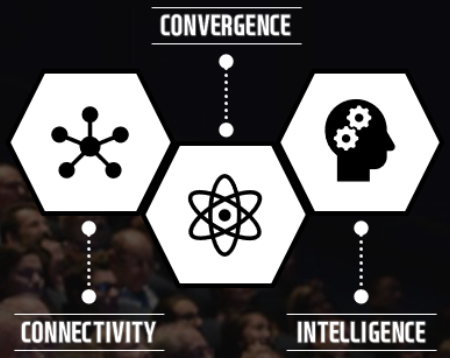


University growth through lecture innovation that strengthens industry-university linkages

Prof. Wooseung Kim
(wskim@hanyang.ac.kr)

President of ABEEK
(Accreditation Board for Engineering Education of Korea)

15th President of Hanyang University (2019.02-2023.02)

2024. 07. 25

List of contents

√ Rapid growth of online education and alternative higher education

√ Innovation in lecture(education) due to the advance of AI

√ Society-linked lecture innovation platform

√ Examples of universities offering PBL education with strengthened links with industries(institutions)

√ Effect of PBL on Entrepreneurship by Strengthening Industry-Academia Collaboration Education

Challenges to traditional universities …

Rapid growth of online education and alternative higher education

- It is necessary to increase student value through university education that clearly differentiates education in the physical space of a traditional university from online education or alternative higher education.

Traditional University vs. Spread of online program - Undergraduate

Best Online Bachelor's Programs

BEST ONLINE PROGRAMS U.S.News & WORLD REPORT RANKINGS

These institutions have the best online baccalaureate-level programs; most of which are degree-completion oriented. Highly ranked programs have strong traditional academic foundations based on student-instructor access, graduation rates and instructor credentials. They also excel at educating distance learners while offering robust career and financial support. Read the Best Online Programs Methodology »

Summary

CARD VIEW TABLE VIEW

382 Items Clear Filters Bachelor's ×

SORT BY: Rankings (high to low)

School Name

School Name

Location

City, State or ZIP

NAME/RANK	TUITION PER CREDIT	ENROLLMENT	COMPARE
University of Florida Gainesville, FL #1 in Bachelor's Programs	$500 (out-of-state)	4,003	☐

Traditional University vs. Spread of online program - Master's program

Best Online Master's in Engineering Programs

BEST ONLINE PROGRAMS U.S.News & WORLD REPORT RANKINGS

These are the best online master's in engineering degree programs. Highly ranked programs have strong traditional academic foundations based on the excellence of entering students, graduation rates and instructor credentials. They also excel at educating distance learners while offering robust career and financial support. Read the Best Online Programs Methodology »

Summary

CARD VIEW TABLE VIEW

119 Items Clear Filters Graduate Engineering ×

SORT BY: Rankings (high to low)

School Name

School Name

Location

NAME/RANK	TUITION PER CREDIT	ENROLLMENT	COMPARE
University of California--Los Angeles (Samueli) Los Angeles, CA	$1,050	587	☐

Traditional University vs. Spread of online program - Master's program

119 Items | Clear Filters | Graduate Engineering | Enrollment: 0 - 1,000+ | SORT BY: Rankings (high to low)

Location

City, State or ZIP

All Distances

Program Rankings

Graduate Engineeri...

Specialties

Best Online Programs for Veterans

Tuition (Per Credit)

$0 - $2,000+

State for in-state tuition:

none

Enrollment

0 - 1,000+

University of California--Los Angeles (Samueli)
Los Angeles, CA
#1 in **Engineering Programs**
$1,050 (out-of-state)

Purdue University--West Lafayette
West Lafayette, IN
#2 in **Engineering Programs**
$750 (out-of-state)

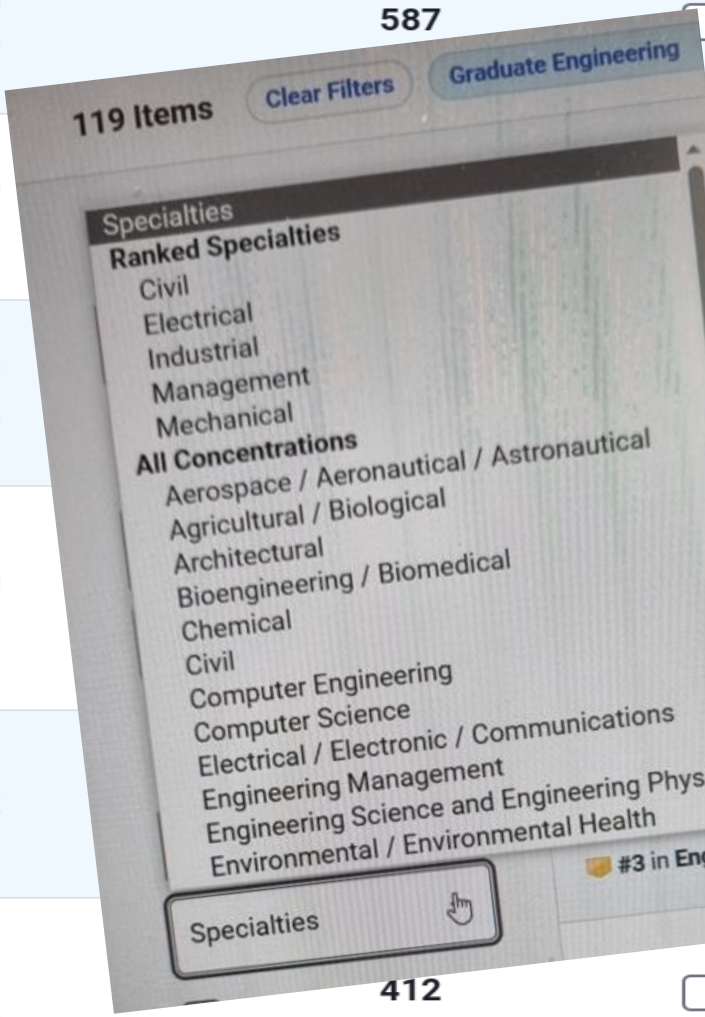
Pennsylvania State University--World Campus
Malvern, PA
#3 in **Engineering Programs**
$1,007 (out-of-state)

University of Illinois Urbana-Champaign The Grainger College of Engineering
Urbana, IL
#4 in **Engineering Programs**
$670 (out-of-state)

Columbia University (Fu Foundation)
New York, NY
#5 in **Engineering Programs**
$2,362

University of Michigan--Ann Arbor
Ann Arbor, MI
#6 in **Engineering Programs**
$1,671 (out-of-state)

587



412

Reality of Virtual Learning: Data Science M.S. 2019 Graduate List (before COVID-19) Online >> Residential (Indiana University @ Bloomington)

Winter 2019 Degrees

Computer Science B.A.
Nathaniel George Ferguson

Computer Science B.S.
Connor Altic
Michael James Ceryak
Hongrui Chen
Yifan Chen
Wei-Tzu Chiu++
Christopher David East
Logan Fields+
Jordan Malcolm Graves
Leiteng Huang
Taylor Richard Johnson
Kristopher Ha Jung+
Chad J. Kowalewski
Yuheng Lin
Zachary Loeffler
Patrick Galen O'Brien
Ian Connor Polito
Reagan Daniel Roush
Nathan Schellink
Rajin D. Shankar+++
Roy Sorce
Christopher Michael Sozio
Alexander Ryan Tames
Jie Tang
Nathaniel Thomas Tavares
Wyatt E. Templeton
Mitchell Thomas
Kun Wang
Jiaxing Wang
Liping Yin
Michael Joseph Zarick

Computer Science B.S./M.S.
Xinran Dai+
Patrick John Duffy+++
He He
Rocco F. Manzo
Jeremiah David Stevens+++

Computer Science M.S.
Taslima Akter
Mahesh Manohar Belnekar
Drishti Vijay Dhamejani
Lawrence Michael Gates
Shubham Godshalwar
Deepak Hanumanthaiah
Rakibul Hasan
Bhushan Chandrakant Malgaonkar
Abu Saleh Md Noman
Khandokar-Md Nayem
Sethu Prakasam
Mohammad Khaledur Rahman
Swaminathan Vengalathur Ramesh
Peng Wang
Yuhan Zeng
Haoyu Zhang

