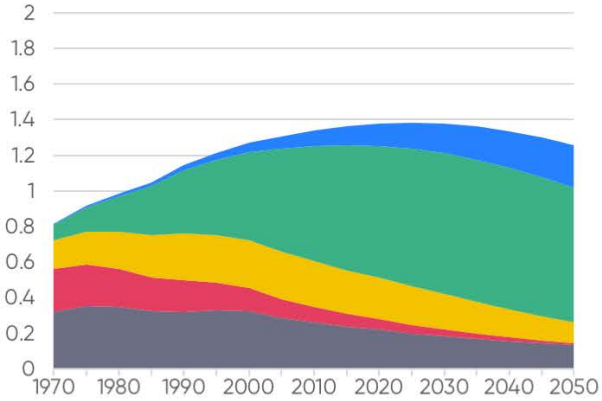
Source: IIASA and Wittgenstein Centre

Highest level of educational attainment in population over 15 years

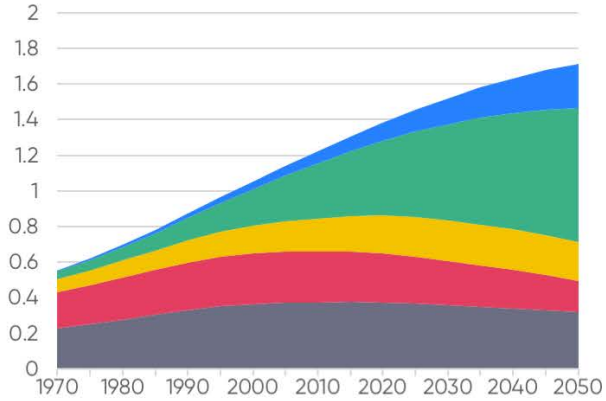
Population under 15 years | No Education | Primary | Secondary | Post Secondary

Six major economies make up 80% of the global demand for education, all at different stages of growth and maturity.

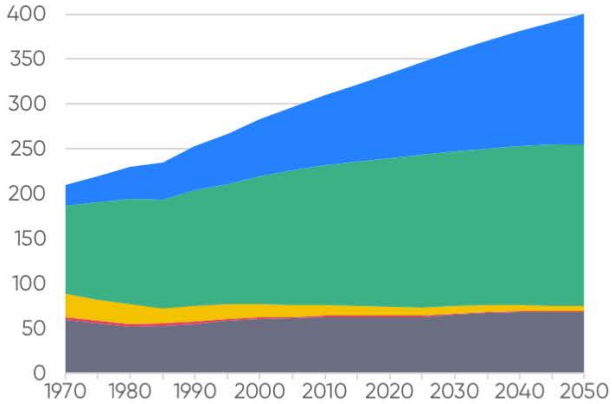
China Population by Education Attainment 1970-2050 (Billions)



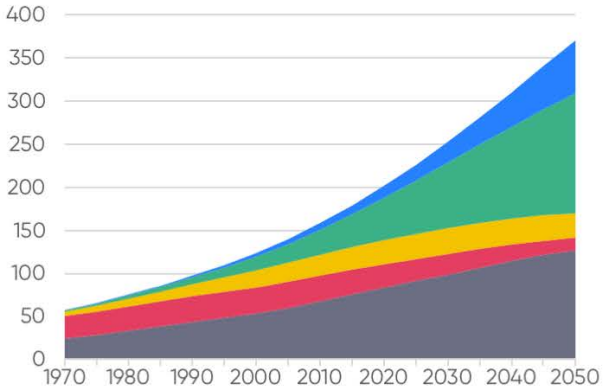
India Population by Education Attainment 1970-2050 (Billions)



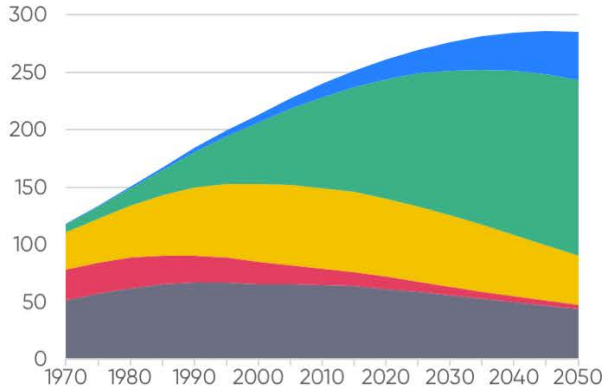
United States Population by Education Attainment 1970-2050 (Millions)



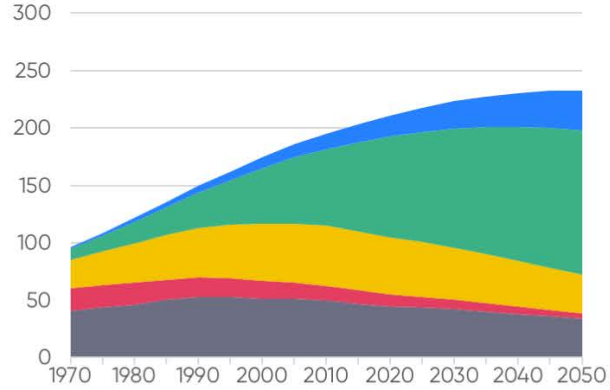
Nigeria Population by Education Attainment 1970-2050 (Billions)



Indonesia Population by Education Attainment 1970-2050 (Millions)



Brazil Population by Education Attainment 1970-2050 (Millions)



Source: IIASA and Wittgenstein Centre

Highest level of educational attainment in population over 15 years

Population under 15 years | No Education | Primary | Secondary | Post Secondary

Future of Work and Skills

There is great uncertainty about the **future of work**, the impact of automation and the most effective and efficient ways for society to **develop human capital** ahead of these impacts.

Learning models and curriculum are changing as we identify which skills the world needs for the fourth industrial revolution.

Top 20 Skills, Abilities & Knowledge

Skill
Ability
Knowledge

1. Judgement and Decision Making
2. Fluency of Ideas
3. Active Learning
4. Learning Strategies
5. Originality
6. Systems and Evaluation
7. Deductive Reasoning
8. Complex Problem Solving
9. Systems Analysis
10. Monitoring
11. Critical Thinking
12. Instructing
13. Education and Training
14. Management of Personnel Resources
15. Coordination
16. Inductive Reasoning
17. Problem Sensitivity
18. Information Ordering
19. Active Listening
20. Administration and Management

Skill Suggestions for each Occupation

A skill is connected to an occupation if it would boost the occupation's chance of growing. Skills are placed near the occupations that they would help. Hover over a node to see the connections.

The Future of Skills, NESTA, Oxford Martin School and Pearson.
Data visualization by Dr. Cath Sleeman, quantitative research fellow at Nesta. Employment figures are from the 2016 Labour Force Survey.

Automation's double threat to education - training people for jobs that won't exist and the automation of education services.

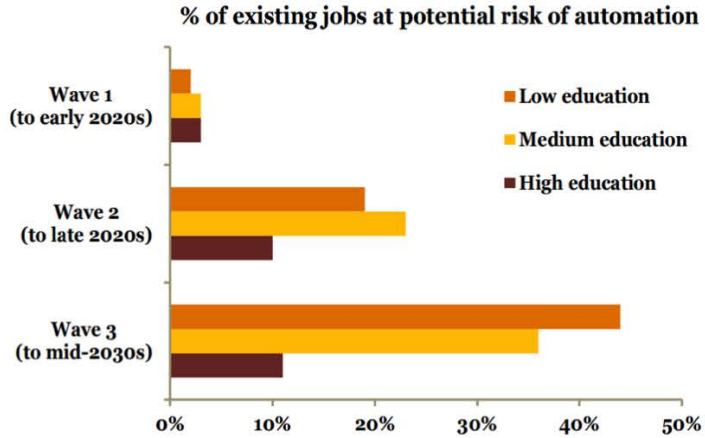
Education needs to ensure it is training people for the skills, knowledge and jobs of the future, or face redundancy.

As an industry, automation could deliver huge productivity gains through enabling better data and decision-making.

While the level of automation in education is far from clear, automation of simple computational tasks from structured data (algorithm wave) will be first, followed by a change to jobs that are routine and repeatable (augmentation wave).

Finally, the 'autonomy wave' will deliver automation that incorporates problem solving in dynamic real-world situations.

Potential job automation rates by education levels across waves



Source: PwC estimates based on OECD PIAAC data (median values for 29 countries)

Source: McKinsey Global Institute

Artificial Intelligence and Robotics are exploding as job categories and desirable skillsets across all industries

The share of jobs requiring AI skills has grown 4.5X since 2013.

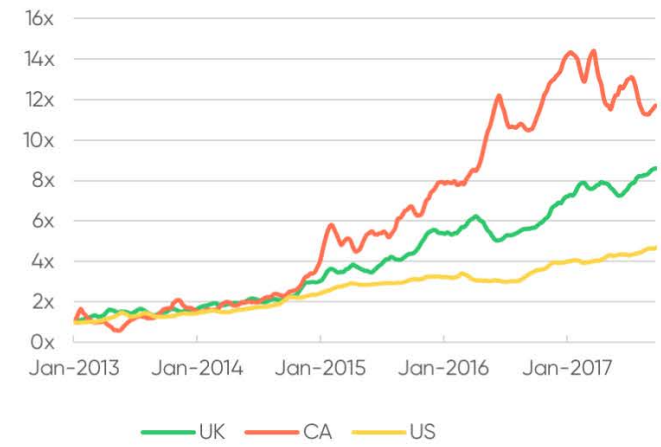
AI use cases appear in all industries, and are particularly strong in marketing and sales, where AI is being used for sales forecasting and lead scoring, email marketing and cross selling.

Customer service is a big user of AI technology such as chatbots, product selection and customer classification/routing.

