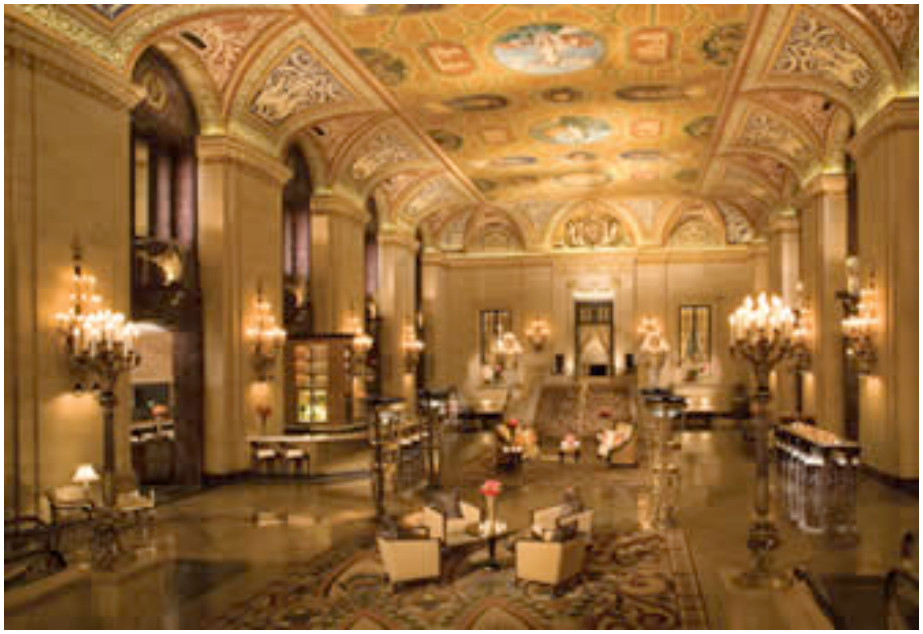
Engineering Education in a Global, Technology-Driven Environment

Prof Dr Seeram Ramakrishna, *FREng, FNAE, FIES*
National University of Singapore

Founder, GEDC



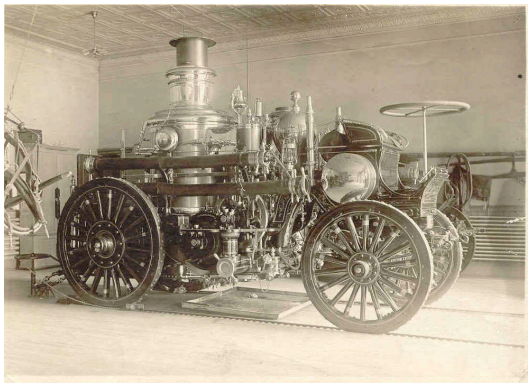
GEDC Paris Declaration
MAY 8 - 9, 2008

GEDC 2013 CHICAGO
Global Engineering Deans Council Conference
Chicago 2013 | October 20-22


Engineering Education in a Global Technology-Driven Environment

Engineering Education in a Global, Technology-Driven Environment

- Our societies are increasingly technology driven
- Innovations inspired the societies & yielded productivity gains



Steam engine

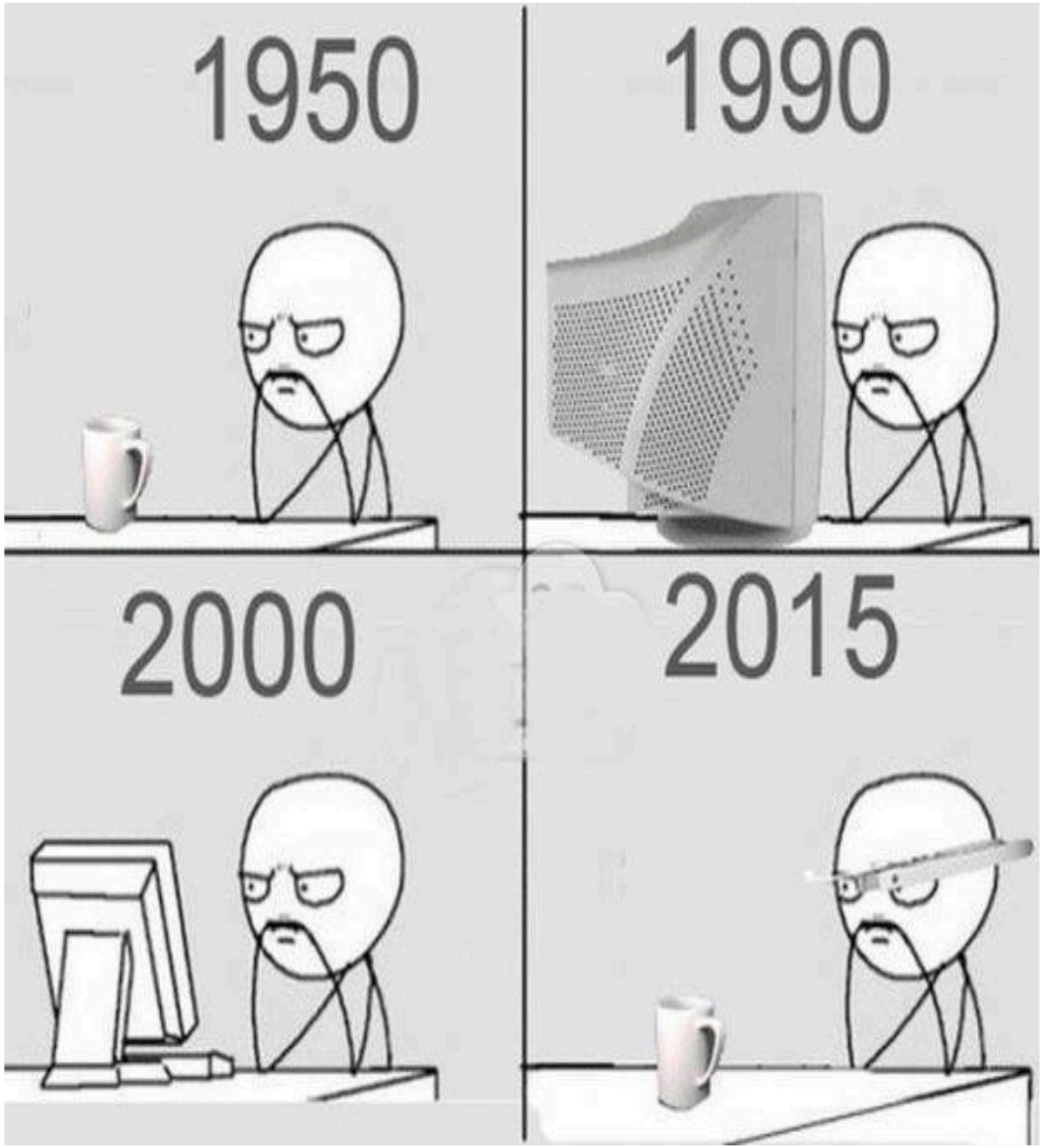
Industrial revolution I

Electricity
IC engines
Communication
Entertainment
Petroleum; Chemicals

Industrial revolution II

Computing
Multmedia
Air transportation
Healthcare

Industrial revolution III

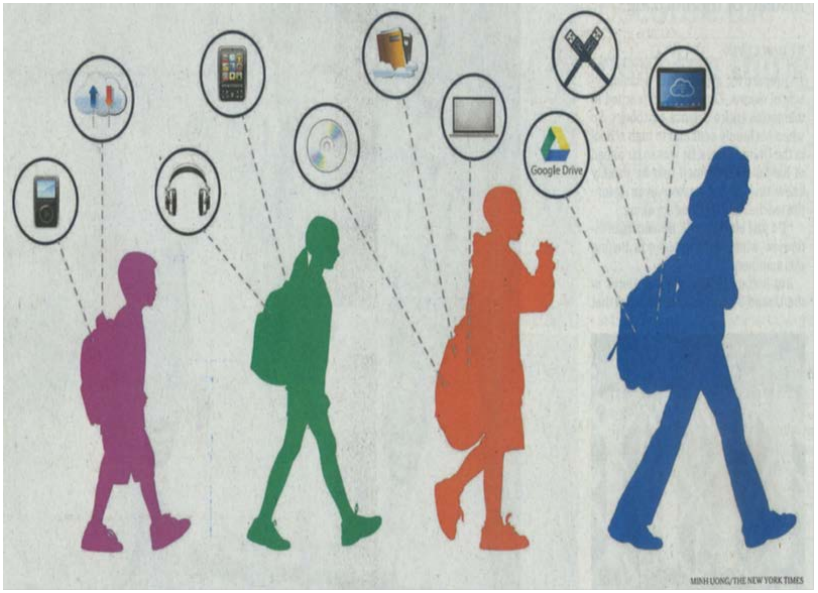


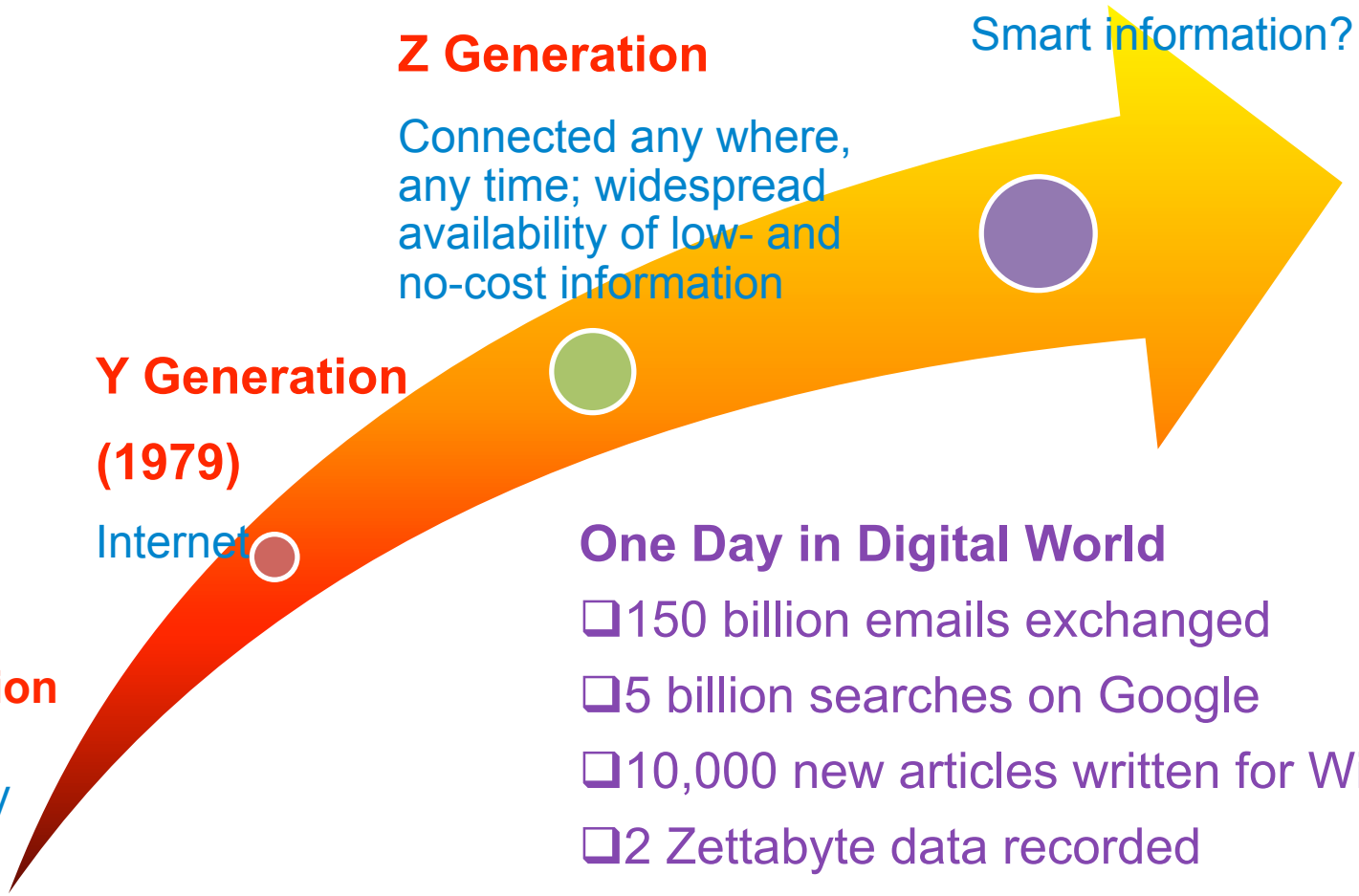
https://www.facebook.com/Trollbook.me

http://www.funnyjunk.com/funny_pictures/4137745/Internet+down/


GPS SAYS...
TURN LEFT NOW!


made by grasundsterne


Google Drive
MINH UONG/THE NEW YORK TIMES



One Day in Digital World

- ❑150 billion emails exchanged
- ❑5 billion searches on Google
- ❑10,000 new articles written for Wikipedia
- ❑2 Zettabyte data recorded

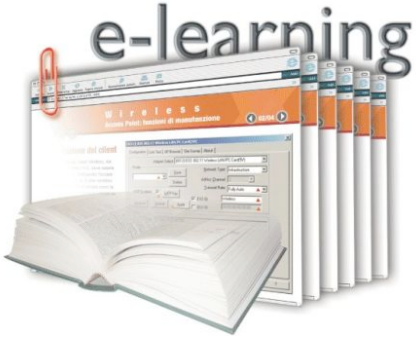
Tools of Teaching and Learning

X-Gen

Minimal technology aids in learning inside or outside class room !