Computer Science Ph.D.
Rakibul Hasan
Andrew Allen Holland
Aaron Wen-yao Hsu
Mark Jenne
Andrew Madison Kent
Praveen Narayanan
Udayanga Shaminda Wickramasinghe

Data Science M.S. Residential
Sahil Adunukota
Adithya Chowdary Boppana
Brian Robert Funk
Manjulata Garimella
Nishant Jain
Siva Charan Mangavalli
Antony Christen Varun Miranda
Barathwaaj Parthasarathy
Jay Rajendrakumar Patel
Rushabh Shivrambhai Patel
Archish Ramesh Babu
Akshay Sandeep Rathi
Bhavna Sinha
Bertolt Sobolik
Pravin Sundar
Dhivya Swaminathan
Ling Tan
Raj Shitalkumar Thakkar
Prashanth Thirukkurungudi Sekar
Gayatree Ravindraprasad Tiwari

Data Science M.S. Online
Wan Rosharniliza Nor A. Rahman
Mohamed Eltateh Abdallah Idris Abdelgader
Evelyn Apolinar
Moeen Arshad
Samuel Henry Ball
Patricia Rose Blecha
Jonathan P. Branam
Jason Matthew Carlson
Divya Chandrashekar
Naimesh Chaudhari
Josiah Philip Clemons
Jason Jerome Crismore
Amanda Michelle Dibble
Anthony Craig Duer
Jarrell Ridley Dunson
Suman Duvvuru
Joseph Gettinger
Matthew Michael Graziano
Anar Hasanov
Dawei Jin
Jessica Jean Johnson
Santosh Chindhu Kangane
Shivam Kapadia
Sandeep Kumar Khandelwal
Shashank Lalit Khedikar
Deepak Madhukar Khirey
Uma Maheswari Kugan
Kristen Suzanne LaEace
William Ching-Harng Liao
Cale Erin Nearing
David Peters
Siddharth Pratap
Rashmi Ray
Ribka Kendie Rufael
Ankit Kalpeshkumar Shah
Anand Sriramulu
Scott Richard Steinbruegge
Robert Vincent Swander
Farbod Taymouri
Weihuan Wang
Darren James Wright
Yelena Yezerets
Shuang Zhou
Hongyu Zhou

Human-Computer Interaction M.S.
Suraj Govinda Chiplunkar
Anany Maini
Jiaqi Zhuo

Informatics B.S.
Nadian Ahmed
Stephen Timotius Algino
Puneet Anjuri
Garrett Carter Ankney
Daniel Frank Bergdoll
Nicholas Anthony Bourdow
Andrew Martin Breitbach
Shelton Lamar Buell
Claire Therese Burdette
Andrew Michael Burton
Jabari Tyrik Carr
Garrett Christian Crowell
Christopher Joseph DeLeo
Julian A. Dietrich
Christopher Gregory Dillon
Hongkai Ding
Hyeonwoo Do
Twanyea C. Donaldson
Kang Jie Gan
Jason Alec Garcia
Christopher William Geib
Jack Robert Gibson
Alvaro H. Gonzalez
Kurtis Reid Greer
Tony J. Gruenloh
Michael Will Gurwin
Dwight William Hall
Christopher Henry Haunert
Jacob C. Hillock
Jacob Hoffman
Cameron C. Hoffmann++
Richer Huynh
Nicholas Vernard Irvin
XiaoLiang Jiang+
John Harold Kavanagh
Yeon Jun Kim
Sangwook Kim
Hyeongjun Kim
Noah A. Kimmel
Andrea Nicole Kwasniewski+
GieMyung Lee
Kenny S. Lin
Haoxuan Liu
Weijia Liu
Yazhong Liu
Benjamin London
Mingshen Lu
Jungmin Maeng
Amirah Malek
Jacob Marcinek
Xavier Martinez
Zachary Ryan Meier
Xiangyu Meng
Chance Harrison Miller
Jacob Daniel Montgomery
Megan M. Morgan++
Randy Nguyen
Young Oh
Reed Edward Orr
Gabriela Putri Prabowo
Hunter Lee Probus
Sreeti Ravi
Yicheng Rong
Carolyn S. Ryan+++
Joshua Jonas Samakow
Lorenzo Alessandro Secci
Faadil Mohammed Shariff
Zachary Schuyler Silcox
Suraj Soni
Hunter Edward Sturgeon
Ning Tang
Joo Kok Teh
Hans Christoph Thieme
Maeve Bruton Tierney
McLean Lawrence Trieglaff
Isaac Vilia
Parker Walkey
Manshuo Wang+++
Shanwen Xi
Ming Yang
Yichen Yang
Xin Yang
Syed Asad H. Zahidi
Chuxuan Zhang
Xiai Zhang
Hua Zhao

Informatics M.S.
Kyrie Jig Amon
Om Guru Naresh Sreenivasan

Informatics Ph.D.
Wan-Ling Chang
Nancy Elizabeth Smith
Steven Charles Williams

Information Science M.I.S.
Boryana Borisova
Benjamin Dailey
Nathan Gallagher
Bo Li
Laura Elizabeth Graham Schneider
Duc Vinh Tran

Information Science Ph.D.
Chenwei Zhang

Intelligent Systems Engineering Accelerated M.S.
Anna Heine

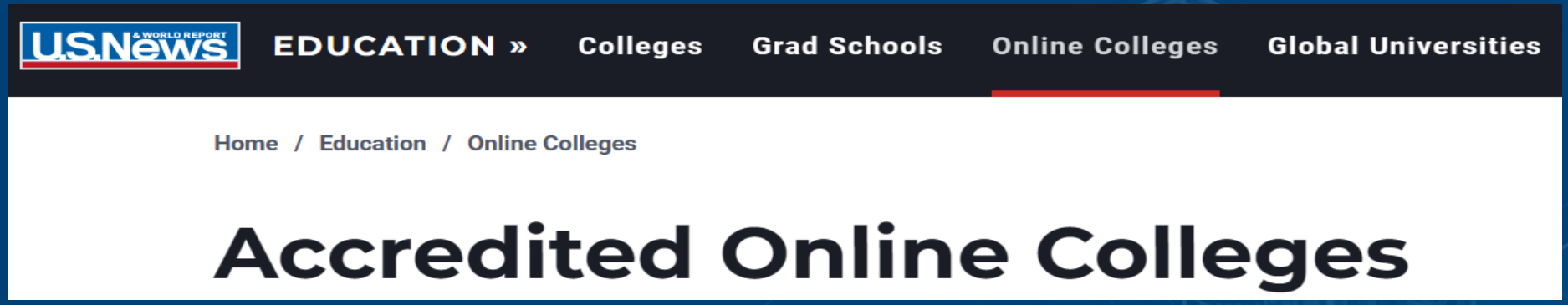
Intelligent Systems Engineering M.S.
Zhixiang Gu
Qian Lou

Library Science M.L.S.
Tennant Frierson Argyres
Madison Baxter Carroll
Claire Elizabeth Drone-Silvers
Joseph Edward McManis
Madeline Mitchell
Laura Elizabeth Graham Schneider