Skills Breakdown by Job Openings ('000s) 2015-2017 by Skill (Monster.com)

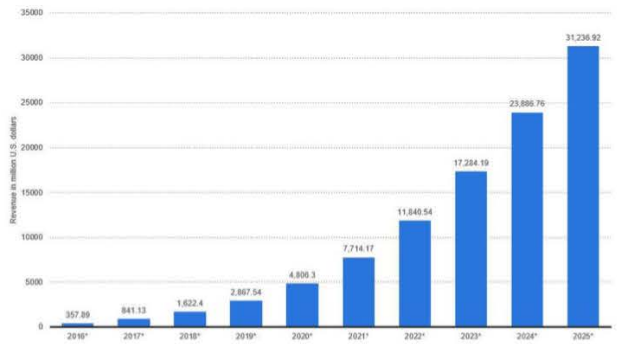
Source: AI-Index

Share of Jobs Requiring AI Skills (Indeed.com)



Source: AI-Index

Revenues from AI for enterprise applications market worldwide – 2016-2025 (in USD millions)



Source: Statistica

Technology Outlook

Advances in technology are shaping the very **foundation** of the way we will **live, work and learn** in the next 20 years.

Mobile-first and mobile-only internet users will shape learning models over the next 10 years

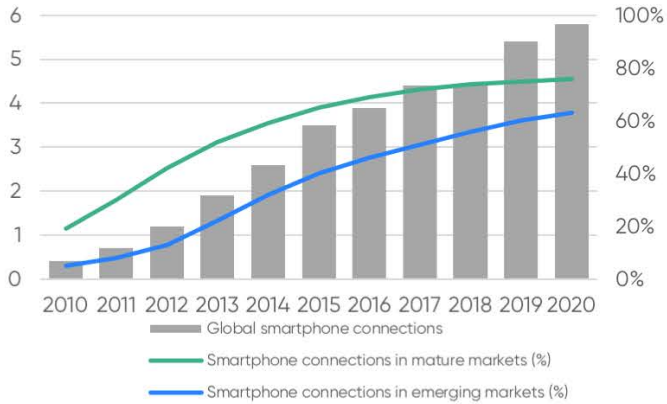
Smartphone only internet connections, increasing time on spent on mobile devices and ubiquitous connectivity will shape how learning content is delivered and learning interaction occurs in the future

By 2030 half the worlds youth will live in countries with mobile-first or mobile-online internet connections

Meaningful social interactions, the long held 'competitive advantage' for face to face learning, comes of age with new technologies, user skills and acceptance, and the network effect of social platforms

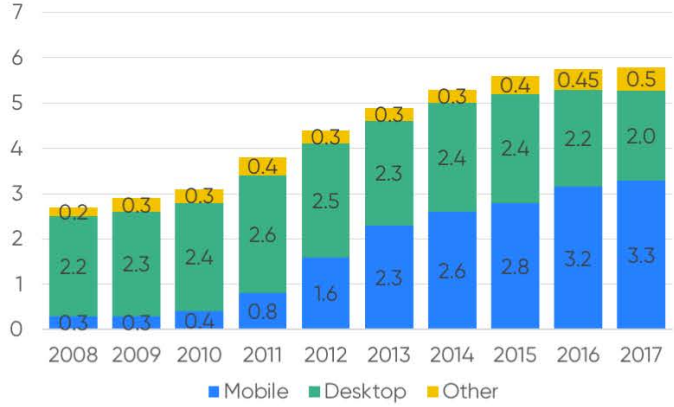
This environment supports peer-to-peer interactions and learning like never before and changes the concept of 'teacher' and 'learner' in the network of interactions

Global smartphone connections (billions)



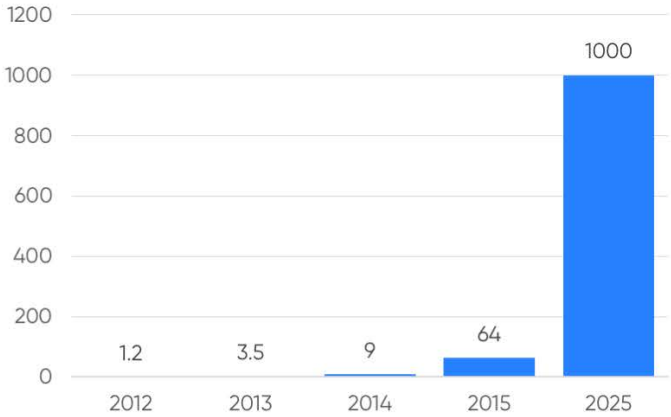
Source: GSMA, The Mobile Economy 2016,

Time Spent per Adult User per Day with Digital Media, USA



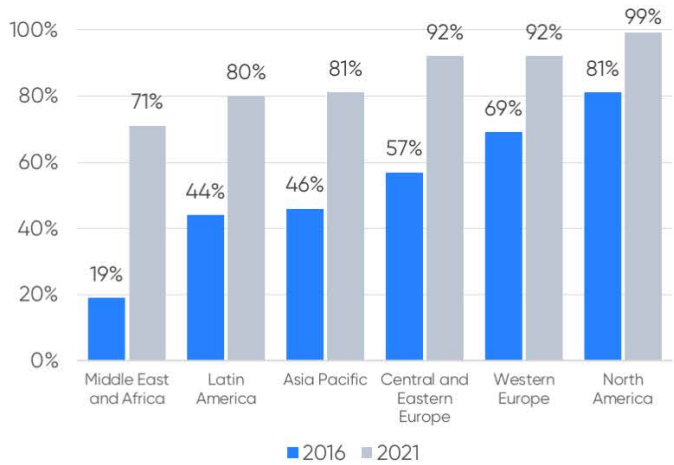
Source: eMarketer

Value of global peer to peer lending from 2012 to 2025 (in billion U.S. dollars)



Source: https://www.statista.com/statistics/325902/global-p2p-lending/

Regional Share of Smart Devices and Connections (Percent of the Regional Total)



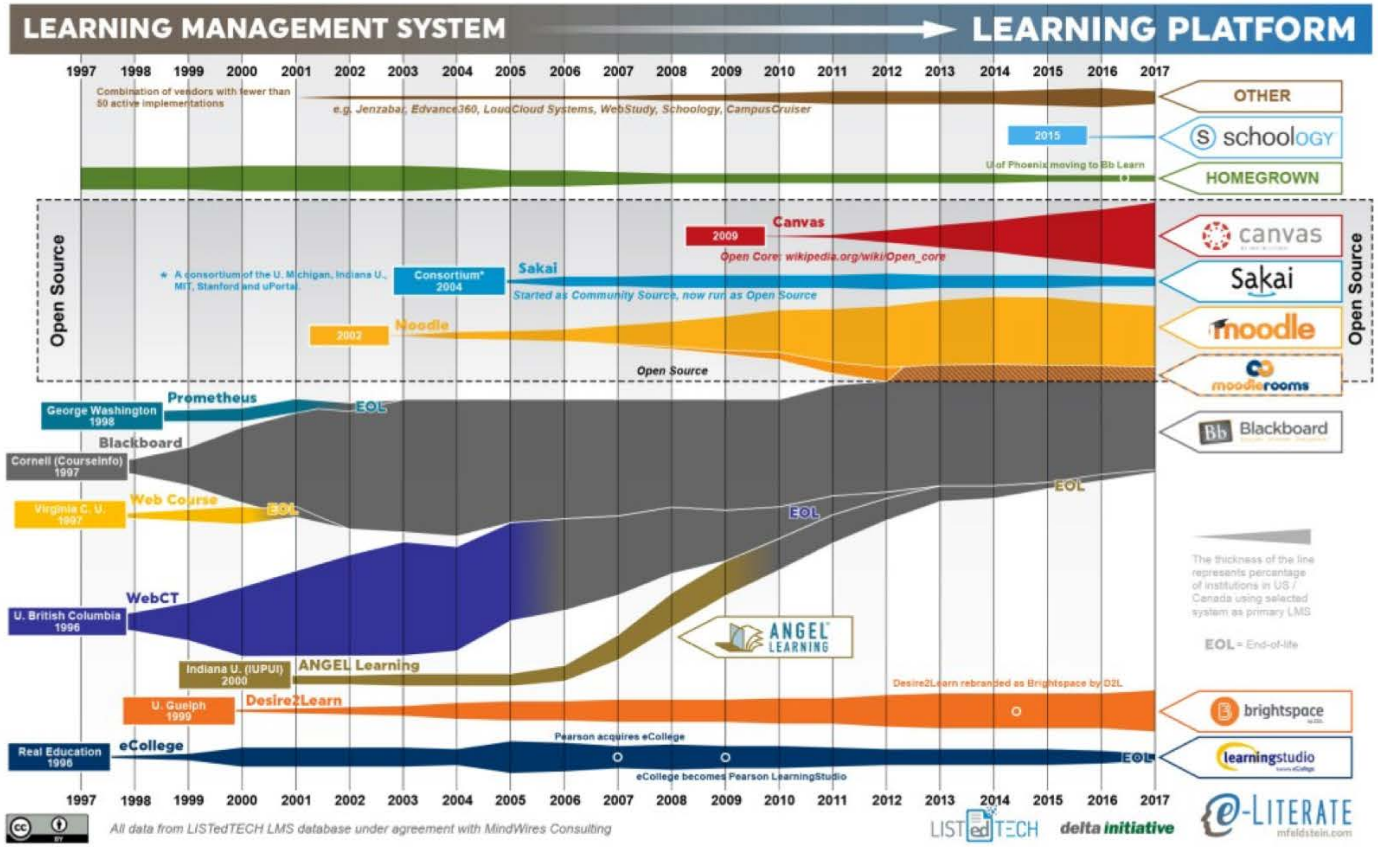
Source: Cisco

The LMS, a cornerstone of education technology, is undergoing a transition from content to learner and social centricity

Learning Management Systems dominate online environments in formal education and training however newer technologies with a focus on interaction, rather than file management will take centre stage in the future

Next Generation Digital Learning Environments (NGDLE) is an ecosystem of interconnected and flexible applications that support learning through five key domains: interoperability; personalization; analytics, advising, and learning assessment; collaboration; and accessibility and universal design.