Y-Gen

Z-Gen



Genius Apps Don't Make Your Child Baby Einstein

NATASHA SINGER
NEW YORK TIMES NEWS SERVICE

The Walt Disney Co's "Baby Einstein" videos do not turn babies into prodigies. And despite marketing claims by Fisher-Price, its popular "Laugh & Learn" mobile apps may not teach babies language or counting skills, according to a complaint filed on Wednesday with the Federal Trade Commission.

As mobile devices supplant TV as entertainment vehicles for younger children, media and software companies increasingly see opportunities in the baby learning app market. But the complaint to the FTC by the Campaign for a Commercial-Free Childhood, the same nonprofit that helped prompt Disney to backtrack from Baby Einstein's educational claims, challenges the idea that such apps provide more than simple entertainment value. In addition to the complaint against Fisher-Price "Laugh & Learn" apps, which have been downloaded more than 2.8 million times, the advocacy group filed a similar complaint on Wednesday against apps for babies marketed by Open Solutions, a software developer.

According to the complaints, the companies say in marketing material that their apps teach infants spatial skills, numbers, language or motor skills. But, the complaints claim, there is no rigorous scientific evidence to prove that these kinds of products provide those benefits.

"The baby genius industry is notorious for marketing products as educational, when in fact there is no evidence that they are," said Susan Linn, the director of the Campaign for a Commercial-Free Childhood, which is based in Boston. "Parents deserve honest information about the educational value of the activities they choose for their children and they are not getting it from these companies."

The group's complaints also contend that using such apps "may be detrimental to very young children." Linn said the programs could take time away from activities, like hands-on creative play or face-time with caring adults, that have proven beneficial for infant learning. She noted that the American Academy of Pediatrics recommends parents avoid screen media for children under 2. Kathleen Alfano, the senior director of child research at Fisher-Price, which is owned by Mattel, said that the company conducts extensive research "to create appropriate toys for the ways children play, discover and grow." She added that the company had "appropriately extended these well researched play patterns into the digital space." Stefan Babinec, an executive at Open Solutions, which is based in Bratislava, Slovakia, said that his company's marketing material does not make claims like "get this game and let it teach your child everything." Rather, he said, the company thinks its apps "can help parents with babies, either by entertaining babies or help them see new things, animals, hear their sounds, etc."

The company agrees with the idea that digital screens are not a replacement for live interactions with humans, he added, and assumes that children use its apps together with a parent, sibling or baby sitter.

Jay Mayfield, a spokesman for the FTC, confirmed that the agency had received the complaints but declined to comment on them.

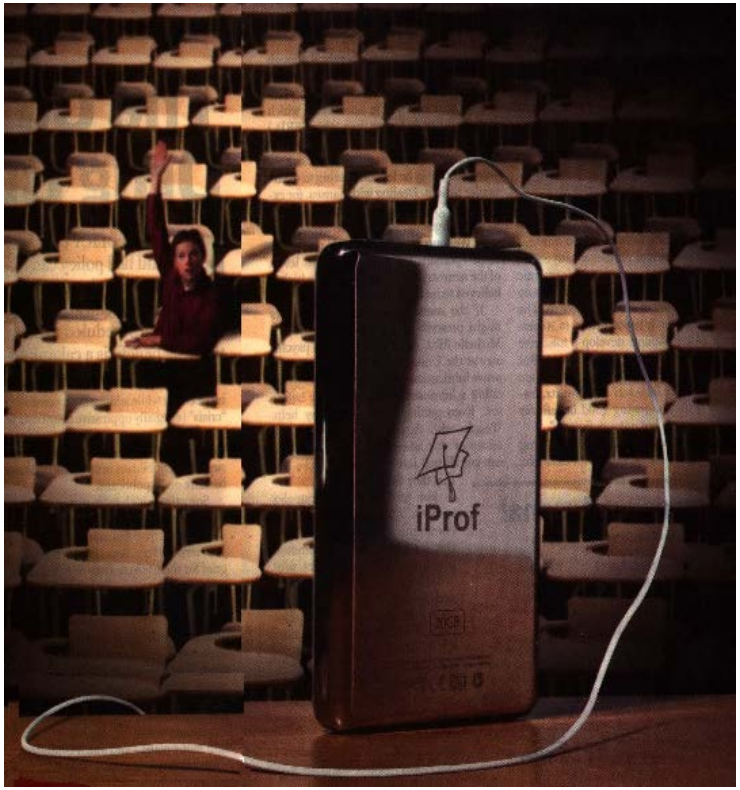
The Campaign for a Commercial-Free Childhood pointed to seven iPhone or iPad apps marketed by Fisher-Price, along with eight by Open Solutions, which have been available for download on the Apple App or iTunes store. The colorful apps feature animated or high-definition illustrations of animal characters who invite younger children to listen to phrases or animal noises or point to the animals' ears, noses and other body parts. The apps are marketed as having educational value for very young children.

The information page for a Fisher-Price iPad app called "Laugh & Learn Let's Count Animals for Baby," for instance, the app says it "teaches numbers and counting (1-10), animals, first words and action/reaction". An information page for an app from Open Solutions called "Baby Hear and Read Verbs" makes more elaborate claims: "Here comes a new and innovative form of kids' education. The application provides learning opportunity to learn how to read, pronounce and spell basic verbs. We have tested this app and the kids and parents simply love it!"

Indeed, Russ Crupnick, senior VP for industry analysis at the NPD Group, a market research firm, said that parents who have downloaded such apps often feel that the technology has made learning more fun and easier for their children. "A lot of parents think these apps are very educational," he said, "especially for younger kids."

The complaints against the app companies are only the latest salvo by the Campaign for a Commercial-Free Childhood against the electronic learning market aimed at infants and toddlers. Several years ago, the group filed a similar complaint against "Baby Einstein", the hugely popular videos for infants; as a result, Disney, which owns the Baby Einstein, ultimately offered refunds to consumers who had bought the products.

Future teaching and learning



Professor, no need to go to class room!

Sit anywhere classroom

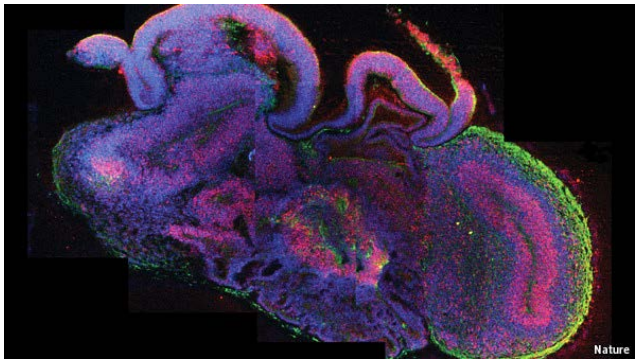
Library in your iPad

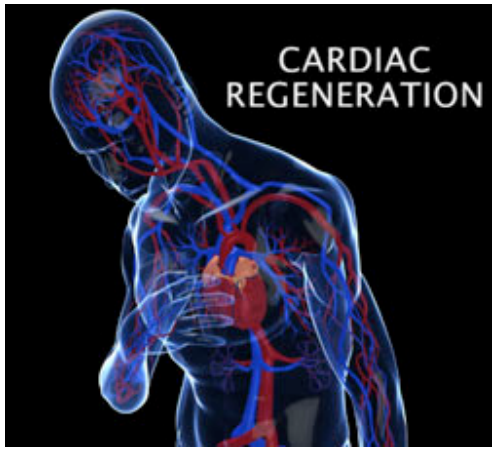
Jamil Salmi, World Bank

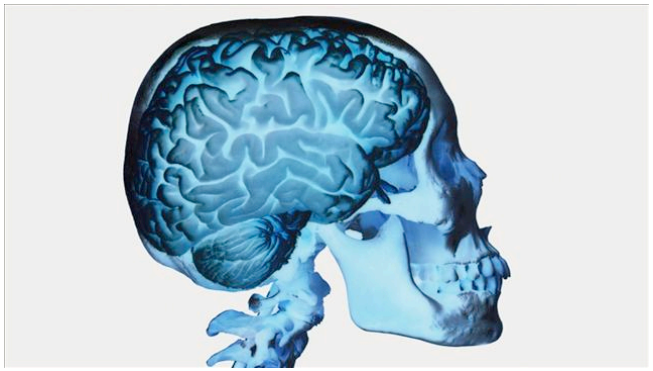
NATHAN WEBER FOR THE NEW YORK TIMES

Members of a church congregation in Chicago using a Bible app called YouVersion on their mobile devices during a sermon. It has been downloaded more than 100 million times.

Medical Advancements







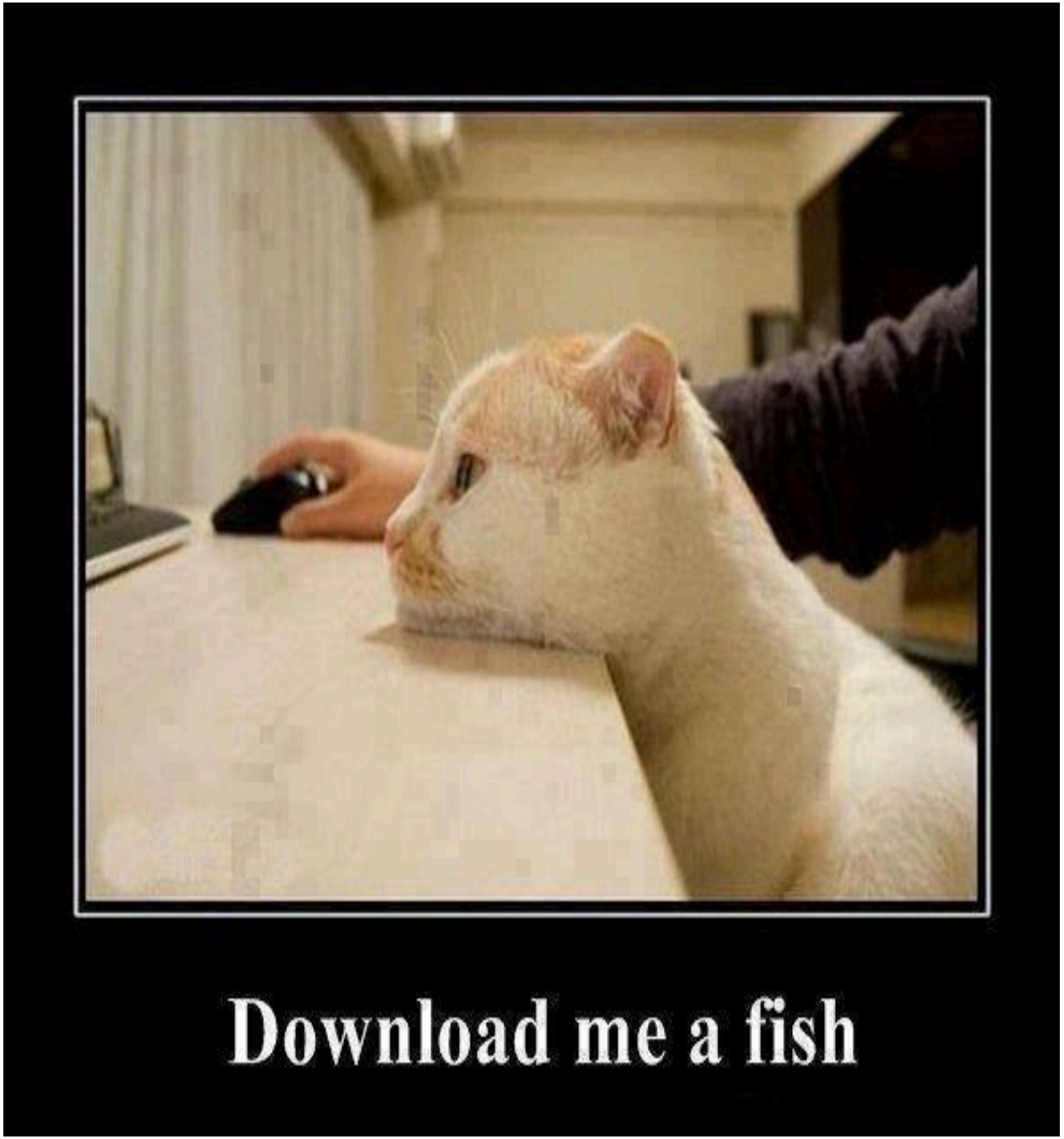
(Reuters) - Scientists have grown the first mini human brains in lab, 29 August 2013, Lancaster, *et al Nature*

Lab grown (In Vitro) meat!