Distinction +
High Distinction ++
Highest Distinction +++

Characteristics of American online education

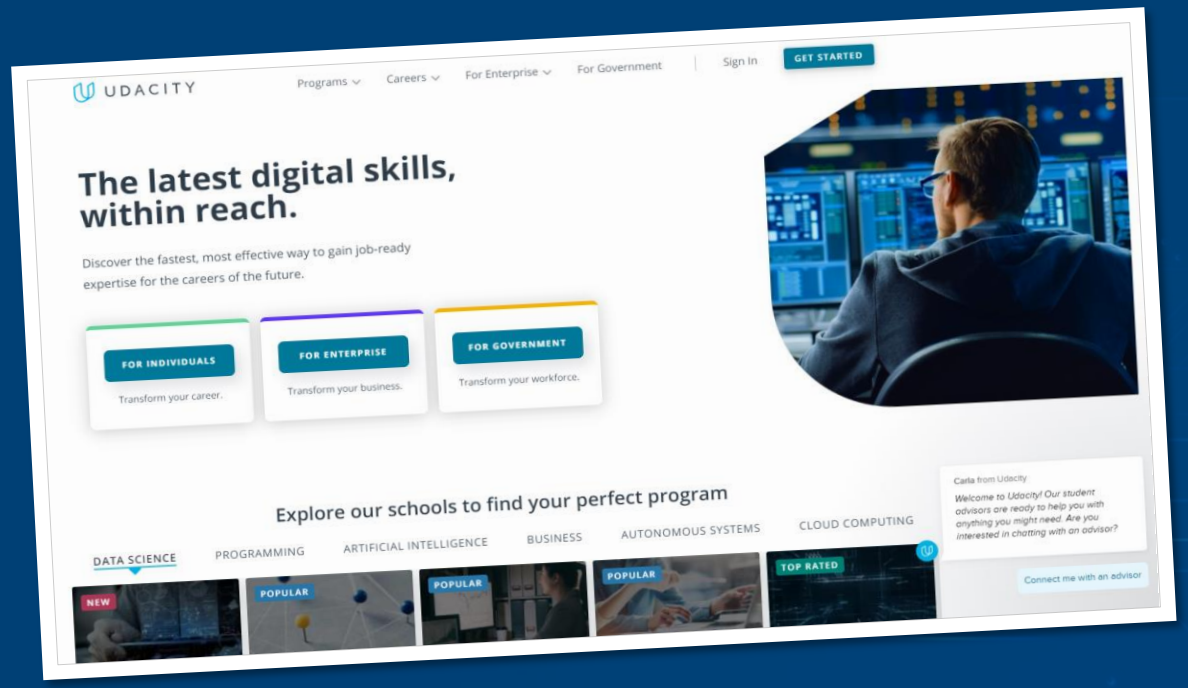
https://www.usnews.com/education/online-education



Online college is **no longer just an option for many students** – it has become **the norm**. Experts say colleges are poised to offer even more online degree programs and develop new ones as well. **Advancements in technology, course design and high-speed internet availability** are moving online learning forward. One reason students enroll in online degree programs is for the flexibility to study from anywhere. Students with family responsibilities or full-time jobs may also be able to work around their own schedules.

Students in online programs usually earn **the same degree as on-campus students**. The curriculum for an online bachelor's degree typically **matches the on-campus curriculum at the same school**, and the **diploma usually doesn't state whether that specific degree was earned online or in person.** This can help **ease fears that employers won't accept applicants with online undergraduate degrees.**

University vs. Spread of alternative higher education



UDACITY

- **Massive Open Online Course Company**
- **Established in 2011 by Stanford University Professor "Sebastian Thrun"**
- **Reasons why it is attracting attention as an alternative to university education**
  - Provides specialized courses in technologies related to the 4th industrial revolution, such as artificial intelligence and self-driving cars
  - **Nanodegree:** A technical education course aimed solely at employment. Provides degrees, job introductions, and resume writing support through 6 months to 1 year of course attendance, discussions, interviews, and project performance.

※ **Representative courses**

- "R data analysis taught by Facebook developers"
- "Android development taught directly by Google developers"

Founder& CEO Sebastian Thrun

University vs. Spread of alternative higher education

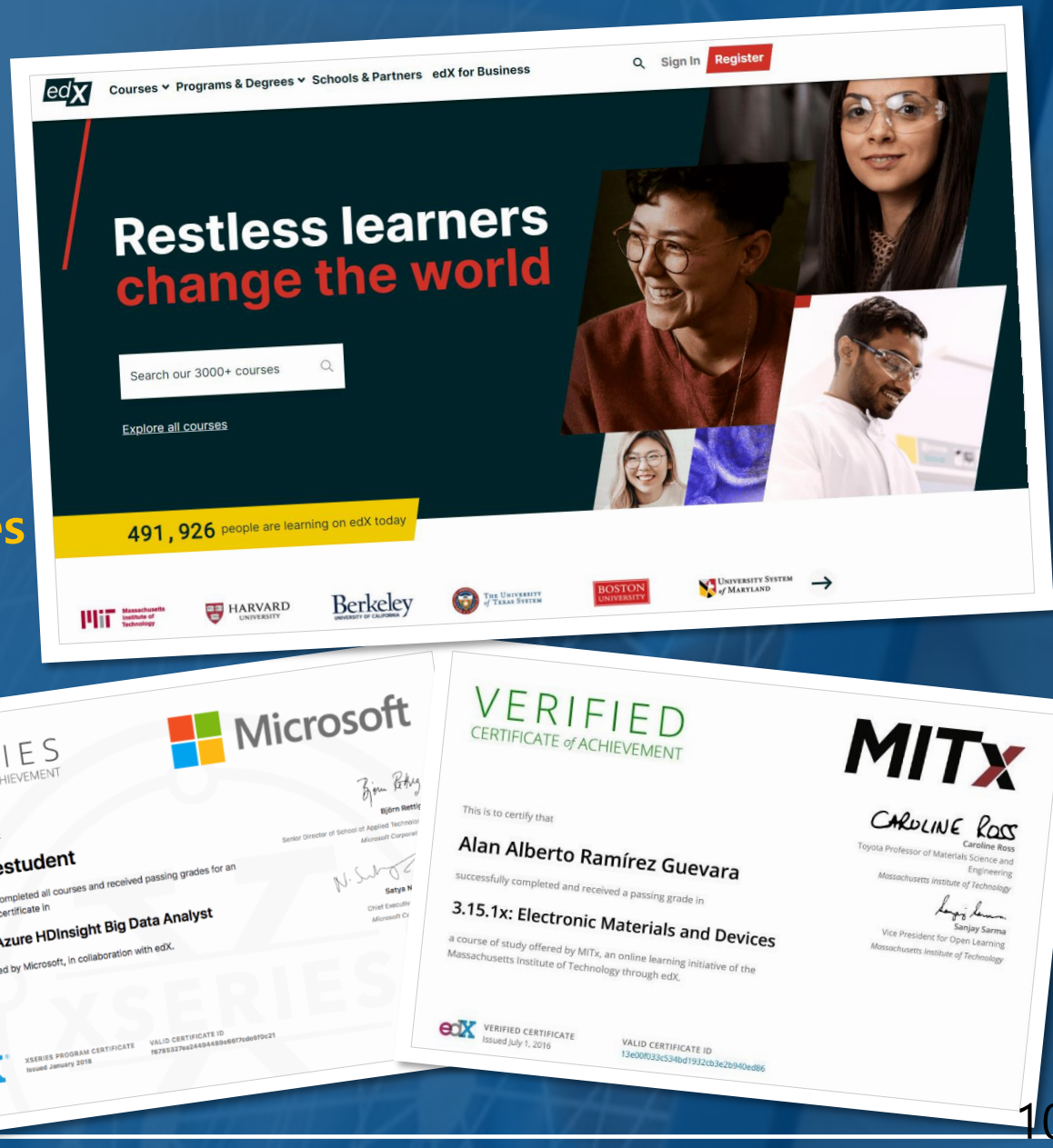
edX

*** MOOC companies**

· 2012. 5. Jointly developed and launched by MIT and Harvard Univ, which felt the need for an open educational platform.