LMS Market Share for North American Higher Ed Institutions, Fall 2017 Edition



Source: e-Literate

Source: EDUCAUSE

AI investment and R&D activity is accelerating as its disruptive potential becomes clearer.

According to a recent Tencent report, there are around 300,000 qualified AI researchers, however, this falls significantly short of demand, which is in the millions.

China's access to data from its 700m internet users will assist with its ambition to lead the world in AI.

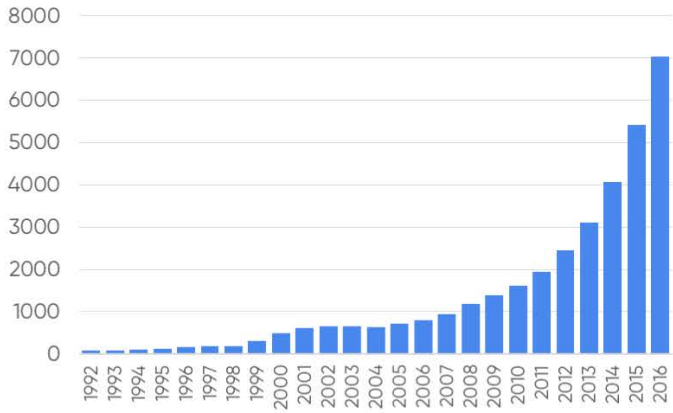
VC investment in AI reached $10.8 billion in 2017, almost doubling from the year before and up from just $500m in 2010

Tech giants including Baidu and Google spent between $20b and $30b on AI in 2016, with 90% of this spent on R&D and deployment, with the remaining 10% on AI acquisitions.

Source: McKinsey. AI the next digital frontier

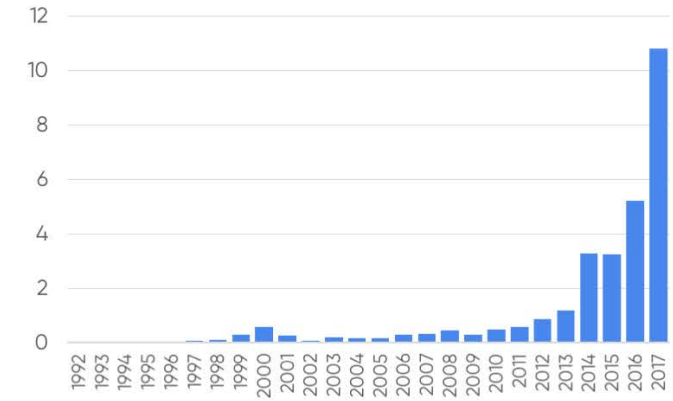
Source: Ptichbook

Start-ups Developing AI systems



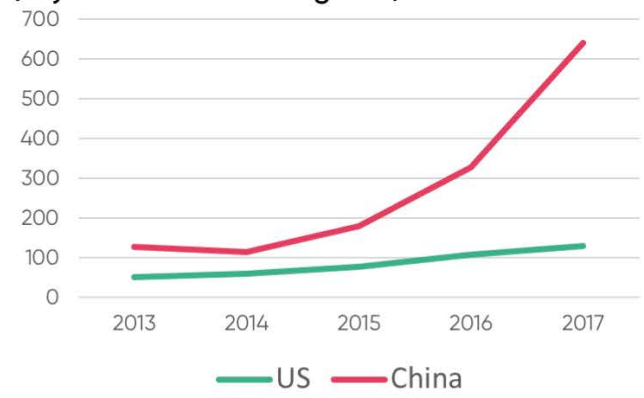
Source: AI Index, Crunchbase

Venture Investment in AI Start-ups (Billions USD)



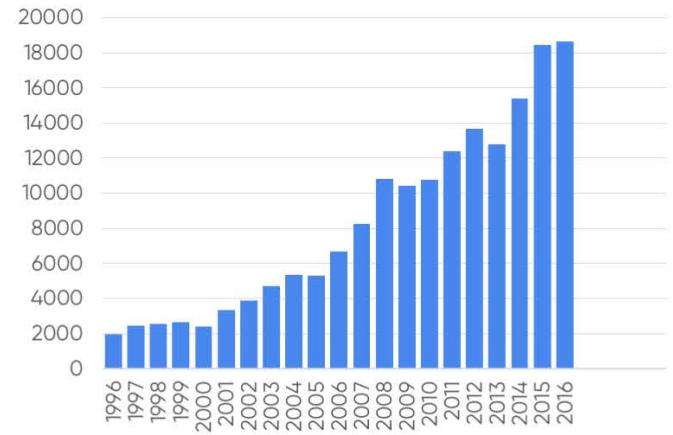
Source: AI Index, Crunchbase, Pitchbook

AI Related Patent Publications (Keyword Artificial Intelligence)



Source: epo.org

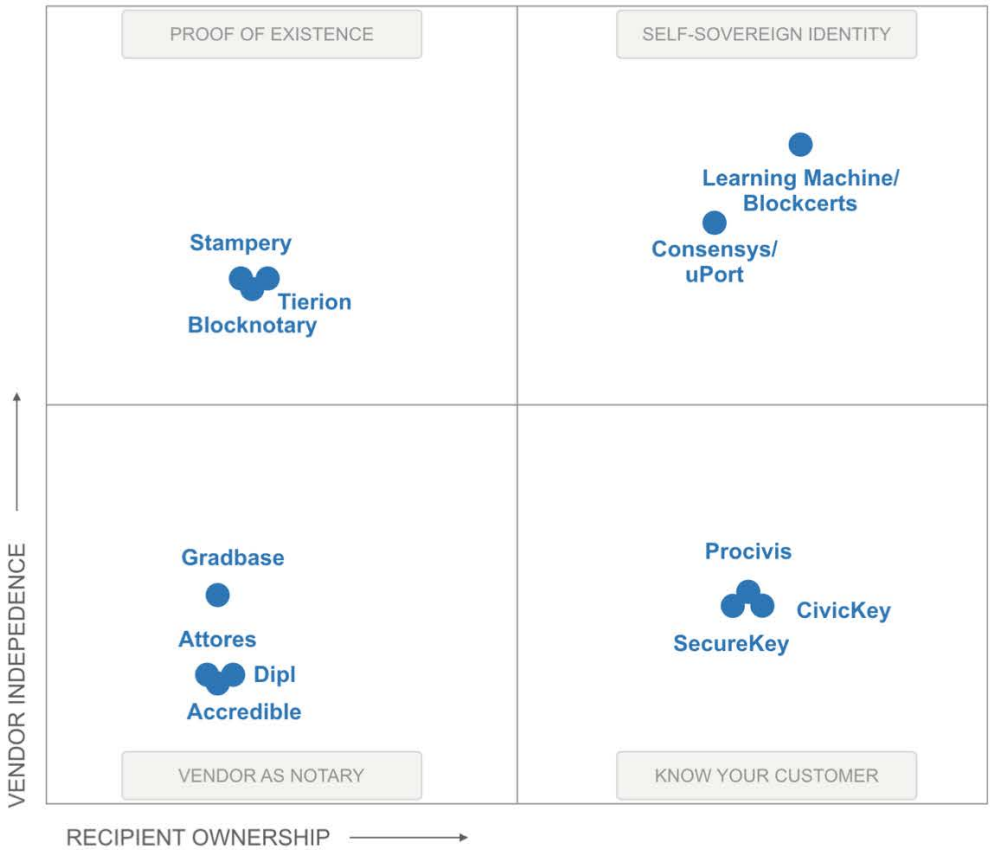
AI Research Papers Published



Source: Scopus, AI Index

Blockchain has found education with the promise of tamper-proof credentials, facilitating student control of their learning records.

Emerging Blockchain Business Models in Education



Source: Learning Machine

Examples of Blockchain StartUps in Education

Tutellus

P2P EdTech platform based on Blockchain

Madrid, Spain

Proofstack

Global & Local Legal Proofs with Blockchain & EU Qualified Timestamp

Singapore

Learning Machine

An enterprise software firm specializing in self-sovereign digital identity through directly owned, verifiable official records.

New York, United States

Vivagogy

Vivagogy is changing learning by creating differentiated learning paths and competency assessments with blockchain credentialling

Dublin, Ireland

Appii

Appii is a company that enables you to quickly access your details of education, accreditations, awards and employment history.

London, UK

Disciplina

We are developing the first blockchain to create verified personal profiles based on academic and professional achievements.

Estonia

The Mixed Reality (AR/VR) market is set to be huge but is yet to make a big impression in education

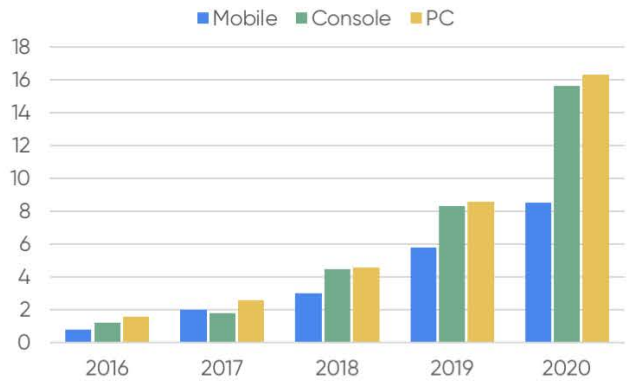
The enterprise and consumer markets for AR/VR are forecast to be roughly equal by 2025 with AR making a head start and VR to follow fast.

Education is not thought of as a major market by the AR/VR industry as yet. Healthcare, engineering, real-estate and retail make up 95% of the enterprise and public sector forecast.

Augmented Reality is considered the biggest short term opportunity, forecast to be a $50B market by 2021.