Technology driven environment is ubiquitous

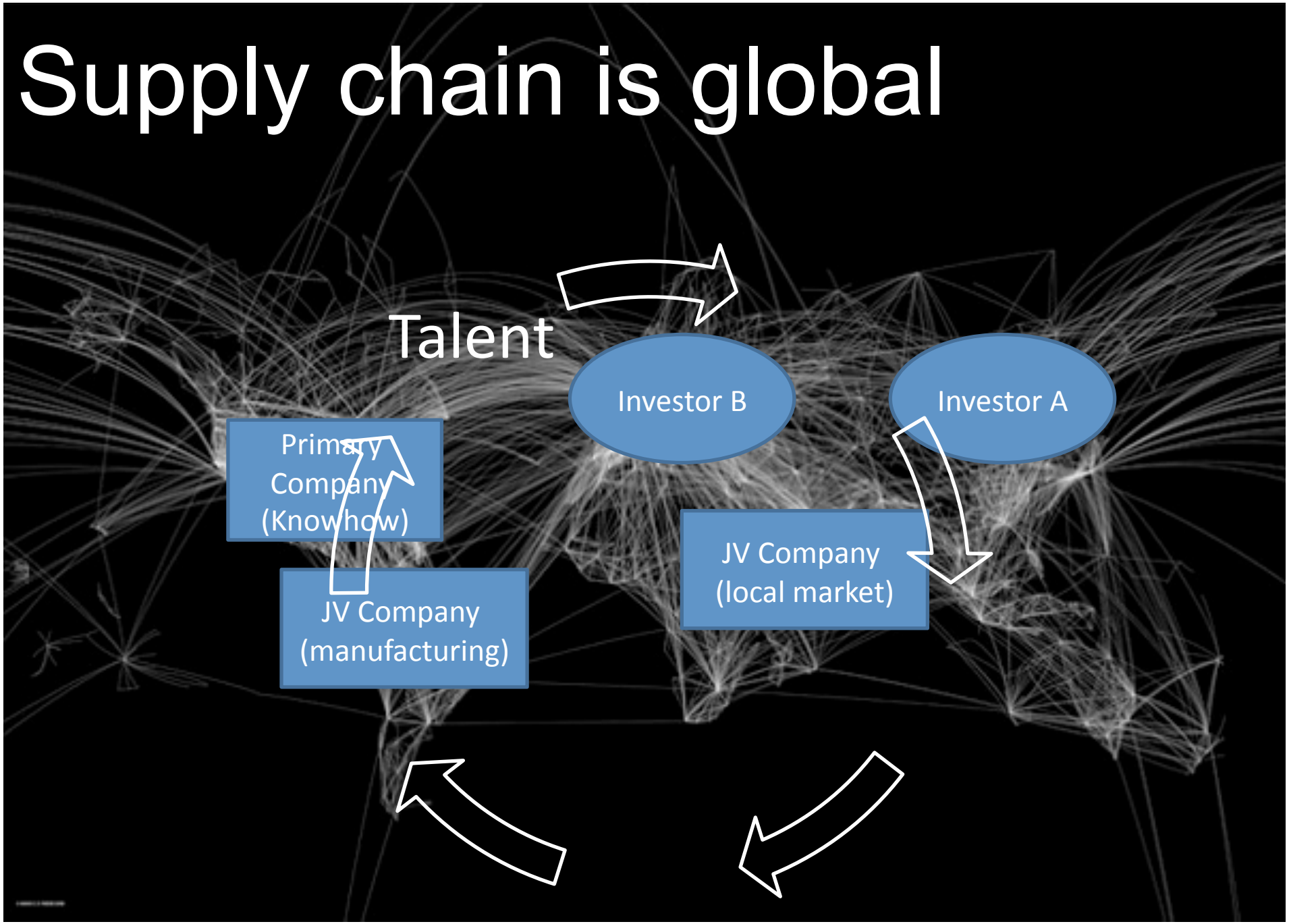
- how we interact with family, friends & governments
- how we live, access services
- how we gather, share information & learn
- how, which, when & where we work
- how we move from anywhere to anywhere
- how we produce and consume
- how we finance activities

skills needed for living have changed for ever ?!


Download me a fish

Engineering Education in a Global, Technology-Driven Environment

Supply chain is global



http://www.blogduwebdesign.com/graphisme/les-50-plus-beaux-graphiques-de-visualisation-de-donnees/25

Pace of innovation is amazing!

Innovation is going global

Up to 1920s

- Significant role of Europe
- Sporadic innovations led by scholars and entrepreneurial individuals
- Apprenticeship model of skills learning
- Limited pool of innovators (~1000)

20th Century

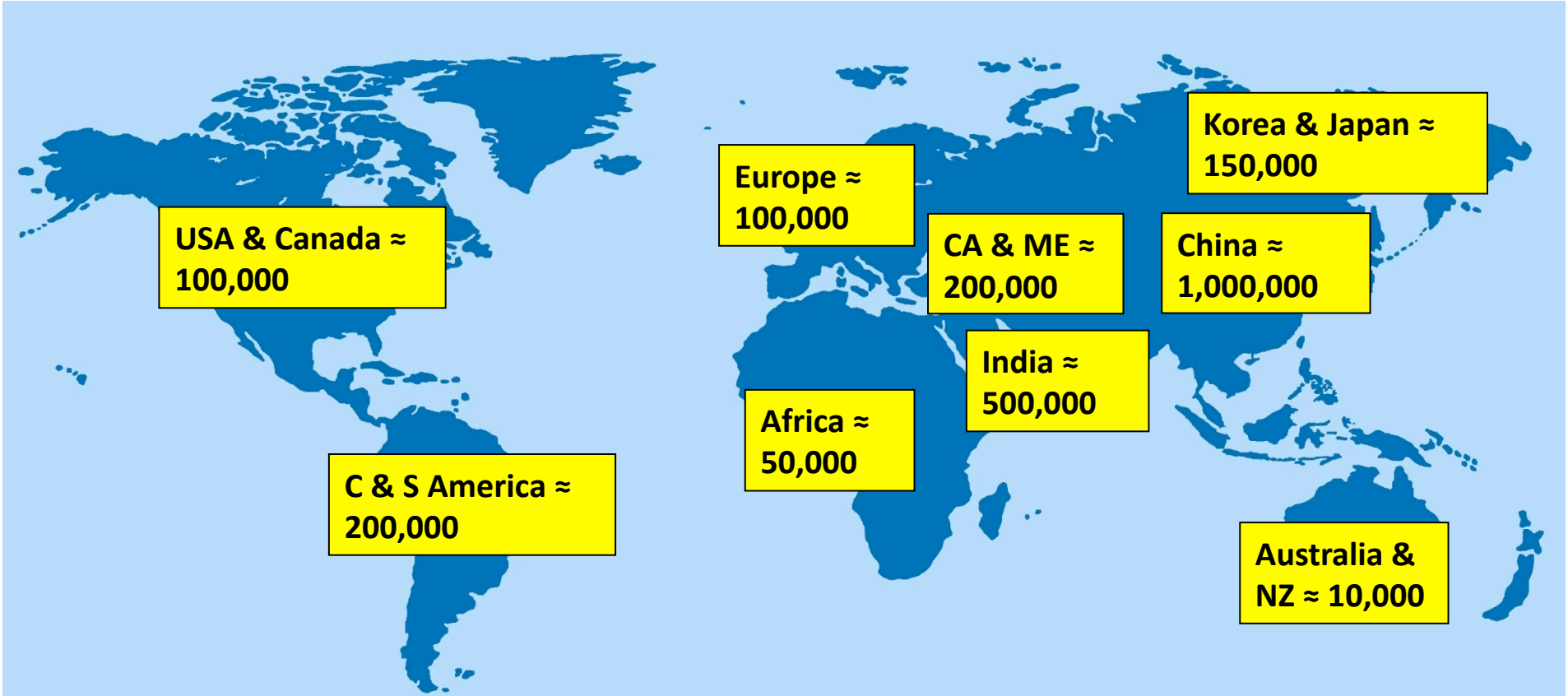
- Significant role of USA
- Corporation led Innovation
- Systematic learning
- Scientific research & technology led innovations
- Standard products for markets around the world

21st Century

- ✓Globally distributed Innovation nodes
- ✓Open source innovation
- ✓Investments by governments around the world
- ✓Participation of universities

Seeram Ramakrishna, Author of The Changing Face of Innovation; National University of Singapore; www.gc-sherie.org *seeram@nus.edu.sg*

Engineering graduates by numbers



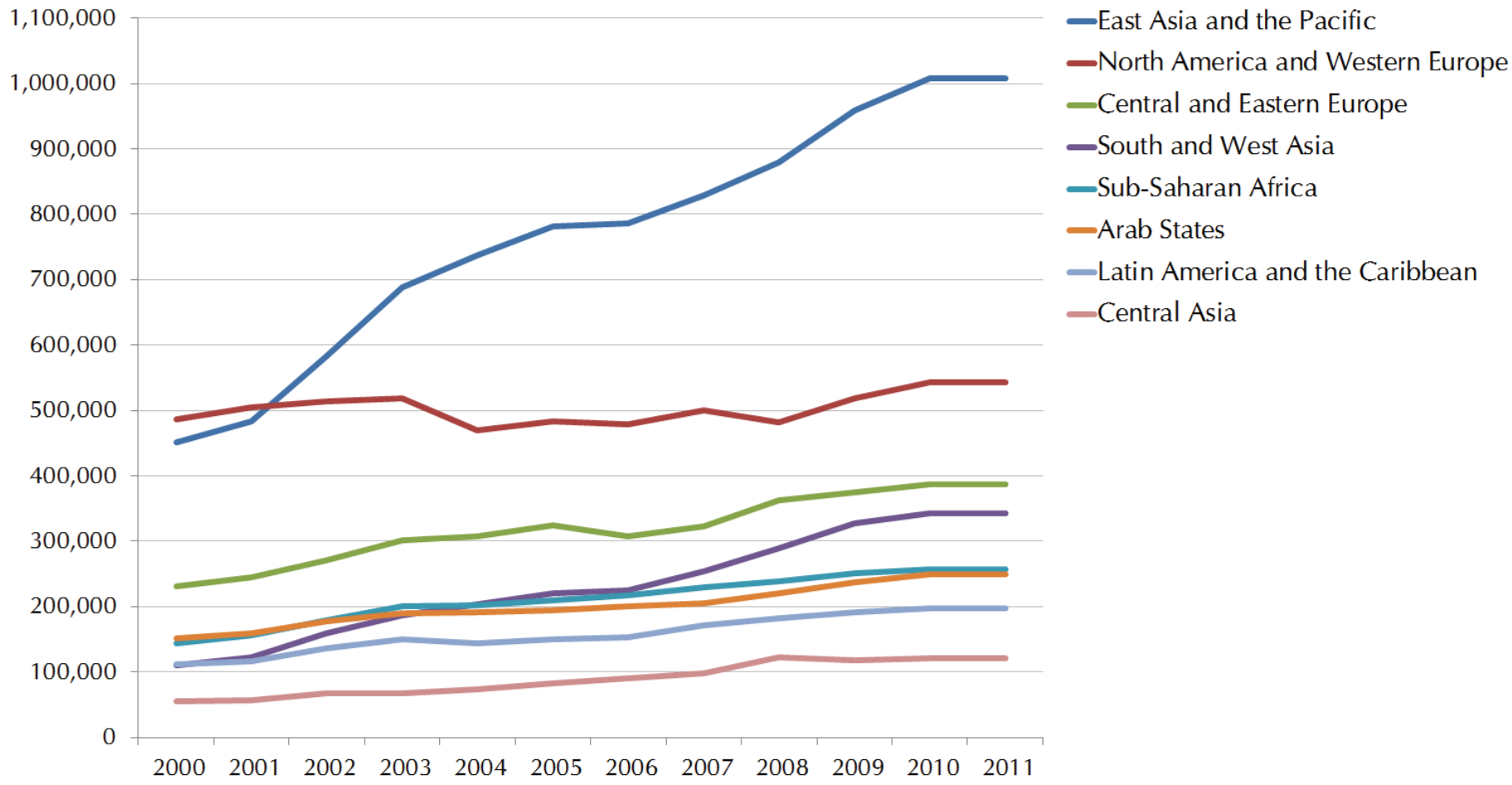
~ two million engineering graduates per annum