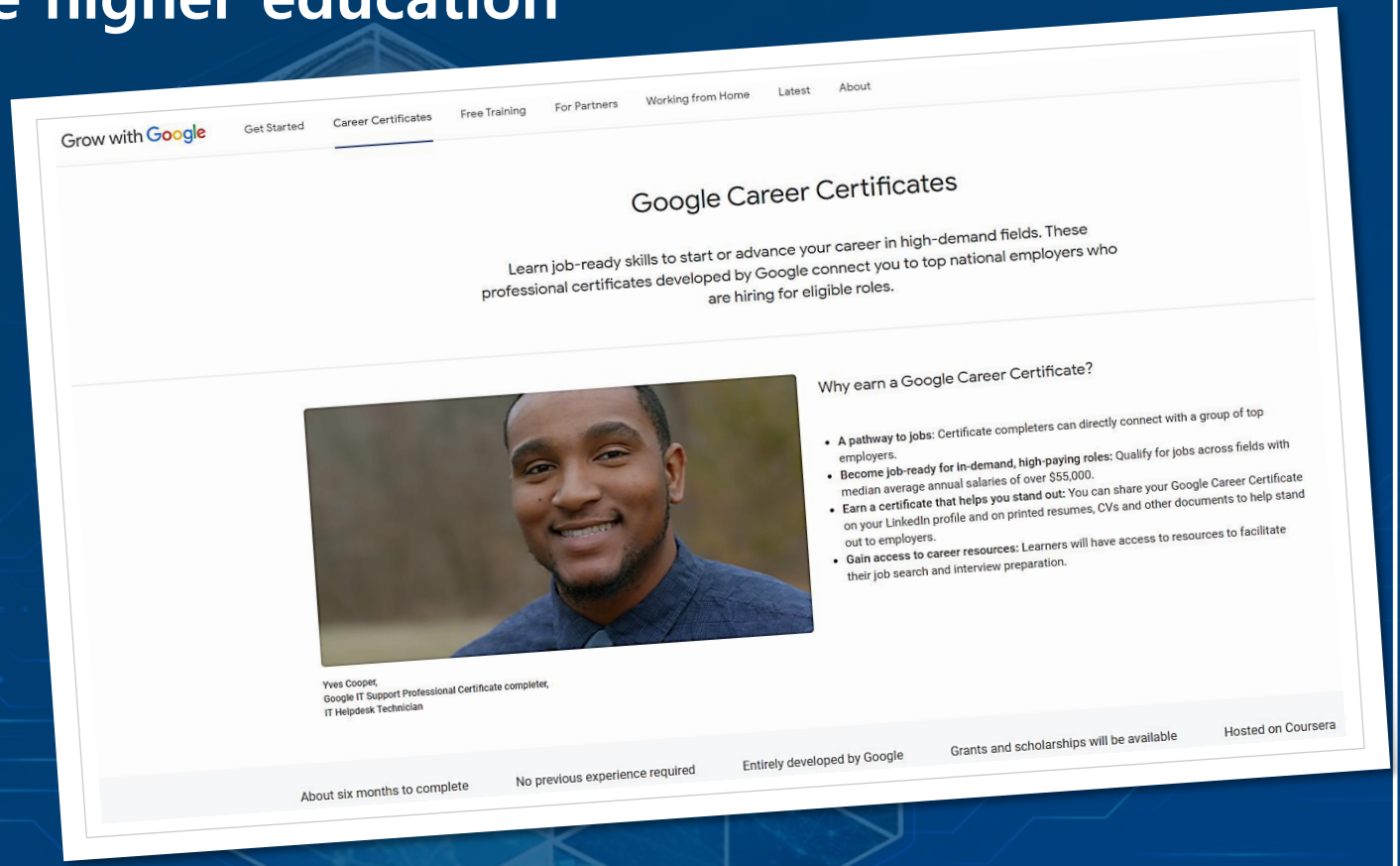
* Joint development of curriculum with not only famous companies but also world-class universities

– Verified Course: If you achieve a certain level of achievement required in the course, you can obtain a certificate of completion, and it is recognized when applying for employment at many foreign companies. :



University vs. Spread of alternative higher education

"Google
–Announcement of scholarship support for students experiencing financial difficulties



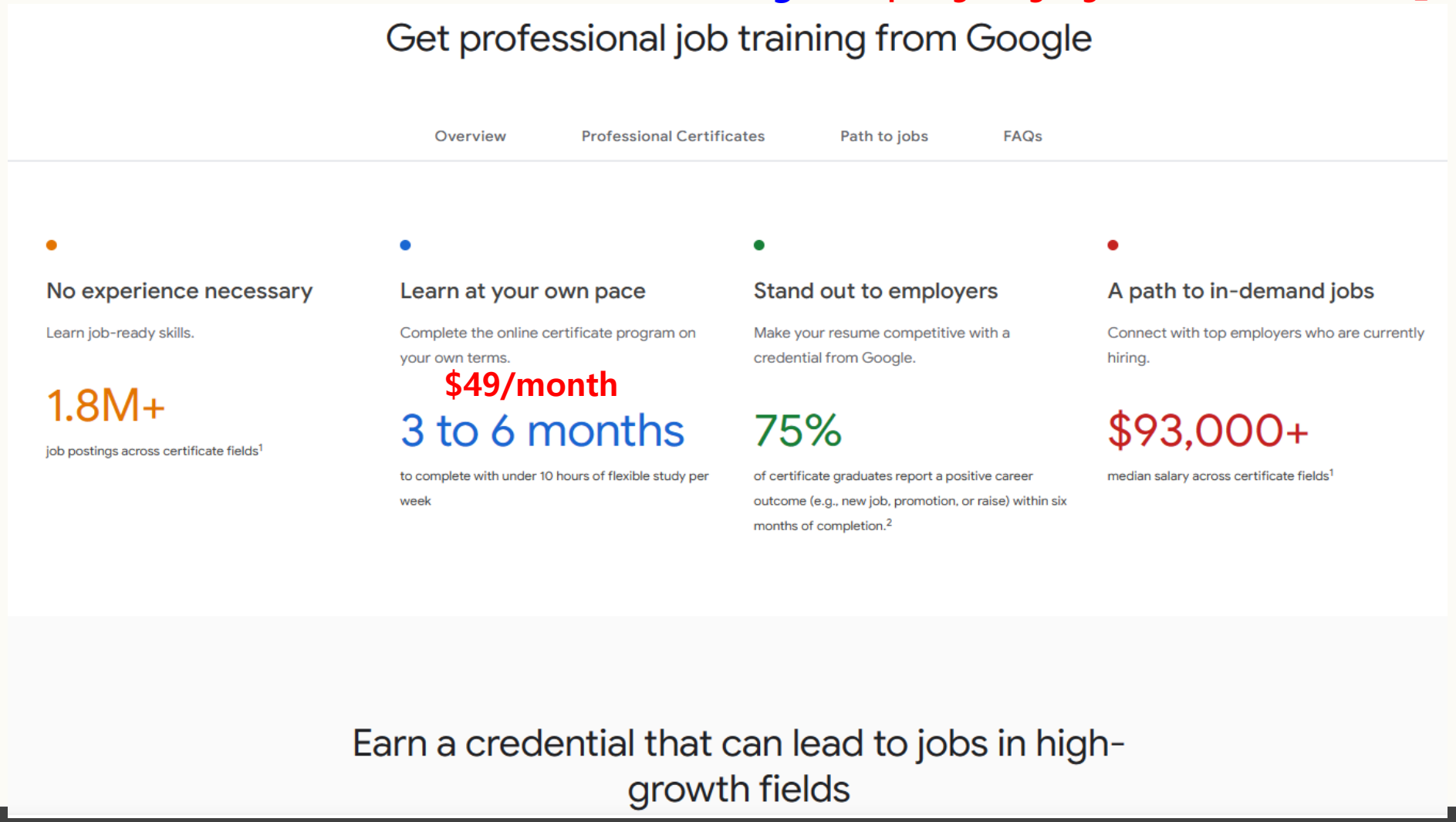
Google Career Certificate

- A career-based curriculum developed by Google to foster talent in the 4th Industrial Revolution technology field
- Google's ambition is to ensure that expertise beyond a 4-year college diploma is recognized in the job market through completion of a 3-6 month ($49 Monthly) course.
- 450,000 people around the world participated in the course, and about 150 global companies have a policy of recognizing the completion of the course as an official career.