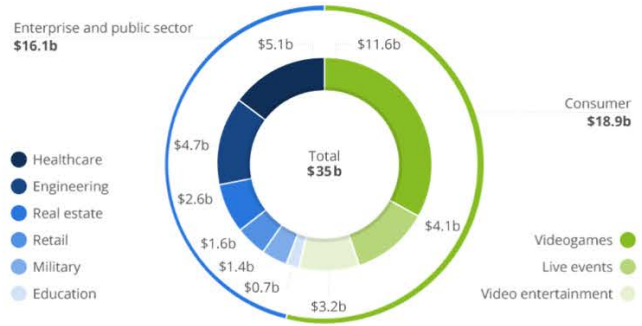
Virtual Reality headsets are set to grow 7x over the next 5 years. As price comes down and content quality and availability improves, VR will rapidly catch-up.

Forecast market size of VR hardware and software from 2016 to 2020 by platform (USD Billions)



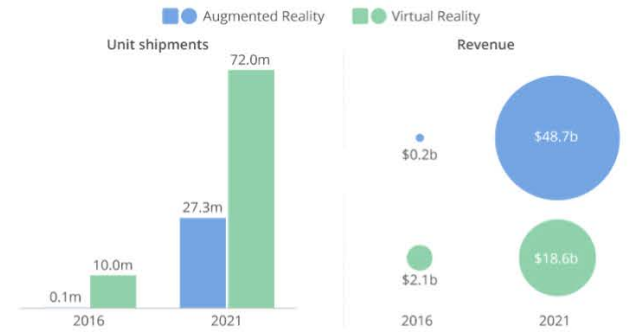
Source: Superdata via VRFocus

Predicted market size of AR/VR software for different use cases in 2025



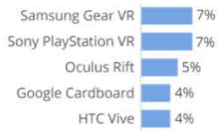
Source: Goldman Sachs Global Investment Research

Estimated worldwide virtual and augmented reality headset shipments and revenue

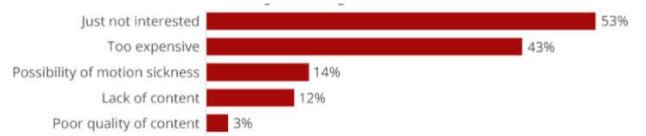


Source: IDC

VR Purchase Intent (% consumers who consider it likely they'll buy VR)



VR Inhibitors (Reasons against owning a VR device)



Source: Nielsen, Thrive Analytics

Global Learning and Teaching

What, how, when and where we **learn** is set to undergo **dramatic change**.

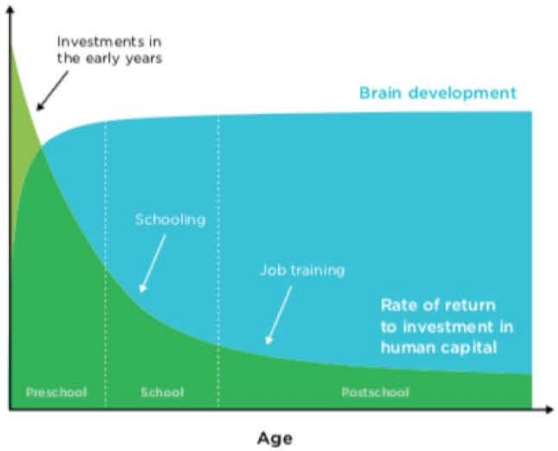
Investment in pre-primary education delivers significant and long-lasting returns

Globally over 150 million children participate in pre-primary education.

Despite the returns on early years schooling, government investment in pre-primary education remains relatively low.

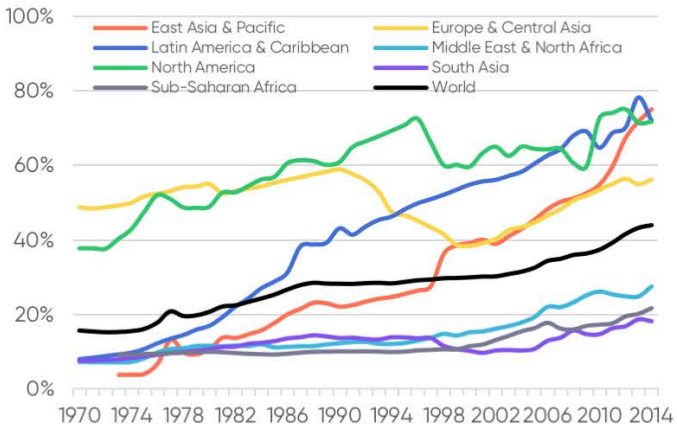
Although participation in pre-primary education is generally increasing across all regions, low income countries are lagging.

Investment in high quality programs during children's early years pays off



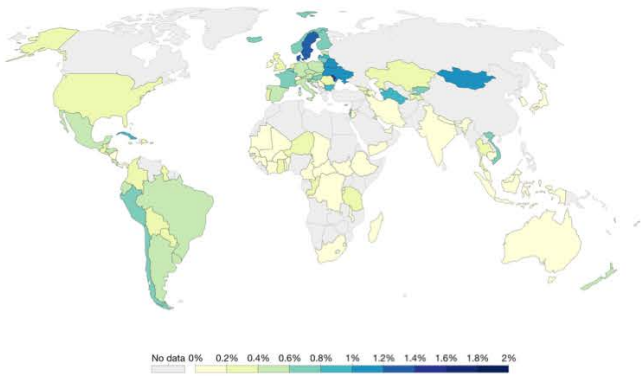
Source: World Bank Development Report, 2018 based on Carneiro, Cunha and Heckman (2003); Martin (2012)

Gross enrolment ratio in pre-primary education



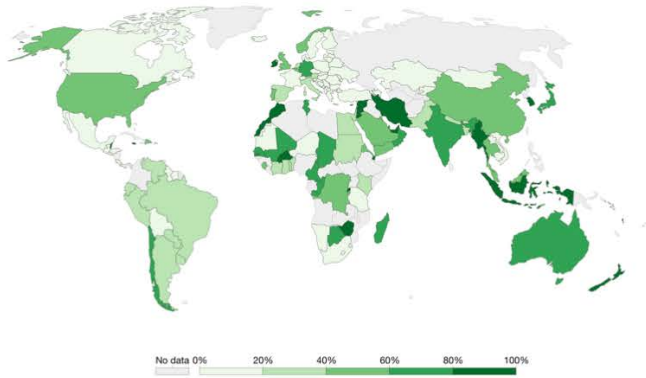
Source: World Bank. Enrolment of boys and girls in pre-primary education, regardless of age, expressed as a percentage of the total population of official pre-primary education age

Government expenditure on pre-primary education as share of GDP, 2014



Source: World Bank, OurWorldInData

Share enrolled in private institutions at the pre-primary education level, 2015



Source: World Bank, OurWorldInData

Over the last 50 years, primary and secondary schooling has expanded dramatically in most low and middle-income countries.

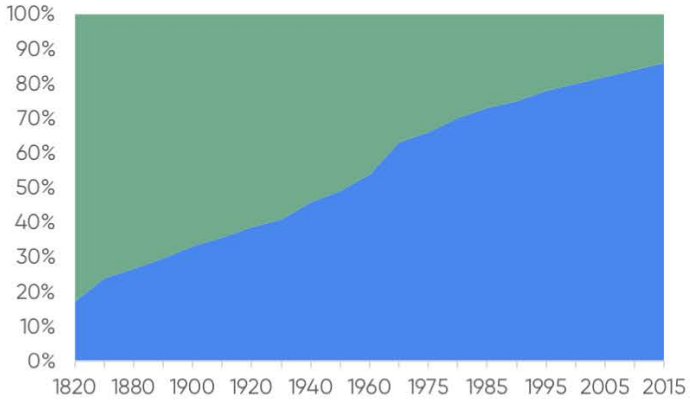
Much of the expansion of net enrolment rates over the past 50 years have been driven by girls joining primary education.

Secondary education has also expanded rapidly, though many young people still remain excluded, even from primary education.

Exclusions due to poverty, gender, ethnicity, disability, and location persist.

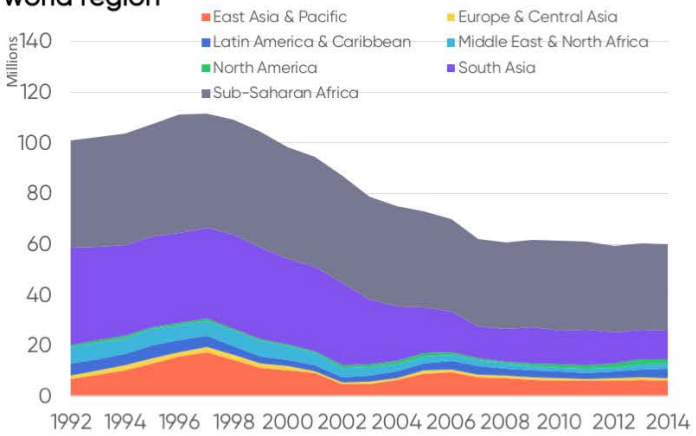
Fragile and post-conflict countries also remain glaring exceptions to the global boom in schooling.