~ 6,000 Engineering colleges

GEDC
GLOBAL ENGINEERING DEANS COUNCIL

Seeram Ramakrishna, www.gc-sherie.org

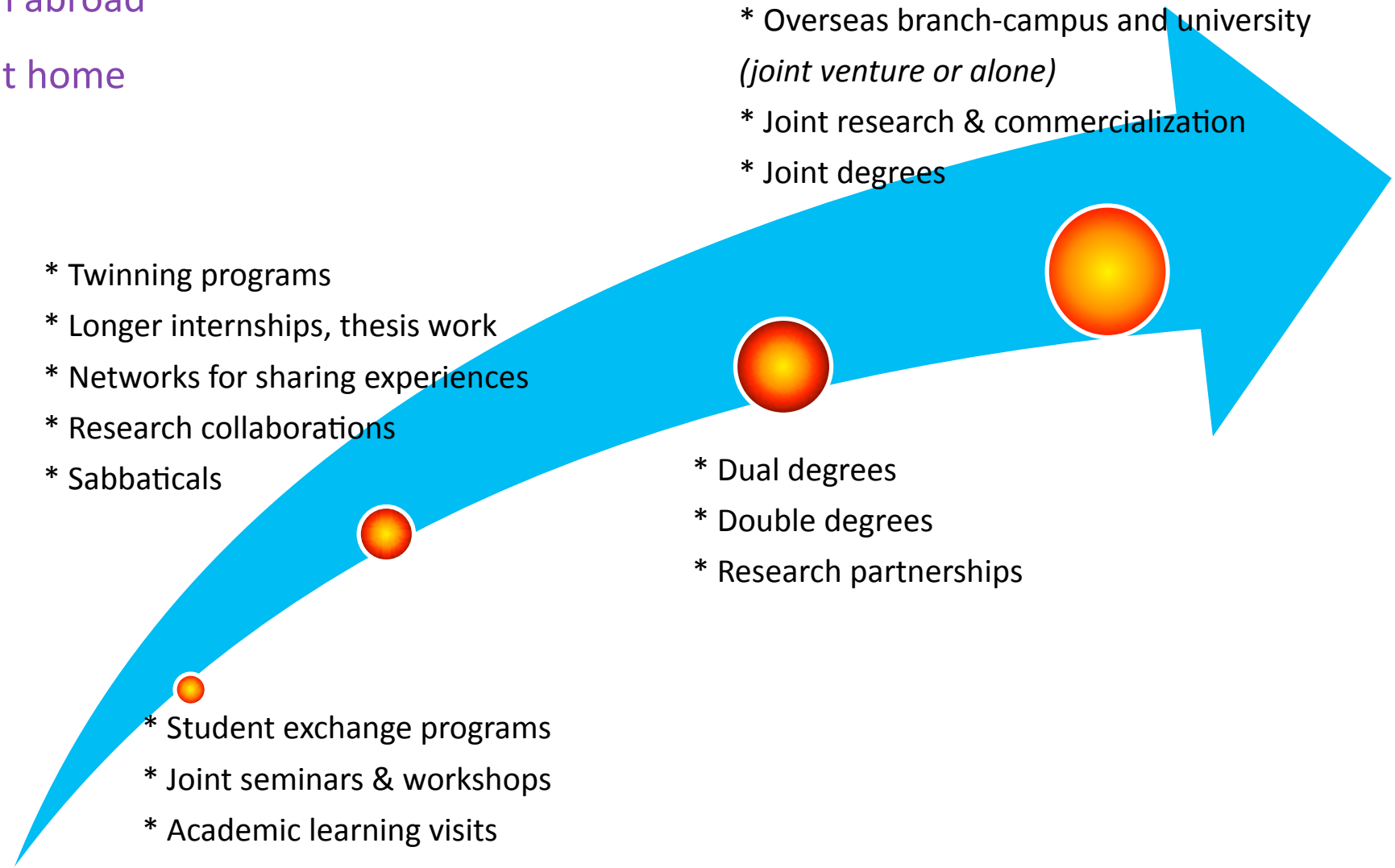
Outbound International Students by Region