The era of lifelong jobs (lifelong learning) - companies are also the main actors of education

Grow with Google https://grow.google/certificates/#?modal_active=none

2024.07.04



rapid technological change

- Company: provide vocational training [Google Career Certificate etc.]
- Individual: securing competitiveness through constant retraining(The era of lifelong employment)

Get a job in data analytics, with help from Google

Learn the foundations of data analytics, and get the job-ready skills you need to kick start your career in a fast-growing field.

Foundation of data analytics

$93,000+

median salary in data analytics (0-5 years experience)[1]

295,000

open jobs in data analytics[1]

Qualify for in-demand jobs in data analytics

Data analysts prepare, process, and analyze data to help inform business decisions. They create visualizations to share their findings with stakeholders and provide recommendations driven by data.

- Data analyst
- Junior data analyst
- Associate data analyst
- Operations analyst
- Business systems analyst

The era of lifelong jobs (lifelong learning) - companies are also the main actors of education

Get started in the field

No experience or degree required

Advance within the field

Some experience required

Advanced Google Career Certificates

Advanced Google Career Certificates build on the skills from our foundational certificates and provide continued learning opportunities for graduates to go deeper in the field.

Prerequisite: This program is designed to follow the foundational Data Analytics Certificate or similar experience.

New

ADVANCED

Advanced Data Analytics Certificate

Advanced data analysts and data scientists are responsible for collecting, analyzing, and interpreting extremely large amounts of data.

Prepare for jobs such as:

- Senior data analyst
- Junior data scientist
- Data science analyst

The era of lifelong jobs (lifelong learning) - companies are also the main actors of education

New

ADVANCED

Advanced Data Analytics Certificate

Advanced data analysts and data scientists are responsible for collecting, analyzing, and interpreting extremely large amounts of data.

144,000+
Job openings in advanced data analytics[1]

3-6
Months completion time

$118,000
Median salary in advanced data analytics[1]

Prepare for jobs such as:

- Senior data analyst
- Junior data scientist
- Data science analyst

Tools included:

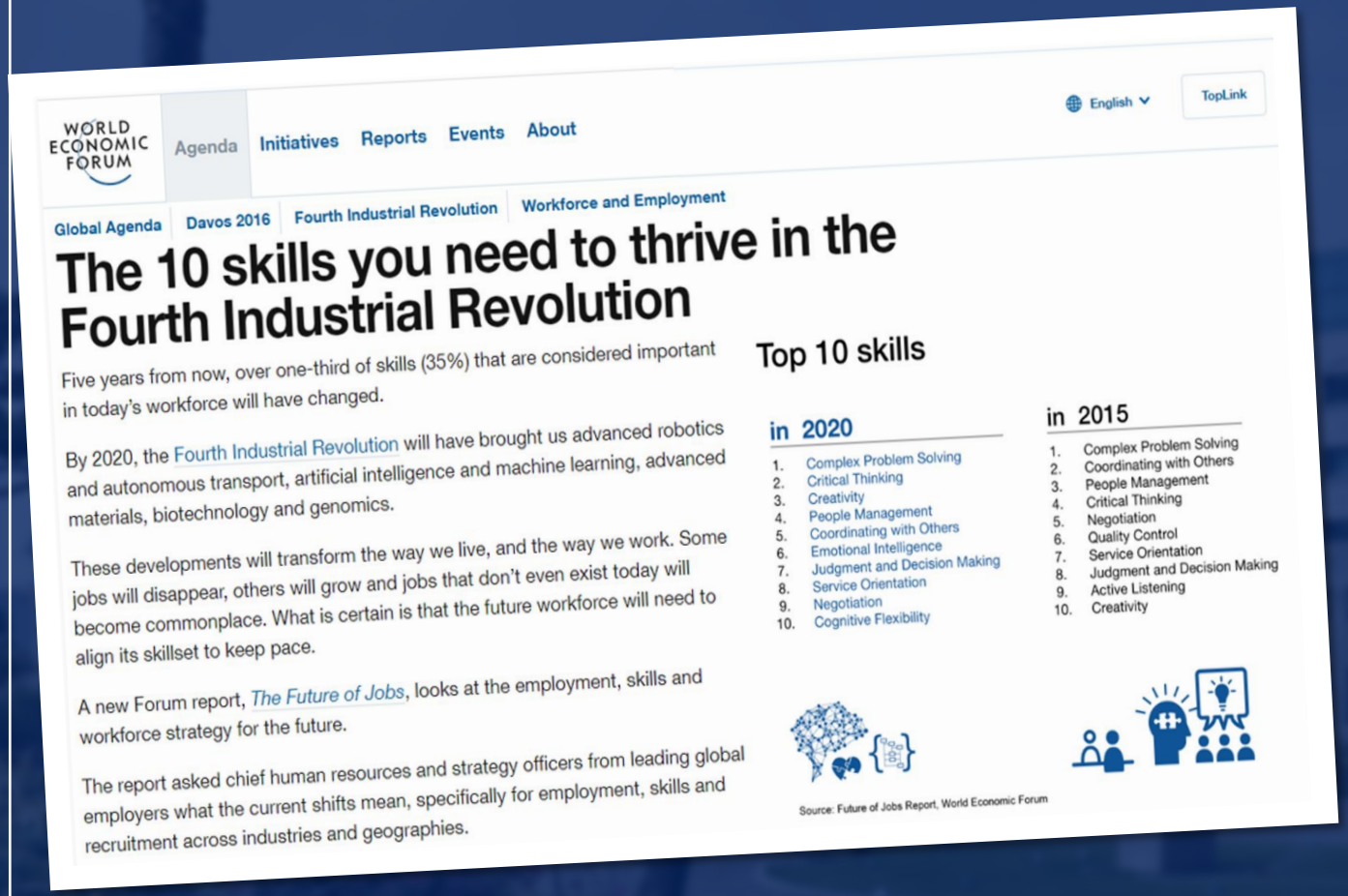
Jupyter Notebook, Python, Tableau

You'll learn about:

- Regression analysis
- Python
- Translating data
- Statistics
- Machine learning

University innovation: the need for education to develop job skills with stronger connections to society

Core Skills needed in the 4th Industrial Revolution



WORLD ECONOMIC FORUM | Agenda | Initiatives | Reports | Events | About | English | TopLink

Global Agenda | Davos 2016 | Fourth Industrial Revolution | Workforce and Employment

The 10 skills you need to thrive in the Fourth Industrial Revolution

Five years from now, over one-third of skills (35%) that are considered important in today's workforce will have changed.

By 2020, the Fourth Industrial Revolution will have brought us advanced robotics and autonomous transport, artificial intelligence and machine learning, advanced materials, biotechnology and genomics.

These developments will transform the way we live, and the way we work. Some jobs will disappear, others will grow and jobs that don't even exist today will become commonplace. What is certain is that the future workforce will need to align its skillset to keep pace.

A new Forum report, *The Future of Jobs*, looks at the employment, skills and workforce strategy for the future.

The report asked chief human resources and strategy officers from leading global employers what the current shifts mean, specifically for employment, skills and recruitment across industries and geographies.