Share of the world population over 15 years with at least basic education



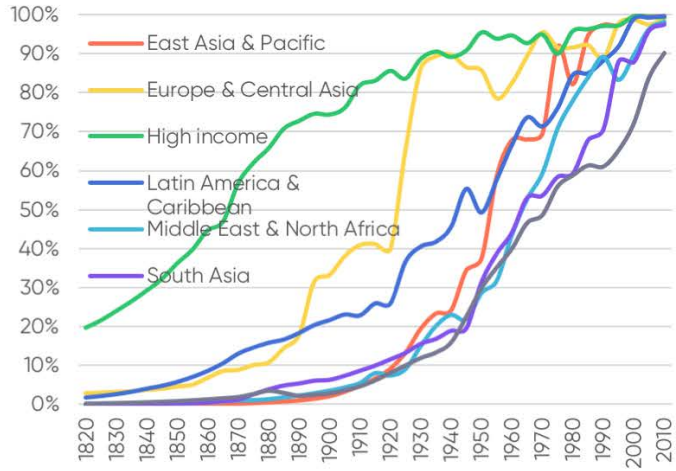
Source: OECD, IIASA (2016)

Out-of-school children of primary school age by world region



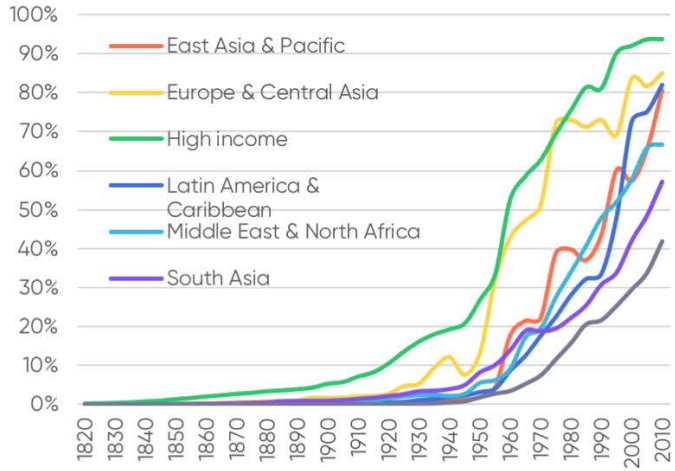
Source: World Bank. Children in the official primary school age range who are not enrolled in either primary or secondary schools

Two Centuries of Growth in Primary Schooling (Net Enrolment)



Source: World Bank Development Report 2018, , using data from Lee and Lee (2016)

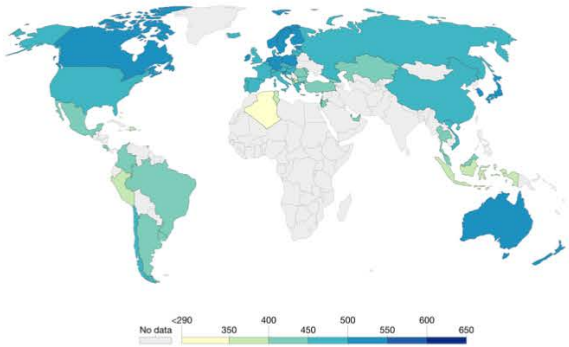
Two Centuries of Growth in Secondary Schooling (Net Enrolment)



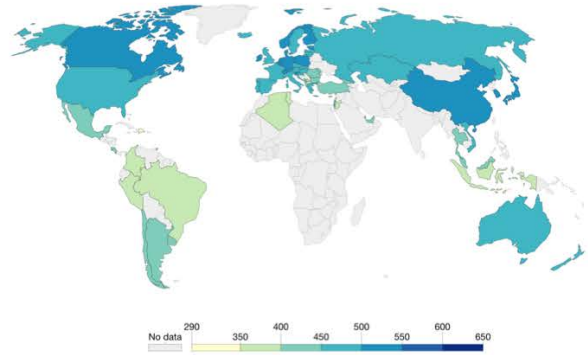
Source: World Bank Development Report 2018, , using data from Lee and Lee (2016)

Standardized tests such as PISA and TIMSS attempt to measure quality and outcomes of education across borders and over time.

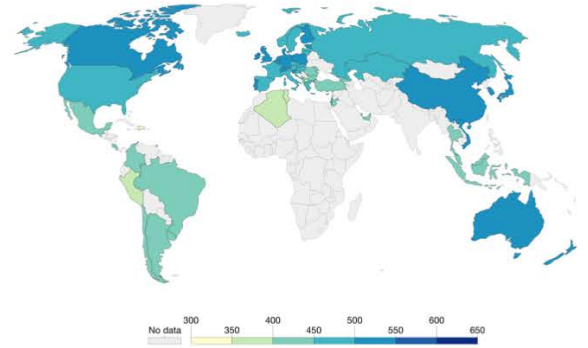
Mean performance on the reading scale, 2015



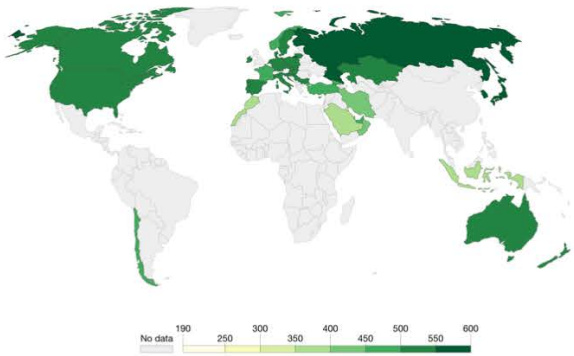
PISA test score: Mean performance on the mathematics scale, 2015



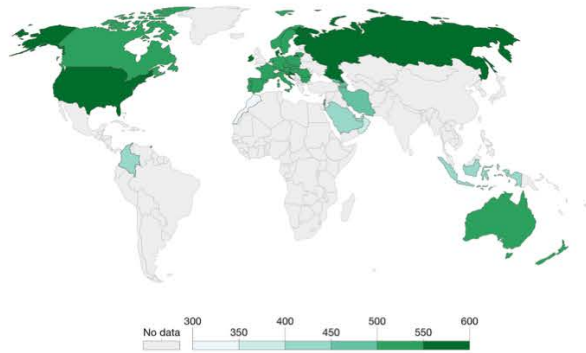
Mean performance on the science scale, 2015



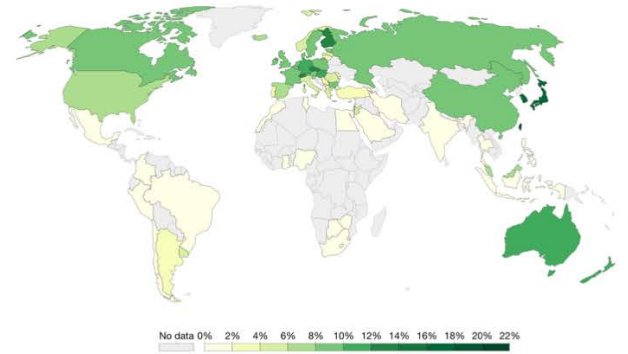
Average score for 4th graders on the TIMSS science assessment, 2015



PISA test score: Mean performance on the mathematics scale, 2015



Share of top-performing students Hanushek and Woessmann's, 2015



Source: World Bank, OECD, Hanushek and Woessmann, OurWorldInData

800 million people have a post-secondary education, up to 35% of the population in some countries.

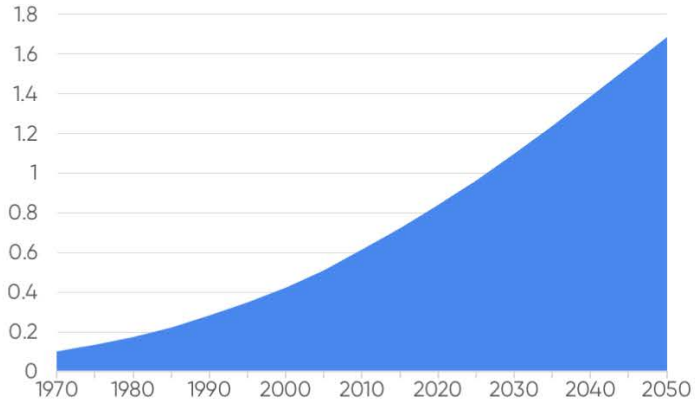
Participation is post-secondary education globally has seen staggering increase over the last 50 years.

If this trend continues, the number of post secondary educated people in the world will be approaching 2 billion.

However, tertiary enrolment and attainment continues to be unequally distributed globally.

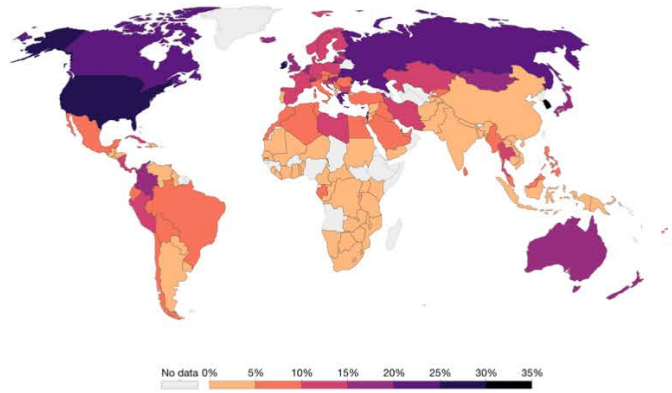
Enrolment ratios in developing regions, in particular Asia, are seeing accelerated participation rates in tertiary education.

Global Population by Post Secondary Education Attainment - Scenario SSP2 (Billions)



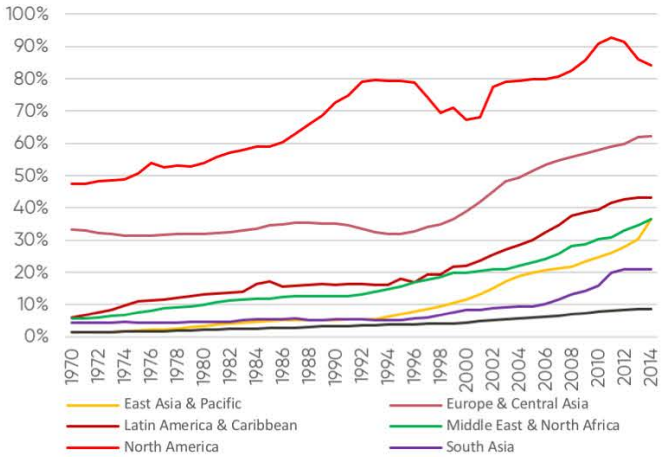
Source: IIASA

Share of the population who have completed tertiary education, 2010



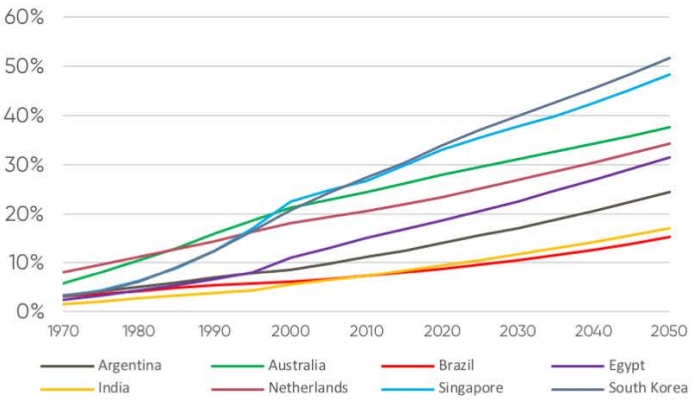
Source: World Bank

Gross enrolment ratio in tertiary education



Source: World Bank. Total enrolment in tertiary education, regardless of age, expressed as a percentage of the total population of the five-year age group following on from secondary school leaving.