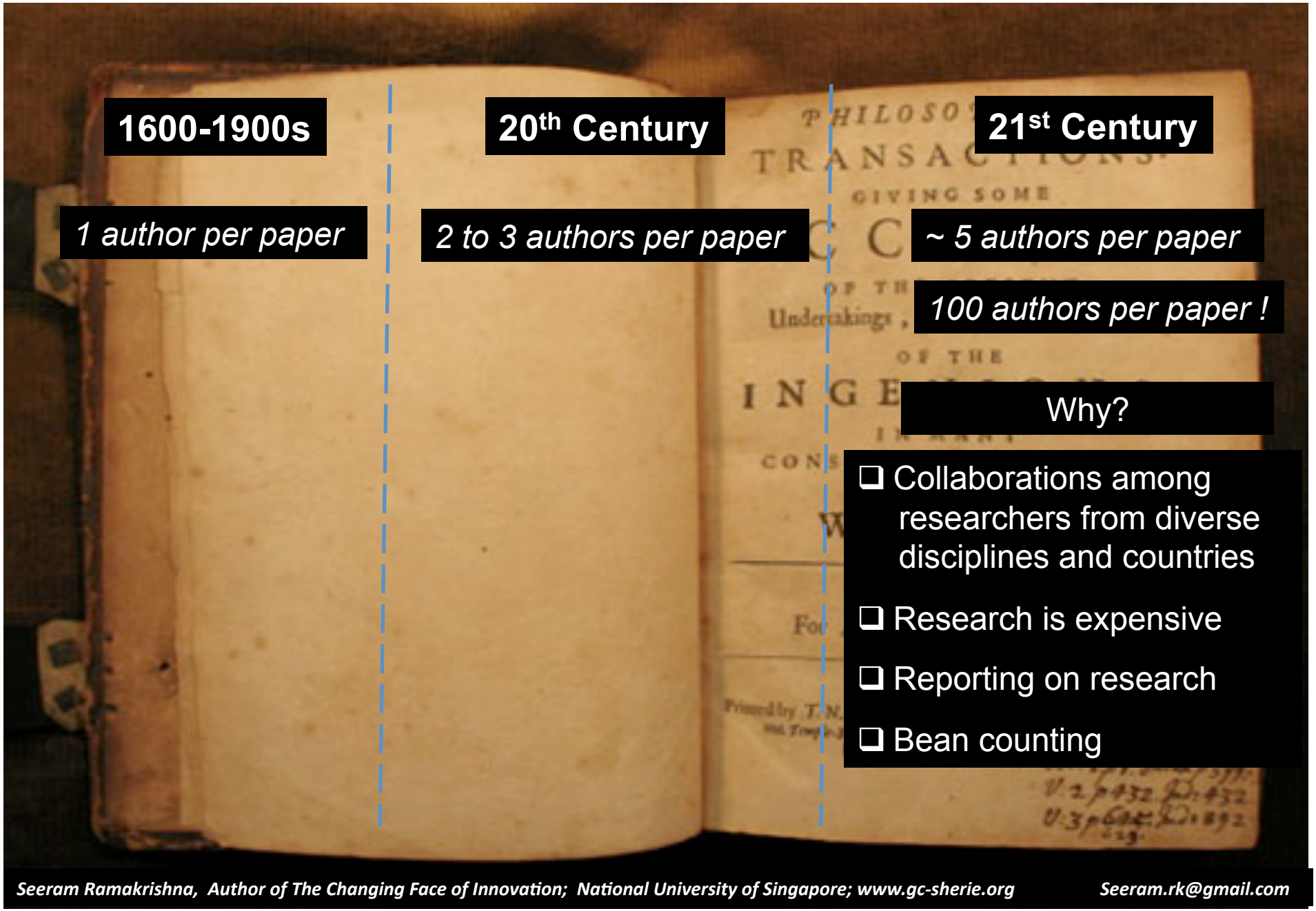
Source: UNESCO

Global learning

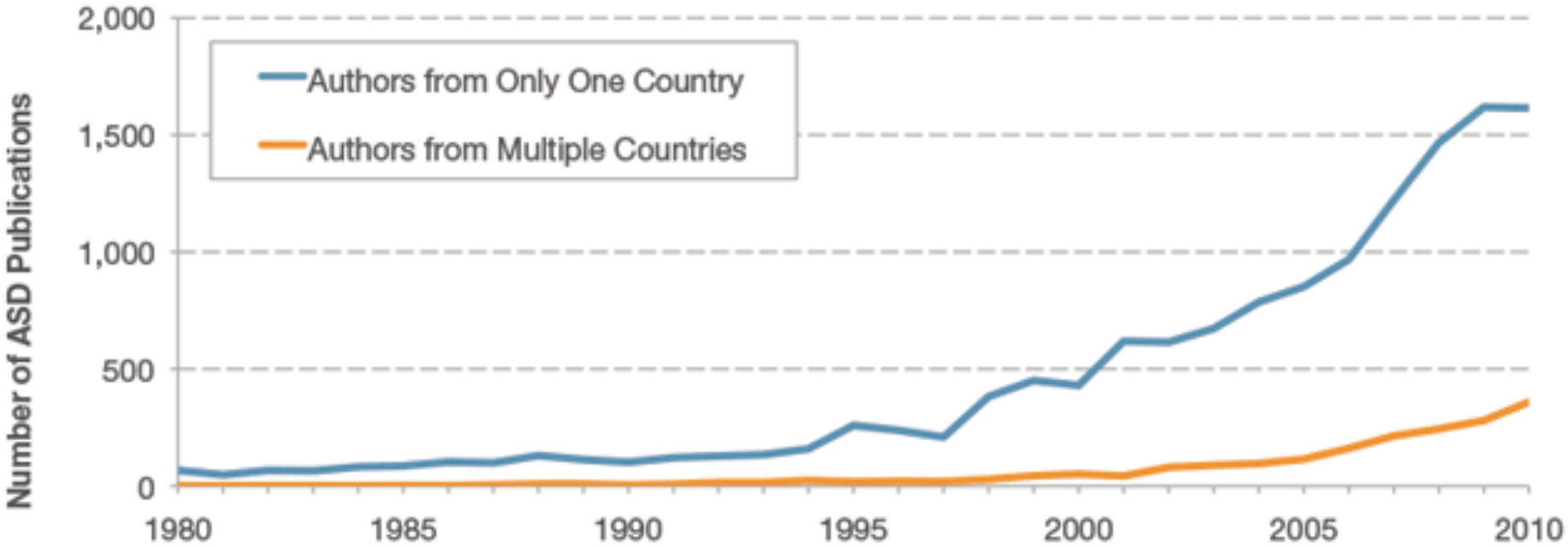
- in abroad
- at home



Scientific Research

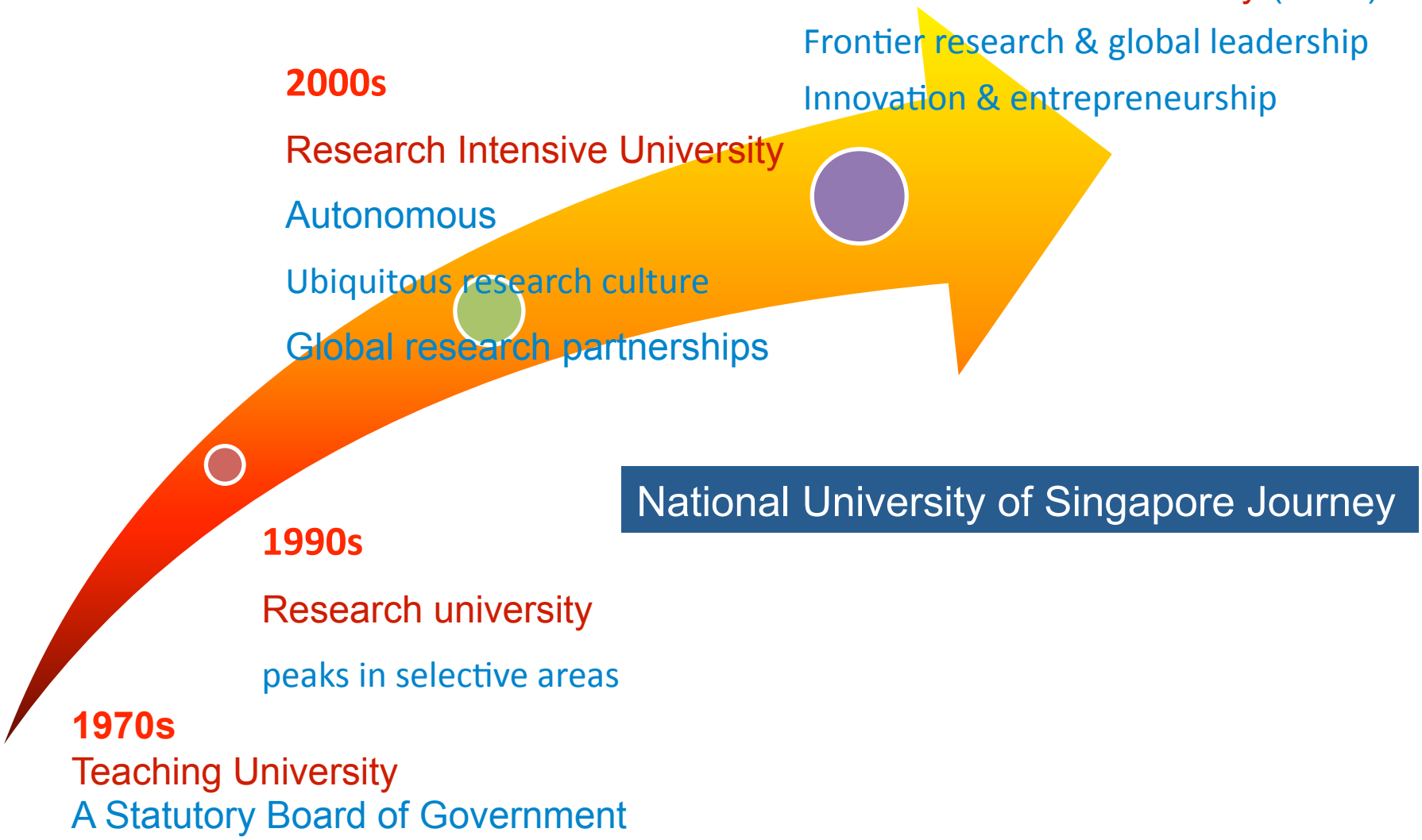


Seeram Ramakrishna, Author of The Changing Face of Innovation; National University of Singapore; www.gc-sherie.org *Seeram.rk@gmail.com*



http://iacc.hhs.gov/publications-analysis/july2012/print_version.jsp

Rise of global research universities



Singapore

Global Partnerships

MIT: Infectious Diseases; Environmental Sensing & Modeling; Bio-Systems and Micromechanics; Future Urban Mobility

ETH, Switzerland: Future Cities Laboratory

UC Berkeley: Sustainable Buildings and Renewable Energy

TUM, Germany: Electromobility in Megacities

Cambridge University: Low carbon processes

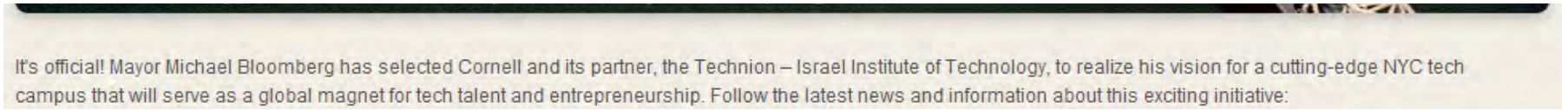
Technion Institute of Technology, Israel: Cardiac Restoration Therapy

Hebrew University of Jerusalem: Mechanisms of Inflammation

Cornell and Technion partner to build a new applied sciences & technology campus in New York City

New York City's information-driven economy is serving as the impetus for the development of many consumer-oriented companies focused specifically on technology to meet end users' needs, including those of NYC's core industries: media, advertising, finance, healthcare, real estate, fashion and design, to name a few.

NYC Tech Campus is centred on flexible and dynamic interdisciplinary application hubs instead of traditional academic departments. The first three hubs – Connective Media, Healthier Life and Built Environment



Global comparison of universities and disciplines

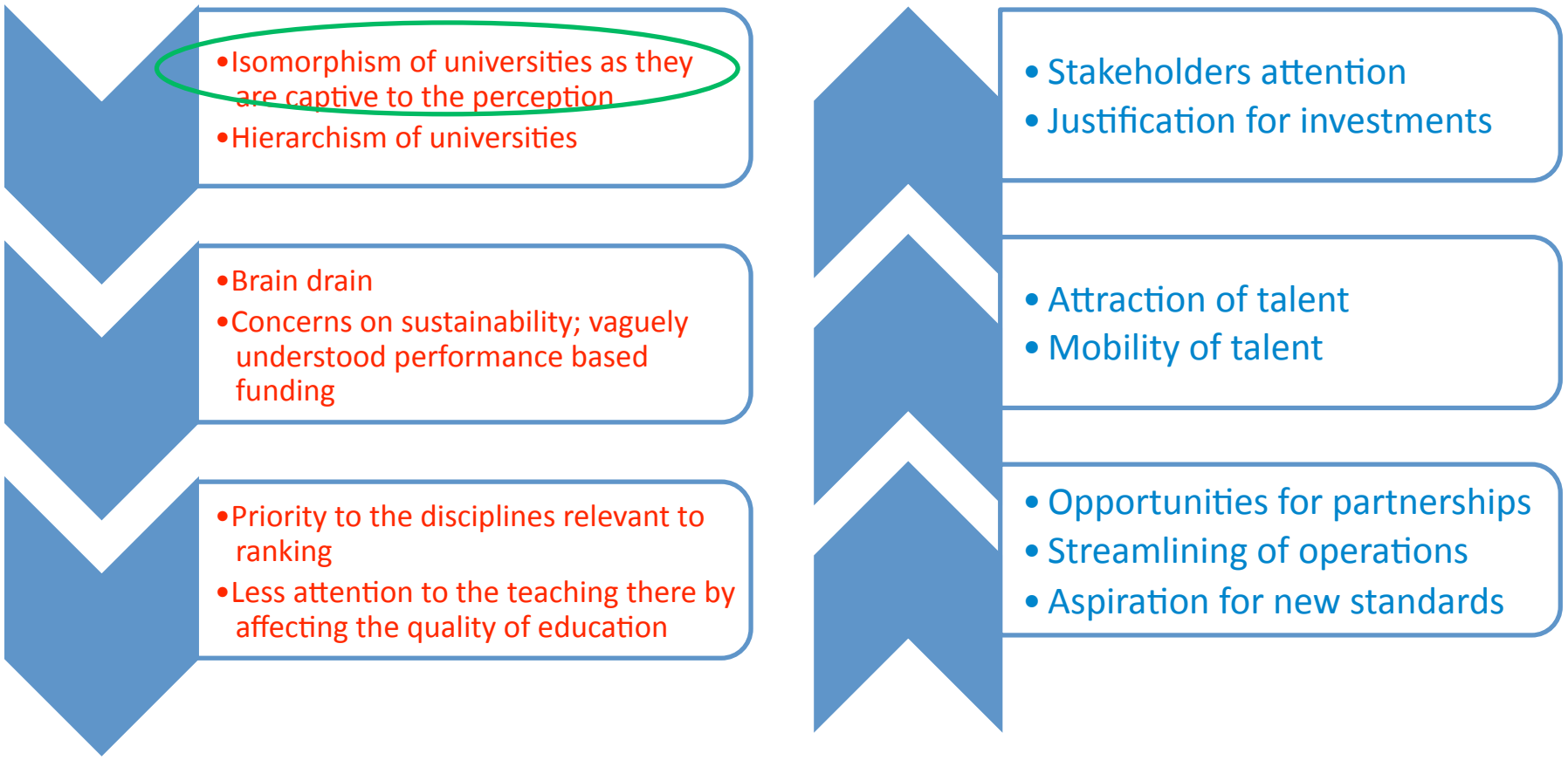
The Australian

WORLD ACADEMIC SUMMIT INNOVATION INDEX

Rank		Average value per researcher (US$)
1	South Korea	97,900 (S$123,100)
2	Singapore	84,500
3	The Netherlands	72,800
4	South Africa	64,400
5	Belgium	63,700
6	Taiwan	53,900
7	China	50,500
8	Sweden	46,100
9	Denmark	43,600
10	India	36,900
11	Russia	36,400
12	Turkey	31,000
13	Canada	27,200
14	United States	25,800
15	Australia	25,600

Sources:
TIMES HIGHER EDUCATION,
THOMSON REUTERS

Implications of Rankings



Tertiary education institutions are subjected to…

US Secretary of Education Arne Duncan called for more accountability in higher education through the development of a university rating system at the TIME Summit on Higher Education, September 2013

Accreditation

(Self) Evaluation

Market Vs Institutional Evaluation ?

Quality Assurance

(Self) Assessment

External Validation

Measure of research quality, significance & impact

Is this the way for engineering research?

Bibliometrics

(No. of Papers; Citations; h index, etc.)

Peer Review

Emerging Trend:

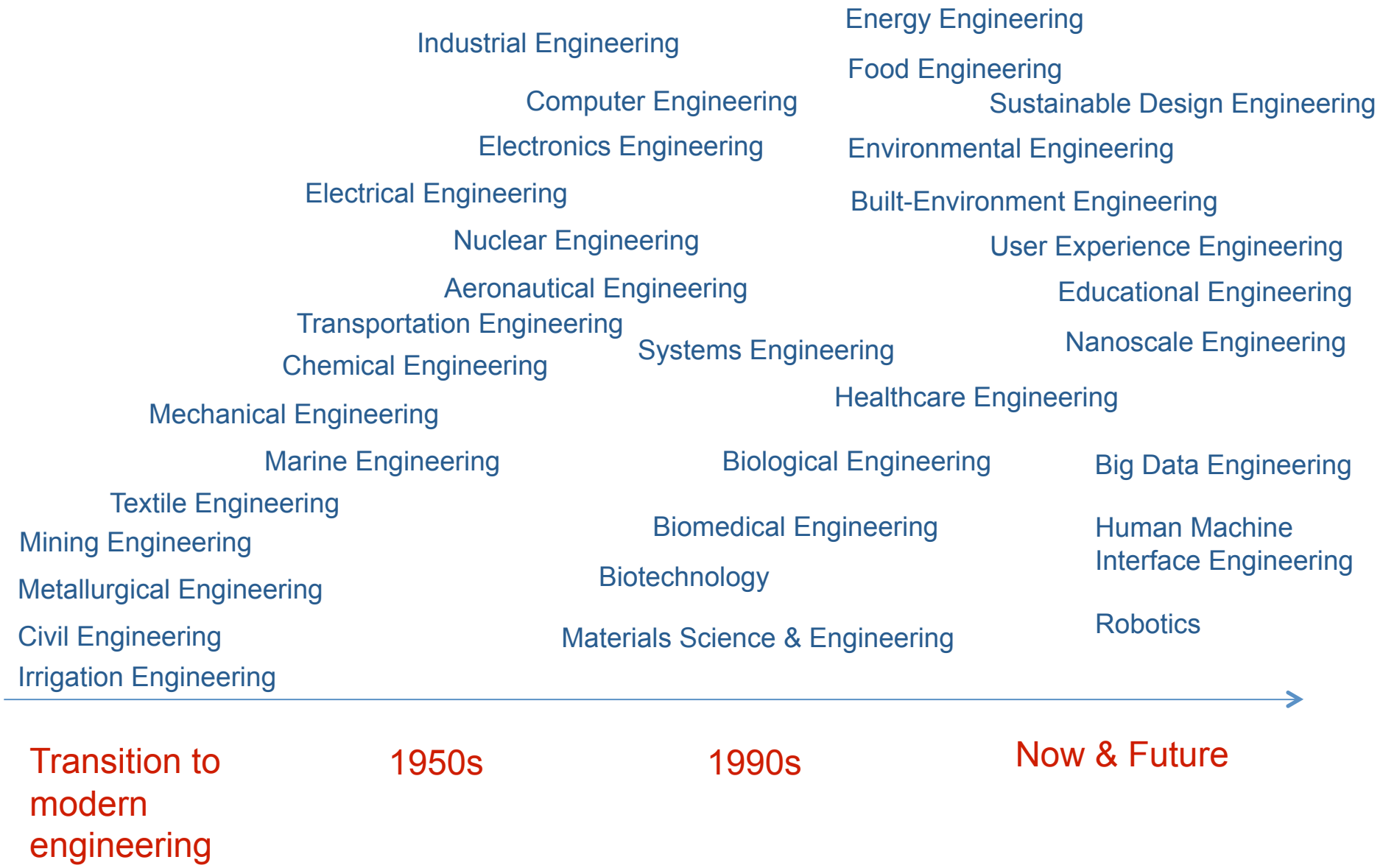
- ❑Reporting on research is a profession by itself now! Many new jobs have been created
- ❑Bibliometrics have been projected as the objective and best proxy indicator
- ❑ Bibliometrics appeal to stakeholders who are away from the operations
- ❑ Enable benchmarking on bigger scale