Top 10 skills

in 2020	in 2015
1. Complex Problem Solving	1. Complex Problem Solving
2. Critical Thinking	2. Coordinating with Others
3. Creativity	3. People Management
4. People Management	4. Critical Thinking
5. Coordinating with Others	5. Negotiation
6. Emotional Intelligence	6. Quality Control
7. Judgment and Decision Making	7. Service Orientation
8. Service Orientation	8. Judgment and Decision Making
9. Negotiation	9. Active Listening
10. Cognitive Flexibility	10. Creativity

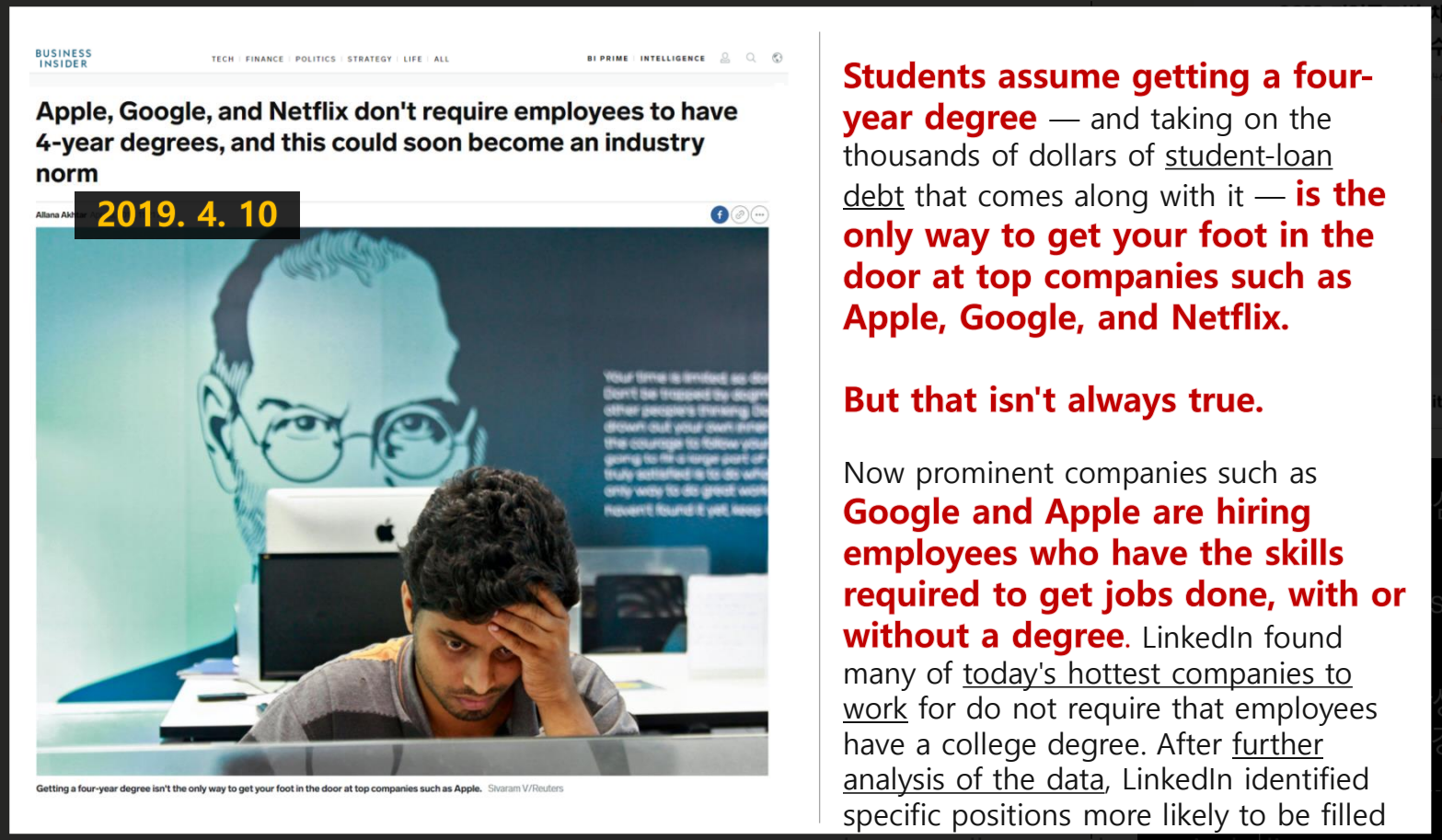
Source: Future of Jobs Report, World Economic Forum

In 2020	In 2015
1. Problem Solving	**1. Problem Solving**
2. Critical Thinking	**2. Coordinating With Others**
3. Creativity	**3. People Management**
4. People Management	**4. Critical Thinking**
5. Coordinating With Others	5. Negotiation
6. Emotional Intelligence	6. Quality Control
7. Judgement and Decision Making	7. Service Orientation
8. Service Orientation	8. Judgement and Decision Making
9. Negotiation	9. Active Listening
10. Cognitive Flexibility	10. Creativity

The ability to exchange questions with others and finding answers together are considered most important

※ SOURCE : World Economic forum, Alex Gray, 2016. 1. 19. https://www.weforum.org/

University innovation : the need for education to develop job skills with stronger connections to society



Students assume getting a four-year degree — and taking on the thousands of dollars of student-loan debt that comes along with it — **is the only way to get your foot in the door at top companies such as Apple, Google, and Netflix.**

But that isn't always true.

Now prominent companies such as **Google and Apple are hiring employees who have the skills required to get jobs done, with or without a degree**. LinkedIn found many of today's hottest companies to work for do not require that employees have a college degree. After further analysis of the data, LinkedIn identified specific positions more likely to be filled by noncollege graduates, including electronic technicians, mechanical designers, and marketing representatives.

Trends occurring in the recruitment field of world-class companies such as Google, Apple, Amazon, and Netflix

Selection of talent based on job expertise and job-related experience, regardless of college graduation

The need to strengthen professionalism-centered education

amazon
Google
NETFLIX

Is a college diploma necessary ?... Education (lecture) innovation is essential

Nov. 26,2022

THE WALL STREET JOURNAL.

DOWJONES VOL. CCXXXVIII NO. 51 EE/PR ★★★★ FRIDAY, NOVEMBER 26, 2022 WSJ.com **** $1.00

EMPLOYERS RETHINK NEED FOR COLLEGE DEGREES IN TIGHT LABOR MAERKET

Google, Delta Air Lines and IBM have reduced requirements for some positions

Companies such as Alphabet Inc.'s Google, Delta Air Lines Inc. and International Business Machines Corp. have reduced educational requirements for certain positions and shifted hiring to focus more on skills and experience. Maryland this year cut college-degree requirements for many state jobs—leading to a surge in hiring—and incoming Pennsylvania Gov. Josh Shapiro campaigned on a similar initiative.

Degree Decline

Percentage of U.S. job postings that require at least a four-year college degree

Note: Only includes job postings with educational requirements

Source: Burning Glass Institute analysis of Lightcast data

More than 100,000 people in the U.S. have completed Google's online college-alternative program that offers training in fast-growing fields such as digital marketing and project management, the company said. It and 150 other companies are now using the program to hire entry-level workers.

The majority of its U.S. roles at IBM no longer require a four-year degree after the company conducted a review of hiring practices, IBM spokeswoman Ashley Bright said. Delta eased its educational requirements for pilots at the start of this year, saying a four-year college degree was preferred but no longer required of job applicants.

"College is a clear pathway to upward mobility, but it shouldn't be the only pathway," she said.

True educational innovation is only possible through lecture innovation.

√ Innovation in lecture(education) is essential due to the advance of AI

O As we enter the AI era, society is changing at a tremendous speed in response to AI. In order for universities to produce human resources suitable for the AI era, if lecture innovation linked to society is not achieved in all majors, students will lose their competitiveness in entering society.

O Most undergraduate graduates enter society immediately after receiving their bachelor's degree.

O There is a need for innovation in lecture that is differentiated from alternative higher education.

True educational innovation is only possible through lecture innovation.

Q1: What are the two things that have had the greatest impact on humanity?
- Fire, Electricity

Q2: What is the one thing that will have an impact beyond predictions in the future?
- AI

About AI...

○ Everything that runs on electricity is linked to AI.

○ AI refers to a large-scale computer-based field that develops technologies that mimic human abilities such as perception, analysis, decision-making, vision, and voice into machines.

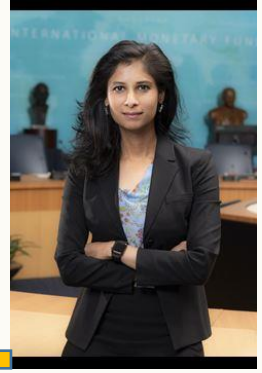
○ Four core concepts of AI literacy:
- Data, Algorithms, Machine Learning, Deep Learning

○ It is essential to strengthen lectures (learning) linked to the four core concepts of AI in all majors.