Projections of the share of the population aged 15+ educated to degree level by country



Source: World Bank

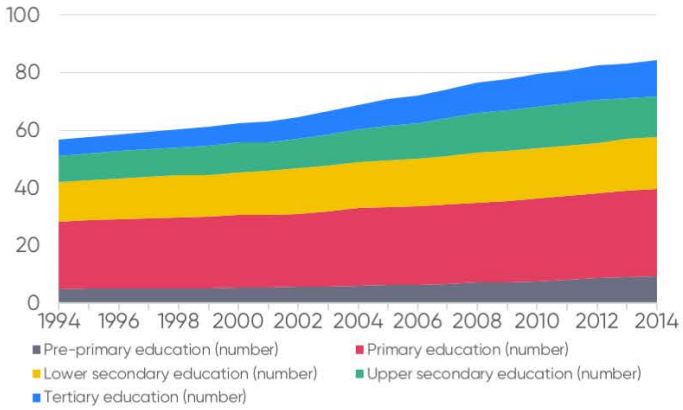
The world is adding 1.5 million teachers per year on average, approaching 100 million in total. 50% teach in Pre-K and Primary.

Teachers are the most fundamental ingredient to delivering education. So it follows that with the recent global expansion of education came a commensurate increase in the number of teachers across all levels of education.

Teacher starting salaries are vary dramatically based on a GDP per capita and the local circumstances.

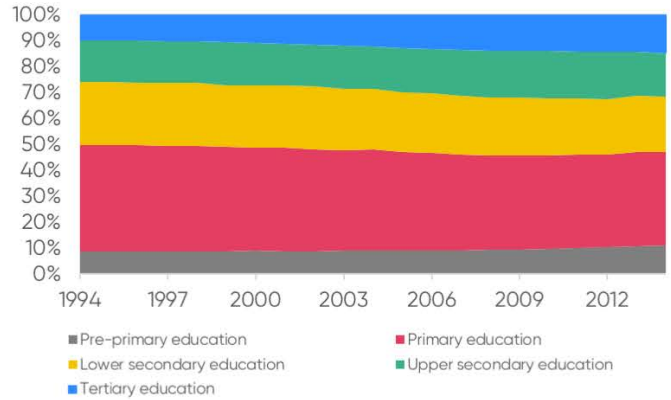
In general the ratio of pupils to teachers has steadily decreased over the last 40 years with a global average of 24 pupils per teacher.

Number of teachers across education levels



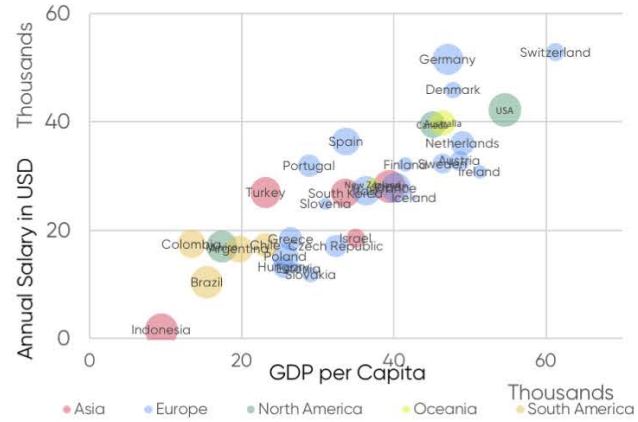
Source: World Bank

Share of teachers across education levels



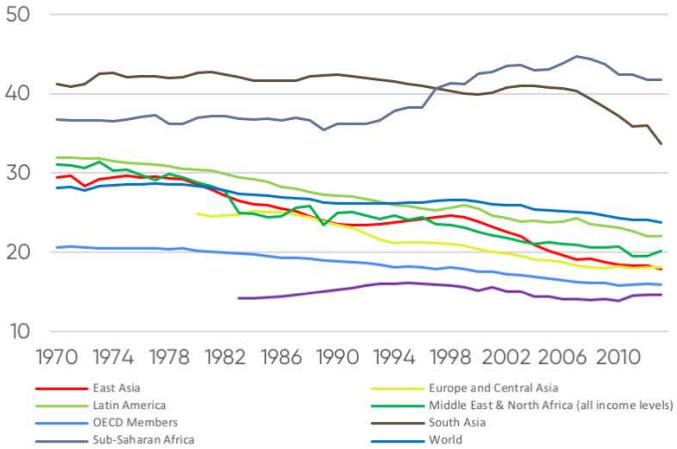
Source: World Bank.

Starting yearly teacher salaries in public primary education, 2014



Source: World Bank, World Development Report

Pupil-teacher ratio for primary education



Source: World Bank, World Development Report

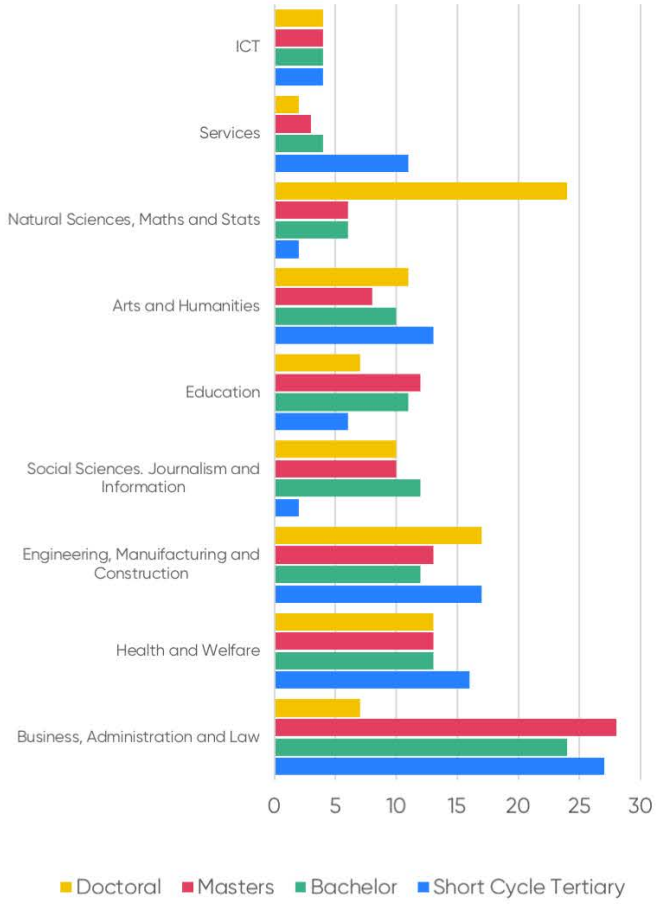
Business still dominates fields of study at ~25% share. Health and Engineering make up the next 25%.

Bachelor's degrees remain the most common tertiary diploma to be held by graduates in OECD countries.

In 2015, on average across OECD countries, a majority of first-time tertiary graduates (72%) earned a bachelor's degree, 11% earned a master's degree and 17% earned a short-cycle tertiary diploma.

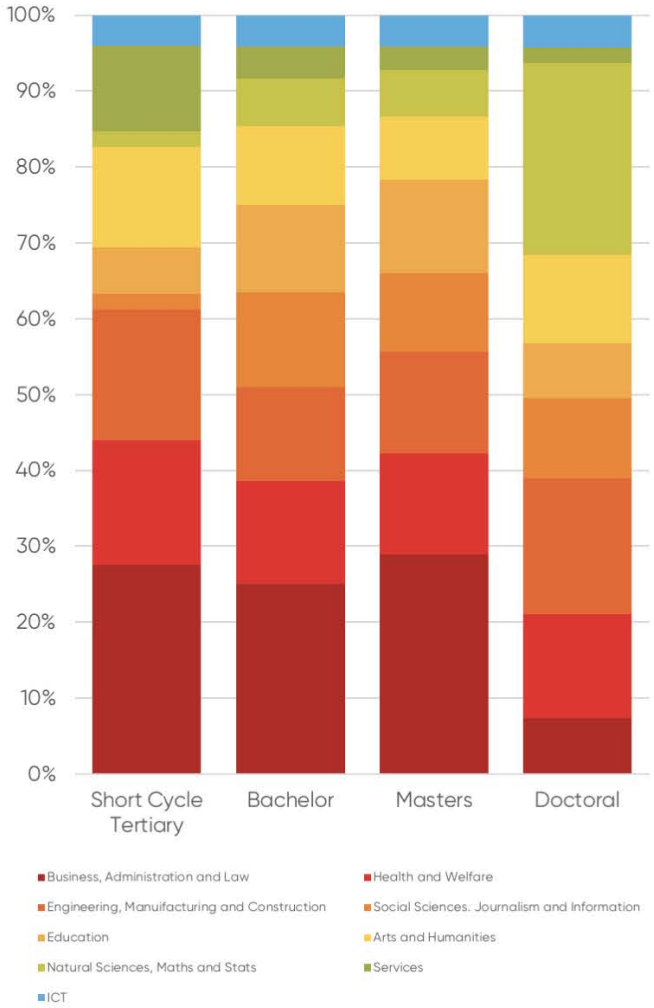
Based on current patterns of graduation, an average of 49% of today's young people across OECD countries are expected to graduate from tertiary education at least once in their lifetime

Distribution of tertiary graduates on average across OECD and partner countries, by field of study



Source: OECD

Distribution of tertiary graduates on average across OECD and partner countries, by field of study



Source: OECD

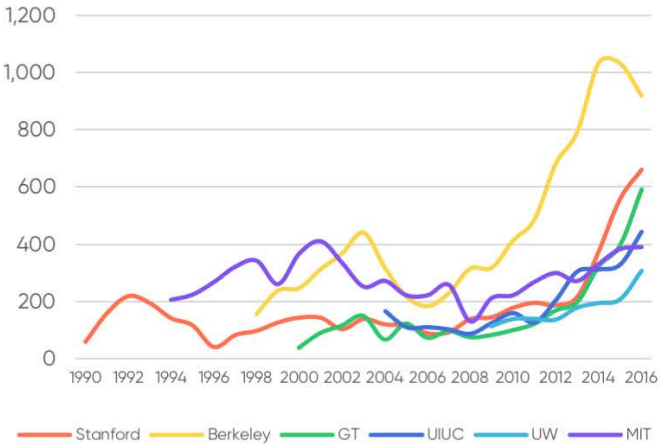
Artificial Intelligence and Machine Learning are one of the fastest growing areas of study underpinning the 'data science' career track

University enrolments in AI and ML have grown dramatically over the past 5 years.