Traditional Practice:

- ❑ peer review has been the tradition for centuries


Engineering Education in a Global, Technology-Driven Environment

Landscape of Engineering

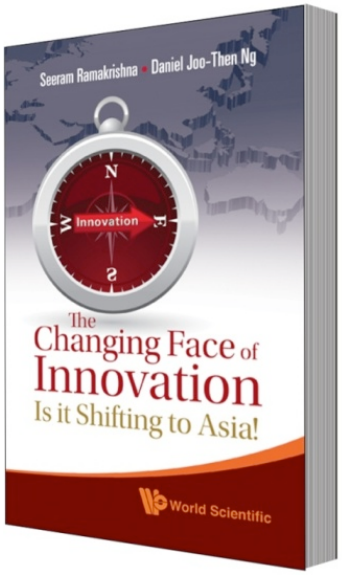


Seeram Ramakrishna, www.gc-sherie.org

Big ideas of the higher education ?

1900s & 50s	1980s & 90s	2000s	Now & Future
Women enrollments	Mass education	Global education	
Research at universities	Private education providers	Glocal education	
		Autonomy	
		Global rankings	

Technology driven environment led to expansion of



200 million students
32% age cohort

25 million papers
10,000 journals

Open
(outsourced)
innovation

Tertiary Graduates

Scientific Papers

Innovative
Products

1950s

2000s


University is a bridge for:
social mobility
innovation

Funding squeeze causes college blues

Education With no tuition fees, universities are overcrowded and teaching is suffering, writes *Eric Frey*

The University of Vienna is one of the world's oldest, dating back some 650 years, and boasts a long list of Nobel Prize winners among its former faculty. But today, there is an atmosphere of gloom in the university's imposing main building on Vienna's Ringstrasse.

The university has dropped to embarrassingly low positions in most international rankings that measure scientific relevance and educational quality. And because of an excess of students – there are 91,000 enrolled – and tighter financial constraints, teaching and studying have become a frustrating and even painful experience for many.

The same is true of most universities in Austria. The combination of an open-access policy, exemption from tuition fees for almost all students and stagnant contributions from the government coffers has undermined the quality of teaching in the most popular subjects and is damaging the country's economic prospects.

In overcrowded departments such as psychology and politics, there is one full professor for every 400 students. Lecture halls fill up hours before the classes start, and even for compulsory seminars students have to line up at four o'clock in the morning to grab one of the scarce spots.

"It is not as disastrous as often depicted, but given that Austria is one of the richest countries in the world, there is a lot of room for improvement," says Hans Pechar, an education expert.

The misery is mostly the consequence of political decisions taken during recent decades. Like in the rest of Europe, the public universities were opened up to the masses in the 1970s. But as enrolment increased, public funds did not grow accordingly and were practically frozen following the recent financial and economic crisis.

Unlike Germany, Austria never instituted a selective admissions process but took in anyone with a *Matura*, the high-school diploma equivalent to the English A-level. A previous conservative government instituted tuition fees of €363 a term a decade ago, but even that puny contribution was abolished just before the 2008 parliamentary election.

Contrary to its promises, the government did not make up the shortfall. Austria's university presidents claim the institutions need an extra €1bn to overcome the present paralysis.

Ailing academy: the University of Vienna has sunk down the global rankings Alamy

> Even for compulsory seminars students have to line up at four o'clock in the morning to grab a spot

The constant tussling between the two coalition parties, the Social Democratic party (SPÖ) and the conservative Austrian People's party (ÖVP), has exacerbated the problems in recent years. Karlheinz Töchterle, the conservative minister in charge of the universities, wants an admissions process that would allow departments to limit the number of university entrants, and would also like to see moderate tuition fees reinstated.

The SPÖ resists both measures, arguing it would prevent children from low-income families from entering higher education. But critics say most students come from a middle-class background and enjoy free study paid for by the public.

Enrolments shot up when the European Court of Justice ruled in 2005 that Austria had to grant all EU students the same free access as it does its own citizens. Thousands of German students who did not meet the tough entrance criteria at home crossed the border to Austria, causing havoc in disciplines such as medicine and psychology.

Admissions to Austria's four medical universities – Vienna, Graz, Innsbruck and Salzburg – subsequently became highly selective, and this month the government agreed on stricter admission standards for several other subjects, including architecture, biology and computer science.

The government's ultimate goal is to switch to a fixed payment for every enrolled student. But the Social Democrats still resist any move that would reduce attendance, pointing to the government's aim of boosting educational qualifications in the workforce.

However, even though up to a third of registered students in some departments hardly attend classes, they nevertheless tie up university resources.

"There is not a single good argument for open access," says Mr Pechar. "That really needs to change."

Ironically, the country's technical colleges, the *Fachhochschulen*, all have admission processes and charge students for tuition. As they often offer a better quality of education, the large research universities have become a sanctuary for students who do not make it into a *Fachhochschule*.

The quality of research at the large universities is often better than the rankings suggest, Mr Pechar says, and the universities have learnt in recent years to gain access to public grants.

The main beneficiary of public support has been the new Institute of Science and Technology (IST Austria), which opened its leafy campus in Klosterneuburg on the outskirts of Vienna in 2009. It received €500m from the provincial government of Lower Austria (Niederösterreich) for construction and was pledged €1.3bn from federal coffers over a 20-year period. In addition, it gained €27m in grants from the European Research Council and other sources, and raised €17m in private donations – an area where the universities have lagged behind so far.

The generosity for IST Austria is controversial among university officials and teachers. "Universities are treated unfairly," says Mr Pechar. "It would have much been better to strengthen existing clusters of excellence."

Other experts say, however, that if Austria wants to compete again in world-class research, IST Austria may be its best bet.

Planning parameters?

- ~ One university per million population
- ~ 5,000 to 10,000 graduates per year per million population
- ~ 50 to 100 PhDs per year per million population

% enrollment in private tertiary education

	0-15%	>15<35%	>35<70%
Emerging countries	Cuba Bhutan North Korea Argentina Thailand Turkey South Africa Kenya Nigeria Uganda	China (15%) Vietnam (15%) Cambodia (15%) Poland (20%) Egypt Kenya Hungary	Indonesia (70%) Malaysia (50%) India (60%) Philippines (70%) Pakistan (35%) Iran (50%) Kazakhstan (50%) Mexico Brazil Peru Chile
High Income countries	Germany New Zealand Australia	USA# (26%) Portugal (30%) Russia	Japan (70%) South Korea (70%) Singapore (40%)

 # USA: *in 1967 about 1% of tertiary students attended for-profit institutions.*
In 2012 about 12% of tertiary students attended for-profit institutions

Source: UNESCO Higher Education Trend Report 2009

Big ideas of the higher education ?

1900s & 50s	1980s & 90s	2000s	Now & Future
Women enrollments	Mass education	Global education	MOOCs
Research at universities	Private education providers	Glocal education	(online digital learning)
		Autonomy	
		Global rankings	

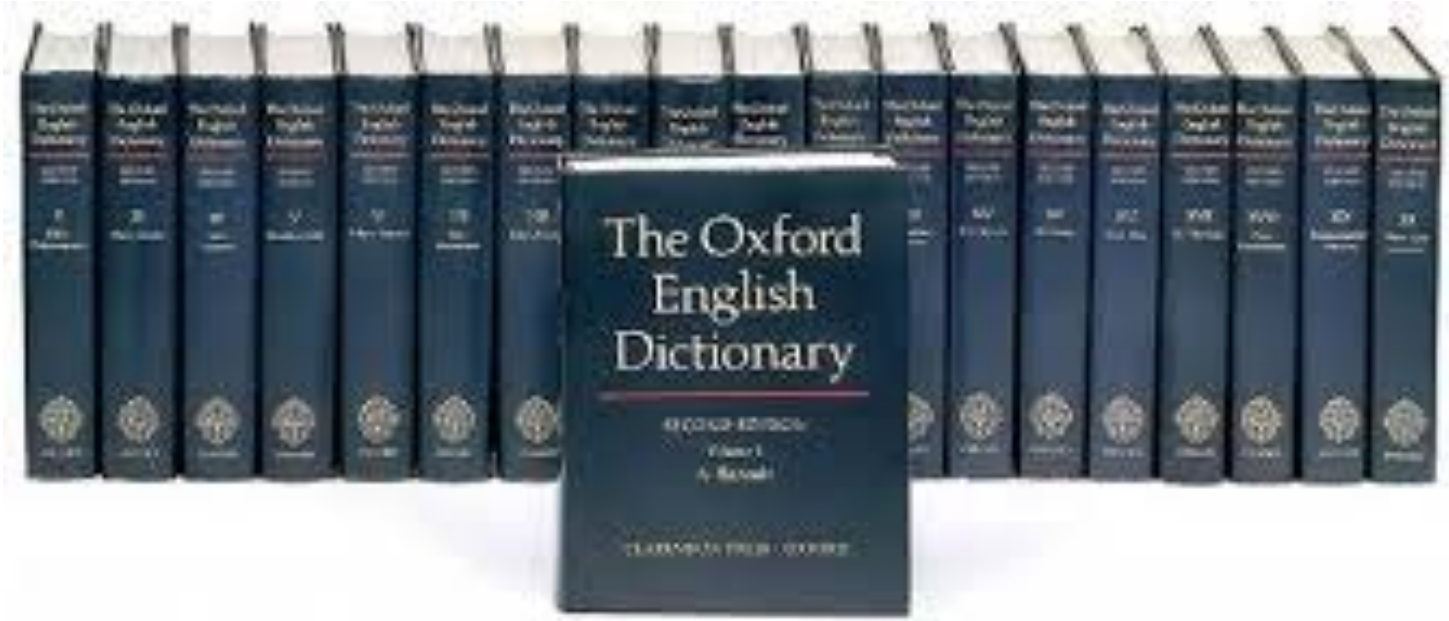
Oxford Language Dictionaries Online
The world's most trusted dictionaries

coursera
edX
UDACITY
University of Maryland University College
UMassOnline
SAINT LEO UNIVERSITY

KHAN ACADEMY

Oxford Dictionaries Online (ODO)

MOOC, n.: a course of study made available over the Internet without charge to a very large number of people.



Second batch graduates at NPS

NPS International School bade goodbye to its second batch of graduating students on March 26. The graduating batch consists of students from CBSE Grade 12 and IB Year 2 who will be appearing for board exams this year. Singapore High Commissioner to Mauritius and chairman of Olam International R. Jayachandran was the guest of honour (seated fifth from left). Dr K.P. Gopalkrishna, chairman and founder, and Dr Bindu Hari, dean of the NPS group of schools, were also present at the ceremony. The IB Year 1 and 2 students raised money for Tan Tock Seng Hospital as part of their CAS (Creativity, Action, Service) and this was presented (right) during the graduation ceremony.

PHOTOS: NPS

Redrawing the tertiary education landscape

Innovative teaching methods and online tools make education more accessible

THE days of using chalk and blackboard for teaching are long gone in many tertiary institutions. Aesthetic powerpoint slides and graphics, on-screen projection systems, video streaming, visualisers and electronic blackboards are now common classroom aids.