AI is another language that must be learned **in all majors**

The Power and Perils of the "Artificial Hand": Considering AI Through the Ideas of Adam Smith

By Gita Gopinath, First Deputy Managing Director,
IMF Speech to commemorate 300th anniversary of Adam Smith's birth, University of Glasgow,
June 5, 2023



Indian-American
Economist,

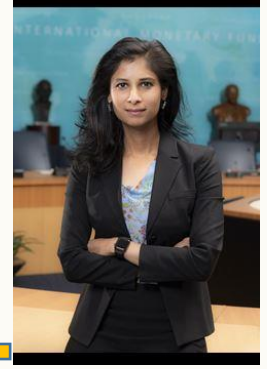
Princeton(PhD),
Univ. of Washington(MA)
Univ. of Delhi(BA,MA)

Professor at
Harvard Univ. (2005-2022)

The Industrial Revolution was ushering in new technologies that would revolutionize the nature of work, create winners and losers, and **potentially transform society.** Today, we find ourselves at a similar inflection point, where a new technology, **generative artificial intelligence,** could change our lives in spectacular—and possibly existential—ways. **It could even redefine what it means to be human.** With machines taking care of routine and repetitive tasks, humans could spend more time on what makes us unique: being **creative innovators and problem solvers.** Aside from the gains in productivity, AI could shake up the labor market in unprecedented ways. Recently, we have seen **the loss of "middle-skill" jobs** due to automation, resulting in large clusters of high-paying and low-paying jobs at either pole of labor markets. Recent empirical studies suggest AI could reduce job-market polarization, by putting downward pressure on wages of high-paying jobs.

The Power and Perils of the "Artificial Hand": Considering AI Through the Ideas of Adam Smith

By Gita Gopinath, First Deputy Managing Director,
IMF Speech to commemorate 300th anniversary of Adam Smith's birth, University of Glasgow,
June 5, 2023



Indian-American
Economist,

Princeton(PhD),
Univ. of Washington(MA)
Univ. of Delhi(BA,MA)

Professor at
Harvard Univ. (2005-2022)

Some studies suggest that **AI adoption could flatten the hierarchical structures of firms,** increasing the number of workers in junior positions and decreasing the number in middle management and senior roles. The number of jobs affected could be sweeping—some researchers estimate that **two-thirds of U.S. occupations could be vulnerable to some form of automation.** It's quite possible that **AI might simply replace human jobs without creating new, more productive work for humans to move into**, as the economist Daron Acemoglu has noted. **AI could be as disruptive as the Industrial Revolution was in Adam Smith's time.** This time, as we confront the power and perils of the artificial hand, we need to summon every ounce of **our empathy and ingenuity**—the very things that make human intelligence so special. The advent of AI shows that **multilateral cooperation is more important than ever.**

CNN BUSINESS

July 4,2023

AI is already linked to layoffs in the industry that created it

A small but growing number of tech firms have cited **AI as a reason for laying off workers** and rethinking new hires in recent months, ….

In its most-recent layoffs report, outplacement firm Challenger, Gray & Christmas said **3,900 people were laid off in May due to AI,…**

Some 212,294 workers in the tech industry have been laid off in 2023 alone, according to data tracked by Layoffs.fyi, **already surpassing the 164,709 recorded in 2022.**

Dan Wang, a professor at Columbia Business School, told CNN that **AI "will cause organizations to restructure," but also doesn't see it playing out as machines replacing humans just yet. "AI, as far as I see it, doesn't necessarily replace humans, but rather enhances the work of humans,"** Wang said. … **human specialists will be replaced by human specialists who can take advantage of AI tools."…**

CNN BUSINESS

July 4,2023

AI is already linked to layoffs in the industry that created it

Lee told CNN that a recent analysis of data from Comprehensive.io shows the **average salary for a senior software engineer specializing in artificial intelligence or machine learning is 12% higher than for those who don't specialize in that area,** a data point he dubs **"the AI premium."**

Lee noted **Dropbox** as an example of a company **offering notably high pay for AI roles**, citing **a base salary listing of $276,300 to $373,800 for a Principal Machine Learning Engineer role.** (By comparison, Comprehensive.io's data puts the current **average salary for a senior software engineer at $171,895**.)

AI is already linked to layoffs in the industry that created it

Wang, the professor at Columbia Business School, told CNN that starting this past spring semester, **he began requiring his students to familiarize themselves with the new crop of generative AI tools on the market.** "**That type of exposure** I think is **absolutely critical** for setting themselves up for success and once they graduate," Wang said.

It's not that everyone needs to become AI specialists, Wang added, but rather that **workers should know how to use AI tools to become more efficient at whatever they're doing.**

"That's where the kind of a battleground for talent is really shifting," Wang said, "as **differentiation in terms of talent comes from creative and effective ways to integrate AI into daily tasks."**

Class to Society(Labor Market)!!!

√ Society-linked lecture innovation platform

★ Nurturing creative convergence talent

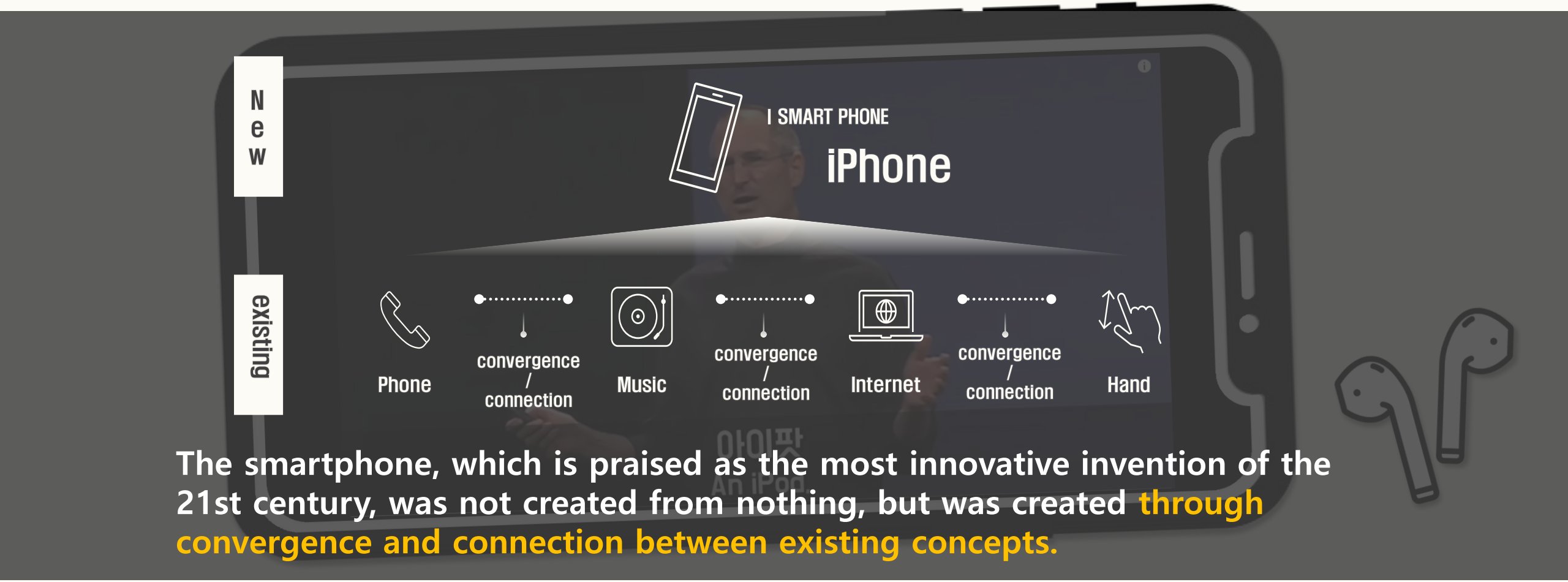
★ MIT's UROP, Stanford's PBL, Olin's SCOPE, Maastricht Univ.'s PBL

★ Hanyang Univ.'s IC-PBL

★ How do we foster creative convergence talent through lecture innovation in the AI era?