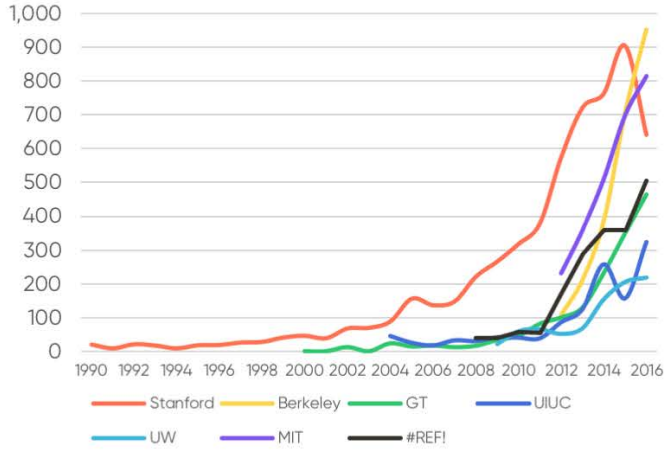
Non degree programs such as MOOCs, nanodegrees and other short-cycle tertiary programs far outweigh university enrolments in AI/ML and are argued by some to have a much higher ROI.

AI and ML will be fascinating areas to watch whether traditional universities can move fast enough to secure the primary skills channel or whether alternate programs deliver skills and outcomes more rapidly for such a fast moving and changing skillset.

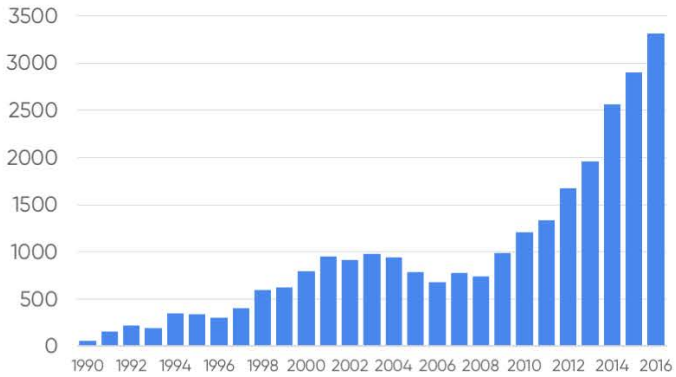
Artificial Intelligence University Course Enrolment



Machine Learning University Course Enrolment

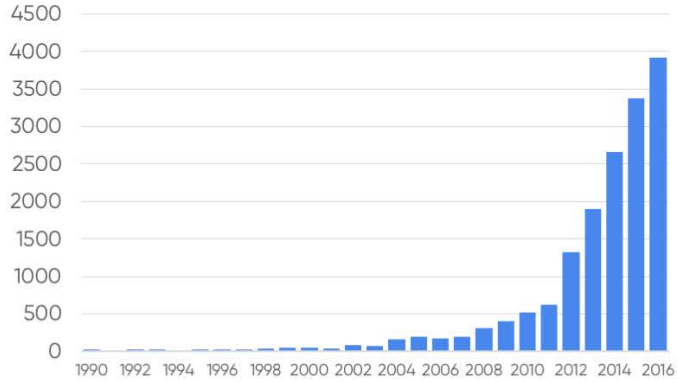


Total Artificial Intelligence Course Enrolment at select Universities.



Source: AI Index, Universities included as above.

Total Machine Learning Course Enrolment at Select Universities.



Source: AI Index, Universities included as above.

Higher education needs to prepare for new models, driven by changes to jobs, new skills and unsustainable student debt.

Another 1 billion learners will join the world in the next 10 years.

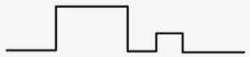
Student numbers will double driven by population growth, enrolment growth and cheaper more accessible education.

1 million additional teachers will be required per year to service this growth.

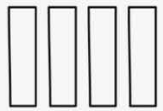
New models for post-secondary education will emerge to deliver outcomes required by the world in 2030.

Stanford 2025 - Designing the future of living and learning at Stanford.

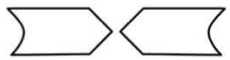
Life long learning

From	To
Students received four years of college education, front-loaded at the beginning of adulthood.	Students received a lifetime of learning opportunities.
	
*4 yrs during ages 18-22	*6 yrs over a lifetime
*Formal learning occurred in the classroom only	*Knowledge was obtained across classrooms and practical settings
*Limited access to academic setting later in life	*Seasoned adults returned to pivot careers and reconnect with community
*Students needed to prove ability by age 18 to be accepted	*Students began studies at a range of ages
*Alumni returned to campus occasionally for selected events	*Populi returned as expert practitioners and enriched campus life

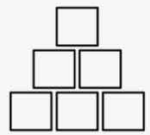
Not all up front

From	To
Structured, 4-year courses of study advanced students by seat hours on a quarterly rhythm.	Three phases of varied lengths provided personalized, adaptive, calibrated learning.
	
*4 yrs: Freshman, Sophomore, Junior, Senior	*6 yrs and 3 phases: Calibrate, Elevate, Activate
*Lecture halls were the predominant teaching spaces	*New spaces were created for reflection and professor-student learning
*10-week courses were the standard	*Faculty offered calibration micro-courses

Flipped

From	To
Knowledge within a particular discipline was the criteria for graduation; skill development was secondary.	Stanford flipped the axes so that skill development became the foundation.
	
*Undergraduate education organized around disciplinary topics	*Undergraduate Skill Acquisition Model now guaranteed fundamental
*University organized by departments based on academic field	*Competency hubs, each with a dean, arranged around campus
*Resumes and transcripts used to communicate acumen to employers	*Skill-prints used to convey a broader story of capabilities and potential

Missions not Majors

From	To
Students declared Majors and focused their studies around set requirements.	Students declared Missions and coupled their disciplinary pursuit with the purpose that fueled it.
	
*Students often declared a major without clear reason	*Students pursued meaning and impact through studies and projects
*Many alumni worked in fields unrelated to their majors	*Alumni cited missions as the compass that guided their careers
*Students deferred work on social issues until later in life	*Global Impact Labs extended platform for faculty research

Source: http://www.stanford2025.com/

MOOCs are maturing rapidly. 80+ million students are studying 9+ thousand courses at 800+ 'universities' around the world.

More than 500 MOOC based credentials are now available.

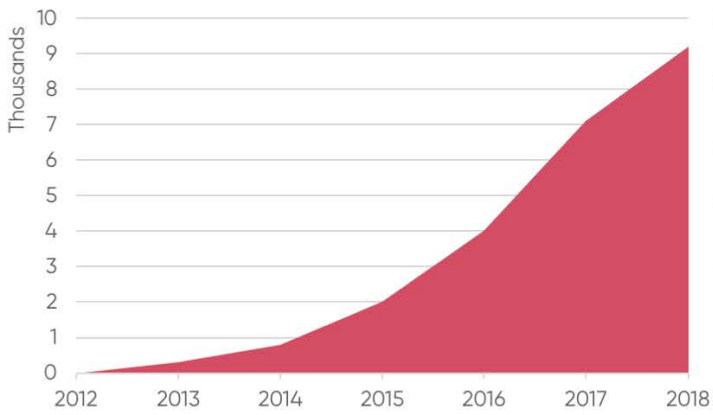
Coursera's 'Specializations' lead the pack (250+), followed by edX (170). XuetangX launched 8 "micro-degrees".

Many (if not the majority) of the new courses that were launched in 2017 are part of credentials.

Several longer courses, originally launched in 2012 and 2013, have been separated into several smaller courses and re-launched, supporting the micro-credentialing trend.

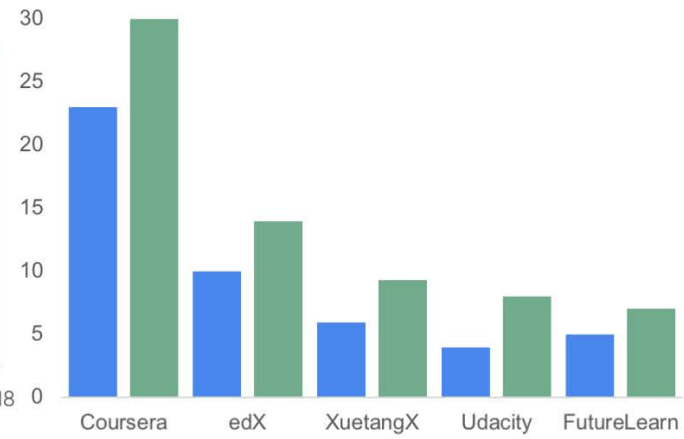
In 2016, session based MOOC's overtook self-paced courses for the first time and by a large margin.

Growth of MOOCs.