These days, students carry laptops, tablets, and iPads to the classroom along with their notebooks and writing accessories. They take notes directly using their information and communication technology (ICT) tools. Some make use of the Internet to quickly know the meaning of new terminology that they come across in the classroom. No wonder then that lecturers are on their toes these days!

innovation
SEERAM RAMAKRISHNA

Thanks to the progress of ICT systems, lecturers are able to conduct Web-based classroom discussions among students, monitor assignments, and facilitate them to learn the concepts while interacting with their peers. It is also possible to make available pre-recorded lecture videos digitally. In other words, the students receive support as and when needed, and connect with the lecture content at their own pace, space and time.

Modern-day lecturing involves enhancing the student-learning outcomes by augmenting the face-to-face classroom teaching with online teaching. A simple survey by show of hands in my class indicated that students prefer face-to-face classroom teaching augmented by online teaching support and resources. This is no surprise as they are Generations Y and Z!

Typical classroom size ranges from 30 to 100 students at world-class universities. In recent years, some faculty members from leading US universities have taken online teaching to a new level. They are offering courses to a large number of interested learners worldwide via the Internet. This is known as MOOCs or Massive Open Online Courses. For example, the Artificial Intelligence online course offered by Stanford University faculty member Sebastian Thrun saw 160,000 signing up for it. UC Berkeley faculty members launched Coursera which claims more than a million learners. Recently, the National University of Singapore signed up with Coursera to offer its own select courses online. MIT, Harvard and UC Berkeley have teamed up and launched edX to offer online courses more widely. The acronym itself suggests the aim of the course. MOOCs are tuition fee-free, and encourage peer-to-peer interactions. They are unaccredited courses with no transferable credits or recognised degree. Those who complete the course successfully will receive a grade with a statement of accomplishment or completion certificate.

Investors in open courseware are seeing potential commercial opportunities. MOOCs are the buzzwords of tertiary education in international media today, and their format is still evolving with the participation of more faculty members and world-class universities.

What makes MOOCs appealing? There are about 180 million students enrolled worldwide in about 20,000 tertiary institutions. The demand for tertiary education is growing and enrolments are projected to reach 260 million by 2025. Going by the various international rankings of universities, only a few hundred are world class.

With the cost of education going up and more students aspiring for quality education, there is growing interest in online courses offered by world-class universities. Teachers at these institutions are often involved in the generation of cutting-edge knowledge. Accessibility of low- or no-cost knowledge and skills from the world's best is appealing to many aspirants and working professionals who wish to upgrade their skills while working and without losing income.

MOOCs are also helpful to pre-university students who are yet to make up their minds on which disciplines to pursue. They also provide students with an opportunity to audit courses and discover their own interests and strengths. They are also a boon to keen learners who come from families with limited financial resources.

Many who opt for online education wish to receive a degree upon successful completion of the courses. This prompted me to take a look at the diverse tertiary education providers worldwide who offer online degrees.

Over the past decade, certain providers have roped in experts and practising professionals, and innovated pedagogy by developing and adopting sophisticated ICT tools to facilitate learning, dynamic interactions and global networking experience among learners in amenable subject areas such as business, accounting, etc. As a result, it is now possible to receive degrees based on full online learning.

The innovations in tertiary education have given knowledge seekers a choice.

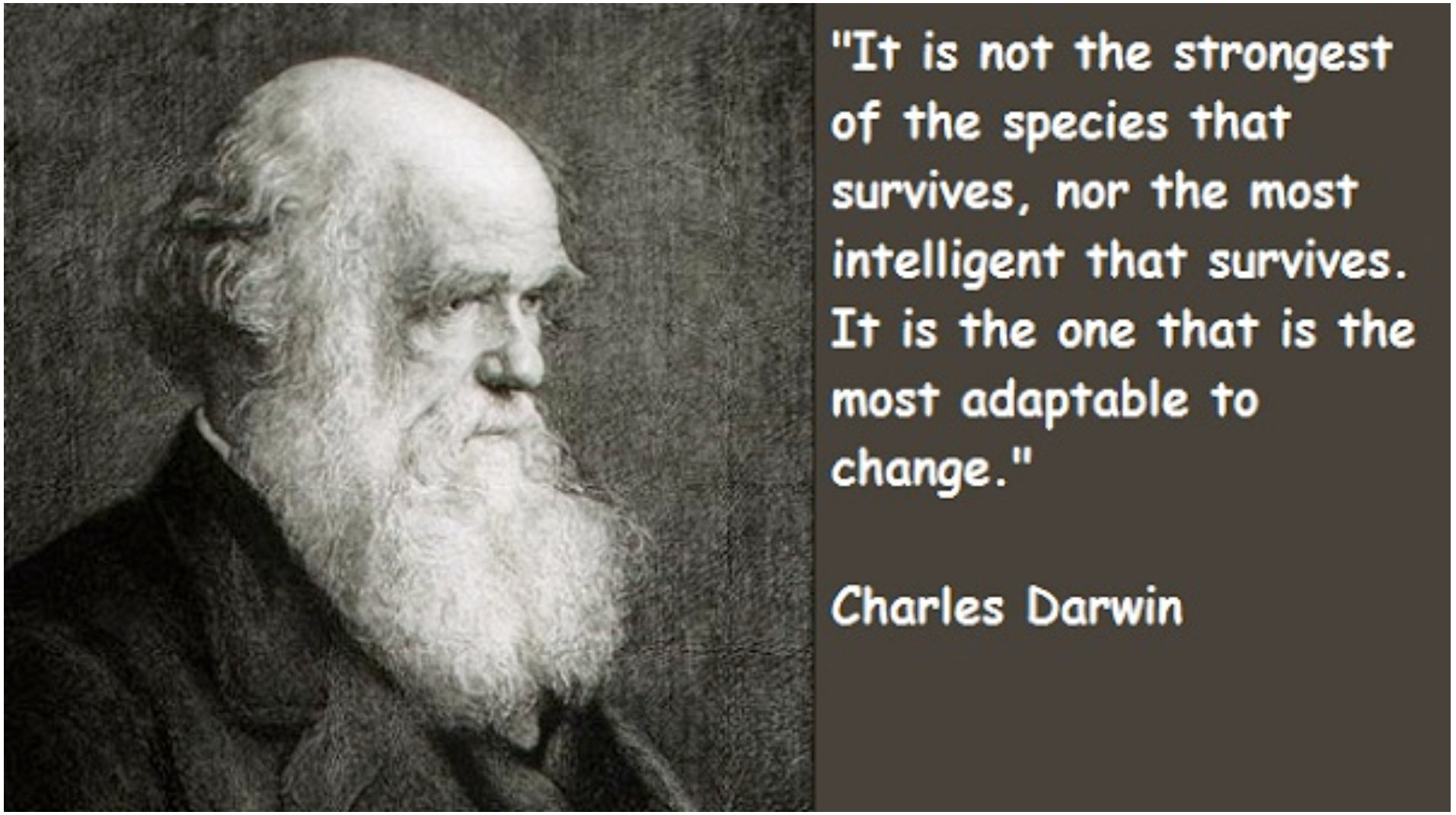
➥ tabla@sph.com.sg

Prof Seeram Ramakrishna is the director of the Centre for Nanofibers & Nanotechnology at the National University of Singapore

"You don't have to worry about my future any more — I just downloaded an entire college education!"

Degrees based on online digital learning

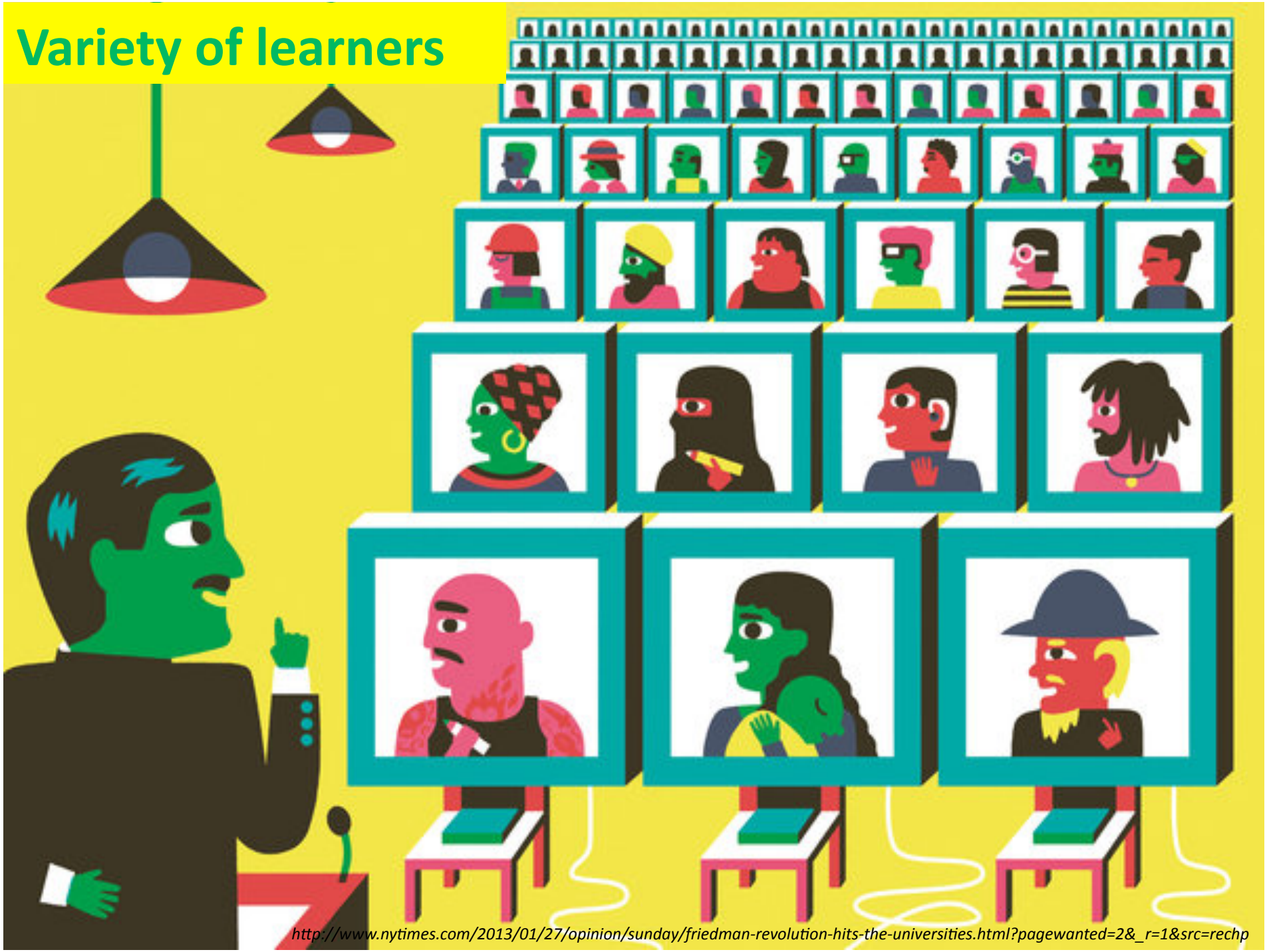
Launched online MBA in 2003



Online learning will make college cheaper. It will also make it better.

L Rafael Reif, President of MIT

Variety of learners



http://www.nytimes.com/2013/01/27/opinion/sunday/friedman-revolution-hits-the-universities.html?pagewanted=2&_r=1&src=rechp

Perfect storm for MOOCs/online digital learning

- ICT progress
- Variety of learners
- Flexibility (learn from anywhere, anytime, anypace)
- Life long learning
- Cost of tertiary education (online education for free?!)
- Limited number of high quality universities
- Universities adapting to the change

Confidence Building

Learning from accomplished professors from world leading universities


MOOCs' Future?


On-LineTeaching Vs Face to Face Classroom Teaching
Yes
No
If this module is offered fully on-line would you take it?
Fully on-line teaching will enhance my learning outcomes i.e. deep conceptual understanding and problem solving skills
Level of student engagement is better in face to face teaching
Level of student engagement is better in fully on-line teaching
Face to face classroom helps me to connect with lecturer & students
Fully on-line teaching helps me to connect with lecturer & students
A blend of face to face classroom teaching and on-line teaching will elevate my learning
I prefer blackboard style of teaching
I prefer ppt style of teaching
I prefer a blend of blackboard and ppt style of teaching
I prefer self-education
14: 10
EXIT
MOOCs

On-LineTeaching Vs Face to Face Classroom Teaching

	Yes	No
If this module is offered fully on-line would you take it?	33%	
Fully on-line teaching will enhance my learning outcomes i.e. deep conceptual understanding and problem solving skills	6%	
Level of student engagement is better in face to face teaching		6%
Level of student engagement is better in fully on-line teaching	6%	
Face to face classroom helps me to connect with lecturer & students		12%
Fully on-line teaching helps me to connect with lecturer & students	12%	
A blend of face to face classroom teaching and on-line teaching will elevate my learning		25%
I prefer blackboard style of teaching	12%	
I prefer ppt style of teaching	6%	
I prefer a blend of blackboard and ppt style of teaching		30%
I prefer self-education	6%	

Regular classroom learning augmented with online digital support is preferred: blended learning or internal MOOCs

Online video lectures, peer assessment, class rooms, engagement, etc.