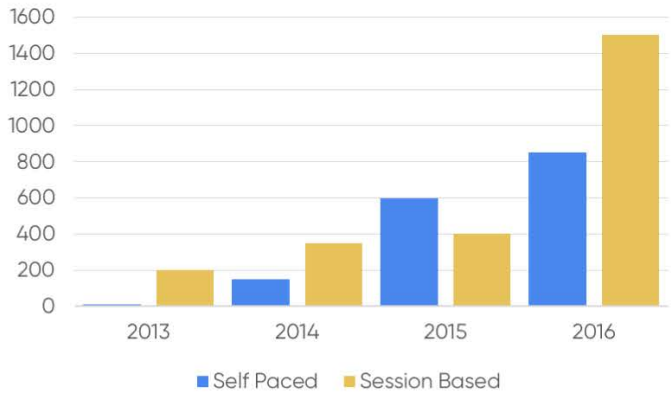
Source: Class Central

MOOCs by registered Users, 2016 vs 2017



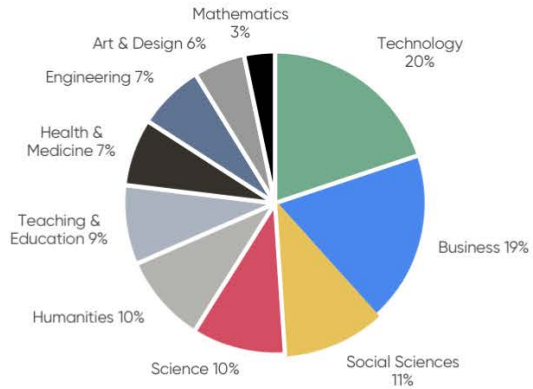
Source: Class Central

MOOCs – Self Paced vs Session Based



Source: Class Central

MOOCs – Course Distribution by Subject



Source: Class Central

Significant demand for English language education is driving the ELT sector with UK, US and AU remaining the top 3 study destinations

English language learners will have grown from 67m in 2013 to 120m in 2017. English language education continues to be a structural growth market, driven by demand from Asia.

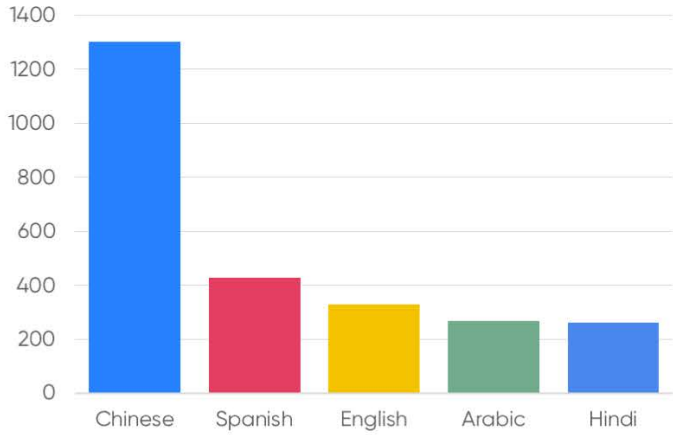
The number of IELTS test takers has grown by 2.5m at a CAGR of 21% from 2001 to 2015.

The UK continues to be the leading region for ELT by number of students however it has declined significantly over the last few years.

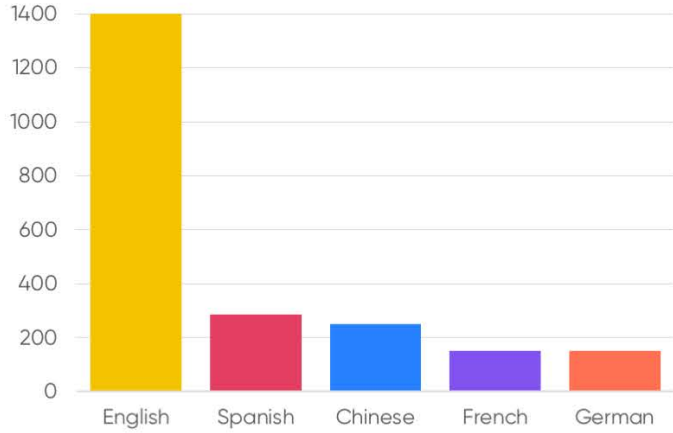
China remains the growth market, with 70% Chinese parents wanting their children to learn English (US $30B market).

Estimated over 50,000 English schools in China, 90% of them private.

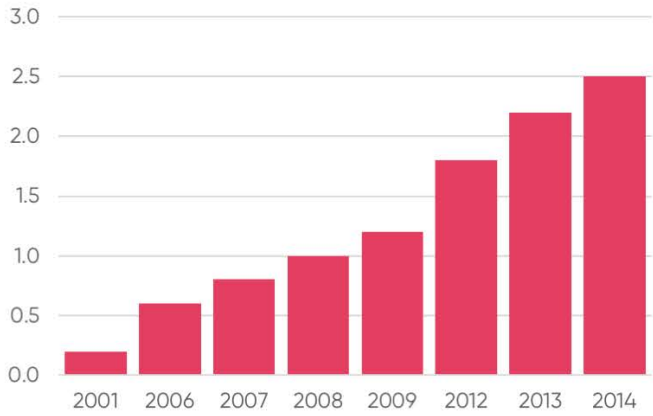
Total number of native language speakers, 2016 (speakers millions)



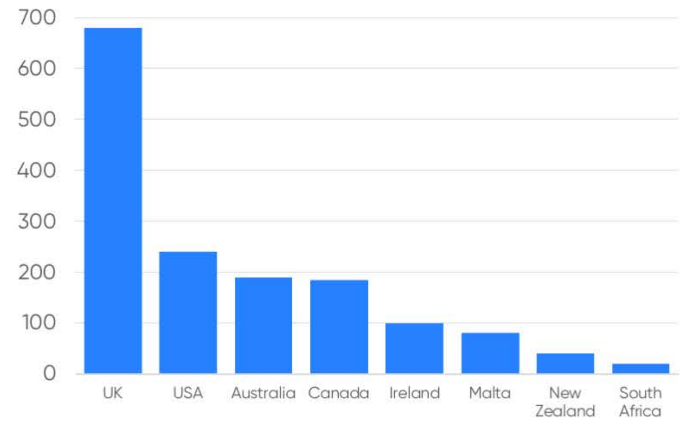
Language by number of learners abroad (speakers thousands)



Number of IELTS test takers over time (millions)



Number of students studying English in 8 major ELT destinations (000's), 2014



Source: IELTs annual review, International Association of Language Centres, Student Marketing 2016

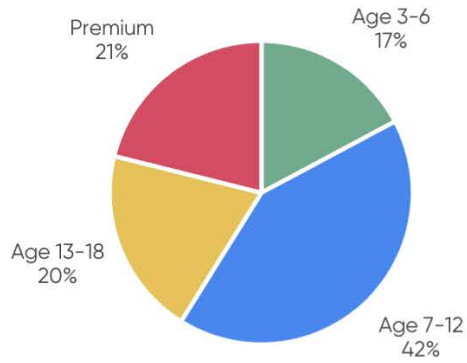
China's ELT market is ~120 million learners today, growing rapidly and is forecast to grow aggressively (25%+ CAGR) through FY20 and beyond

China's English Language Training (ELT) market is growing rapidly, driven by favourable government policies, supportive economic conditions and increasing cultural and societal emphasis on English education.

The Top 10 junior ELT providers in China account for a little over 5% of revenue. The junior ELT market in China remains highly fragmented with significant opportunity for providers to gain market share.

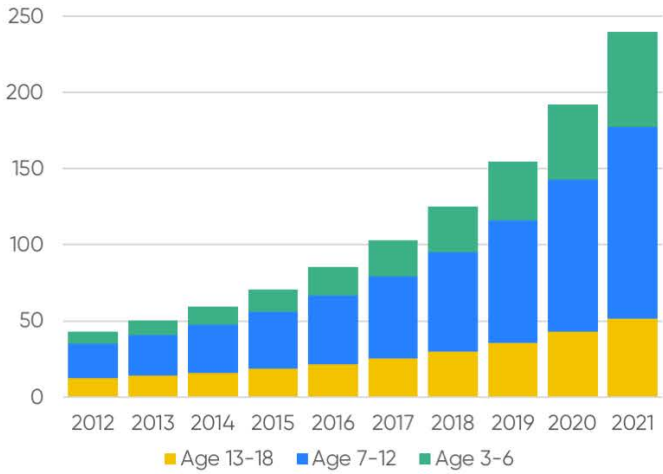
Skilled graduates of the future from emerging economies will be servicing a global employment market, further driving the demand for English language training.

ELT market breakdown (RMB)

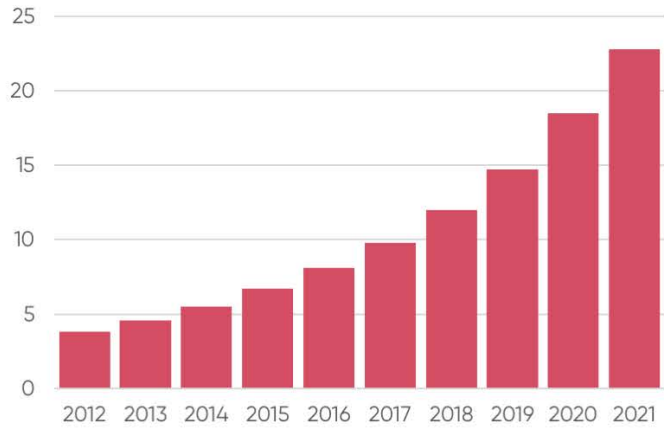


Age 3-6	• Pre School Market • Approx. 30 million learners in 2018 • Fastest growing segment. 25%+ CAGR
Age 7-12	• Primary/Elementary School • Approx. 56 million learners in 2018 • Largest segment making up 42% of the market • Growing above 20% CAGR
Age 13-18	• Middle School and above • Approx. 30 million learners in 2018 • Slowest growing segment but holding 19% CAGR
Premium	• Premium market • Holds 20% of market size in dollars at

ELT market size over time (Millions people)



ELT market size over time (RMB in Billions)



Source: Frost and Sullivan

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