Real classroom discussions, interactive sessions, problem-solving activities, etc.

Big Screen Vs Small Screen

Survival tips: a) sell the experience and b) expand the pie

Journalists

- Analysts (insights vs news)
- Scholars (book writing)
- Expert commentators
- Star reporting (branding)
- Guanxi

iReporters

Professors

- Analysts
- Scholars (book writing)
- Experts/foresight
- Star lecturers (branding)
- Guanxi
- Mentors/coach

Digital learning

MOOCs (online digital learning) Future

Impediments:

- Criteria used in global rankings of universities
- Accreditation & quality assurance
- Monetization of MOOCs
- Not ready to replace face to face learning with mentors & peers

Opportunities:

- MOOCs will be leveraged by for-profits, on-line, open, new, second tier and third tier universities
- Leading universities are likely to pursue internal MOOCs (blended learning) to embrace change and deliver effective education

makes – more than 4100 to date – which he keeps deliberately simple. You only hear his voice as he works through step-by-step diagrams on an electronic blackboard, as if a friend were sitting beside you. The site now boasts a full maths curriculum – reflecting its origins and his speciality – as well as units in science, computer science, finance and economics, and humanities.

Khan has written a book about his vision for education, *The One World Schoolhouse: Education Reimagined*. He lays out his vision for the future of education, including self-paced learning and the idea of the "flipped classroom", in which students take instruction online outside of class and do their "homework" in the classroom. He also questions Western orthodoxies, such as how many years we attend school, at what age we begin, and why we think it reasonable to move past a unit of study with anything less than total mastery of it.

"Human teachers will become far more valuable in the future"

He was raised by a single mother and attended public schools, discovering an aptitude for maths. "By high school, if you wanted to be a really good competitive student – like if you wanted to get straight As and be top of your class and get high scores – then you had to engage a little bit more seriously, and so I [did]," he says.

In person, Khan's is not a messianic presence. He is whip-smart, but he is also goofily funny, self-deprecating and attentive. He has the unbounded imagination of a computer scientist mixed with the precision of a mathematician, and the endearing geekiness of both. His generosity and self-assuredness are conveyed in the videos he

According to Khan, "the biggest misconception is that this whole project is somehow a way to replace human teachers." But, he says, "human teachers will become far more valuable in the future because [the classroom] will be a more interactive place and they are going to be doing the things computers cannot do, which is form bonds, motivate, mentor, diagnose."

A NEW DAWN IN EDUCATION

THE KHAN ACADEMY

Salman Khan is using the internet to widen access to education – one free video at a time

Speeding through Silicon Valley to Los Altos, my taxi driver is pointing out the headquarters of all the major technology companies I've ever heard of. "There's Microsoft. Intel. Behind there is Yahoo..." he says.

My destination is Mountain View, home to the tiny online non-profit Khan Academy. Words like "world-changing" and "revolutionary" are used to describe the education academy, the core of which is a website featuring free video tutorials and interactive exercises. As well as earning founder Salman Khan a place in *TIME*'s "100 Most Influential People: 2012" list, this virtual learning centre based in California has attracted the support of some very big names, including Bill Gates. "Sal Khan is a true education pioneer," the Microsoft co-founder told *TIME*. "[His] impact on education might be truly incalculable."

BY PIP CUMMINGS
FROM *Good Weekend*

Salman Khan has a mission: a free, world-class education for anyone, anywhere

Big ideas of the higher education ?

1900s & 50s	1980s & 90s	2000s	Now & Future
Women enrollments	Mass education	Global education	MOOCs (online digital learning)
Research at universities	Private education providers	Glocal education	Skills (quality & relevance)
		Autonomy	Life long learning
		Global rankings	The source for innovations

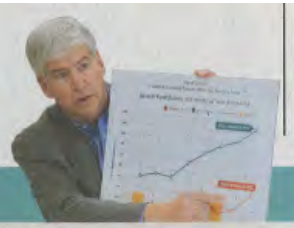

Across the OECD the share of all STEM (science, technology, engineering and mathematics) graduates declined from 22.7% in 2000 to 20.4% in 2010
More over the growing skills shortages have become a global concern


Has A Master Degree
in Electrical Engineering
Becomes Comedian

WORLD

THE STRAITS TIMES
SATURDAY, JULY 20, 2013

A12



A18 Cambodian opposition leader ends exile

A28 Detroit insolvent

"There is a mismatch in what our education system is producing and what industry is looking for."

Academically Adrift (2011) by Richard Arum and Josipa Roksa,

1961: 40 hours per week for school work & studies. Now that had declined to 20 hours.

36% of college graduates had not shown any significant cognitive gains over four years

Almost half of India's 5m fresh degree holders each year are unemployable

Students at Khalsa College in Amritsar. Some 12 million Indians are expected to join the workforce every year over the next decade. PHOTO: AGENCE FRANCE-PRESSE

Chronicle of Higher Education and American Public Media's Marketplace, half of employers say they have trouble finding qualified recent college graduates to hire

ans who receive college degrees every year but are unemployable

our education system is producing and what industry is looking for,"

ers are getting pickier.

Experts said India must im-

hiring firm Vindsor.

mkritti@sph.com.sg

Students are motivated to work on areas related to societal challenges

Materials Today (2013) 16(4), 102-103

At Harvard College, a recent engineering graduate from Sierra-Leone, David Sengeh ’10, worked with researchers on refining an inhalable TB vaccine. Through NGOs he helped distribute mosquito nets in Africa. “It’s not enough just to be a good scientist,” he’s says. “You have to bring science to the smallest village to produce real social impact.”

We need to bring a deeper level of analytical thinking and a new set of social and leadership skills to their education. By doing so, engineers will gain a well-deserved seat at the grown-ups table.

Cherry A. Murray, Dean of Harvard SEAS

Andrew R. Garman, managing partner at New Venture Partners.

Green Tech Humanism Award

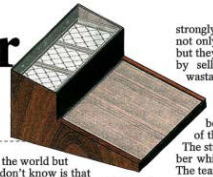
Green Tech Highest Popularity Award

Low Cost Solar Chilli Dehydrator

NUS National University of Singapore

Headline: Spicy news for chilli farmers
Source: *Tabla!*, p8
Date: 1 February 2013

Spicy news for chilli farmers



NUS students design solar dryer for Indian conditions

MOST of us love the spicy flavouring that chilli peppers bring to our dishes in subtle or sharp ways depending on the preparation style. This tradition of using chilli peppers has been passed down for generations in India, where some of the hottest peppers in the world are grown including the Assamese variety which has a rating 10,000 times hotter than Tabasco sauce! But beyond these facts have we thought about where those chillies come from?

A team of seven mechanical engineering students from the National University of Singapore (NUS), which include five Indian nationals – Siddharth Rajgopalan, Kshitij Jhunjhunwala, Nishant Jalgaonkar, Prateek Sinha and Yashvardhan – have decided to explore the farmer's story of growing chillies in India. The other two students in the team, Barry Chew and Sahirul Aidil, are Singaporeans.

Under my supervision the team critically analysed the way chilli is grown and marketed and they designed a device that may be able to empower the farmers.

India is the largest producer and consumer of chillies in the world but what most people don't know is that 30 to 40 per cent of the chillies are lost during the harvesting, processing and assembling process before it reaches us consumers.

One major reason is due to the traditional method of drying chillies in the open because it is exposed to rain, pests and other natural agents. Unfortunately the people most affected by this wastage are the farmers who have to settle for a lower income due to poor quality of a large portion of the chillies. Armed with the hope of bringing change to the farmers, the students' main motivation was to use engineering to empower more farmers to rise out of poverty.

After much research, the team designed an affordable dryer (above is the visual representation of the solar dryer the students plan to build) that helps the farmer dry chillies using the power of the sun. Not only does the dryer help the farmer process chillies in a hygienic and safe environment, it also operates on the renewable energy of the sun which is available in abundance. There have been attempts in the past to make solar dryers but they have never been affordable or long lasting for the farmers.

The students estimate that the dryer they have designed will be able to dry 100kg of fresh chillies in two days as opposed to three weeks required for drying them in the open sun. The team strongly feels that by using their dryer farmers will not only be able to process chillies more efficiently but they will also be able to obtain a higher income by selling better quality chillies with minimal wastage.

Moving forward, the team has planned a trip to India to meet farmers and get more information about their situation. They will be using this information to build a prototype of the dryer as part of their curriculum in NUS. The students hope to build the prototype by October which they estimate would cost around $400. The team hopes to raise funding to conduct field research in Indian villages as well as cover the expenses of building a second prototype in India.

Using their learning experience from the solar chilli dryer they are keen to design similar solar dryers for other agricultural products as well. They have just got started on a journey with the aim of using engineering to bring change to the world. I see a bright future ahead with more students stepping up to take action on different issues that the world is facing.

➥ tabla@sph.com.sg

Prof Seeram Ramakrishna is the director of the Centre for Nanofibers & Nanotechnology at the National University of Singapore

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UNIVERSITY of CAMBRIDGE International Examinations
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Powered by Renewable Energy
Independent of electricity from the grid
No Production of greenhouse gases
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Materials can be recycled or reused
CO2
LOCALLY SOURCED

~ 50% of degree holders are holding jobs that do not require a degree

McKinsey & Co report dated 2013

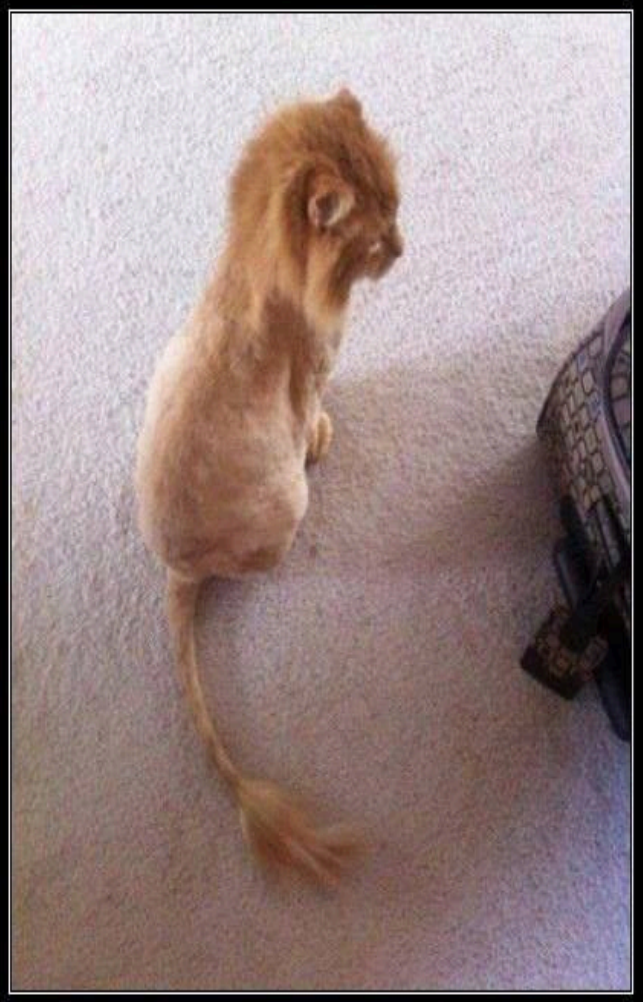
The biggest challenge of massified higher education systems is to produce graduates qualified to work in modern economies and enable sustainable development

Way Forward

- ❑ Proficient in the use of ICT
- ❑ Problem solving skills
- ❑ Real world experience
- ❑ Knowledge of diverse cultures & approaches
- ❑ Life long learning

For Millennials, the tertiary education is different. It is not about coming out of poverty. It is about personal fulfillment.

Skills & Experience



Tailor education to an individual’s interest and capabilities


Thank you
Singapore
seeram@nus.edu.sg
seeram.rk@gmail.com