Since the use of AI in society(industry) continues to evolve rapidly, it is also important to utilize AI well in the AI era. **Experiential learning by successfully carrying real-world projects** given by institutions(industries) in general subjects related to one's major at university is **the shortcut to nurturing creative convergence talent suitable for the AI era.**

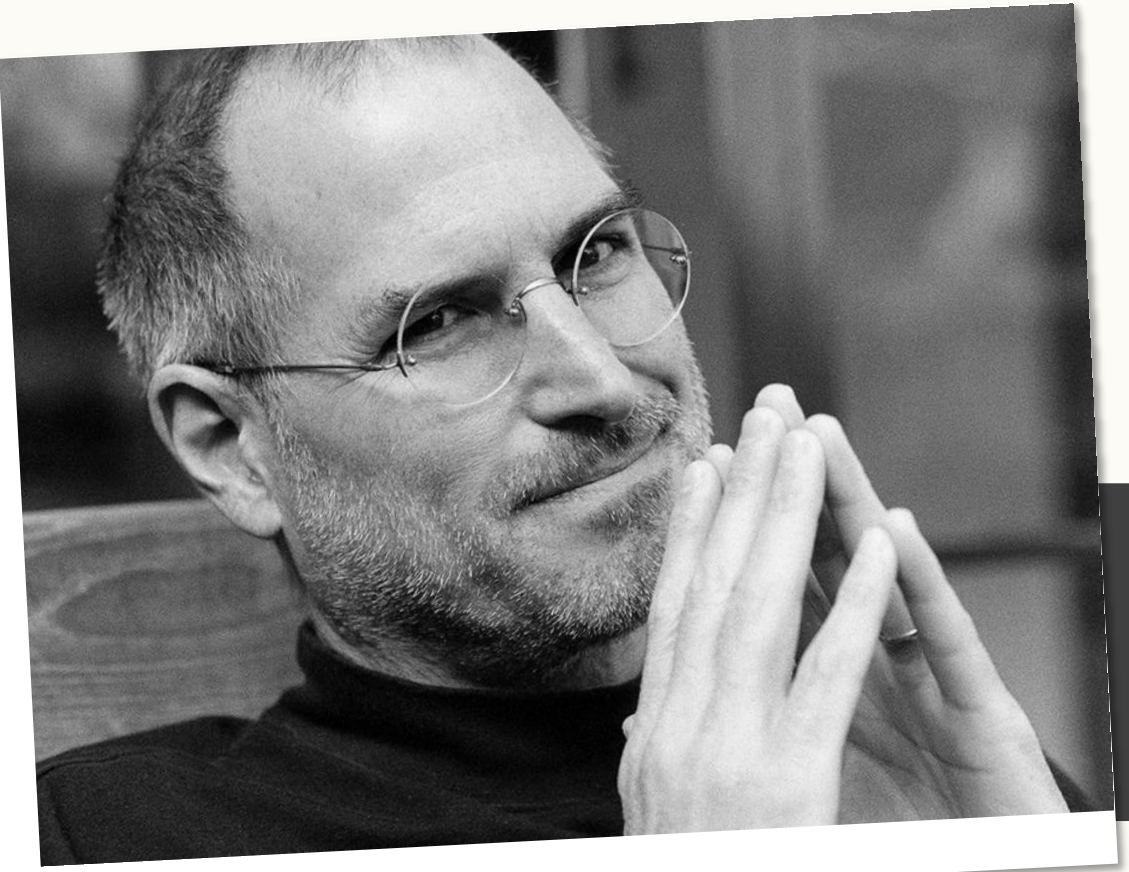
Innovations that changed the world in 2007



The smartphone, which is praised as the most innovative invention of the 21st century, was not created from nothing, but was created through convergence and connection between existing concepts.

Innovations that changed the world in 2007

Creativity is the ability to create something new by fusing and connecting existing things.



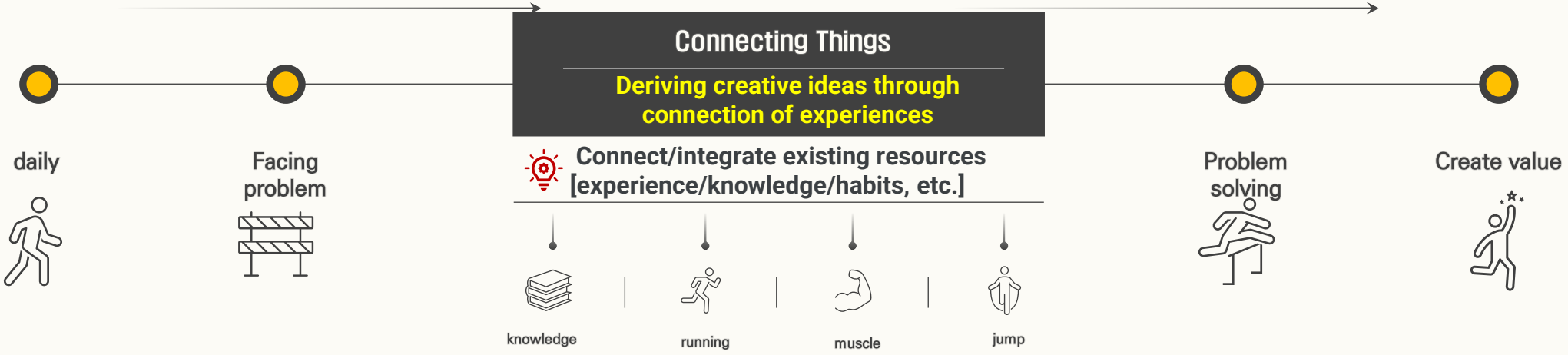
"Creativity is Just Connecting Things" Steve Jobs

Creativity is just connecting things. When you ask creative people how they did something, they feel a little guilty because they didn't really do it, they just saw something. It seemed obvious to them after a while. That's because they were able to connect experiences they've had and synthesize new things. And the reason they were able to do that was that they've had more experiences or they have thought more about their experiences than other people.

More experience and more thoughts and reflections on experience are the sources of creativity.

Steve Jobs

Education that provides more experience: Nurturing creative talent



- **Creativity** is the new idea that emerges in the process of resolving the **inconvenience and inefficiency of the problems we face.**

Creativity is the ability of a person with **more resources (experience, knowledge)** to create something that did not exist before **through connection/fusion between them.**

Q. What education is necessary to cultivate creative convergence talent?

A. Education that provides more experience and the opportunity to connect knowledge and experience

In the AI era, education to strengthen connectivity with society is essential.

Creating value through cultivating talent that solves **real-world** problems

Problem-solving-oriented education:

IC-PBL(Industry*-Coupled Problem/Project-Based Learning)
- Hanyang University's education innovation platform

* **Industry** is **not limited to science and engineering**, but refers to the entire society, including institutions (companies) where students get jobs related to their major after graduation and institutions (companies) where professors conduct research related to their major.

Class to Society(Labor Market)!!!

There are various slogans for educational innovation, but it is difficult to achieve educational innovation without lecture innovation. The reason is that lecture innovation is realistically impossible without the efforts of instructors.

IC-PBL stands for **I**ndustry-**C**oupled **P**roject/Problem-**B**ased **L**earning. Industry here is not limited to science and engineering, but refers to the entire society, including institutions (companies) where students get jobs related to their major after graduation and institutions (companies) where professors conduct research related to their major. I think there is **no major that is not connected to industries** such as the art industry, music industry, sports industry, and education industry. If there is a major without an industry, students in that major who want to get a job related to their major will have difficulty finding a job after graduation.

Lecture innovation should occur in general lectures offered in each semester, not in special programs. In order to help students develop job skills related to their major, lecture innovation must be implemented **to allow students to experience real-world problems related to their major in general lectures.**

IC-PBL : Definition

Definition of IC-PBL

Industry-Coupled Problem-Based Learning (IC-PBL) is a learner-centered educational model at Hanyang University in which learners solve context-rich problems occurring in real-life fields, coupled with industry and society

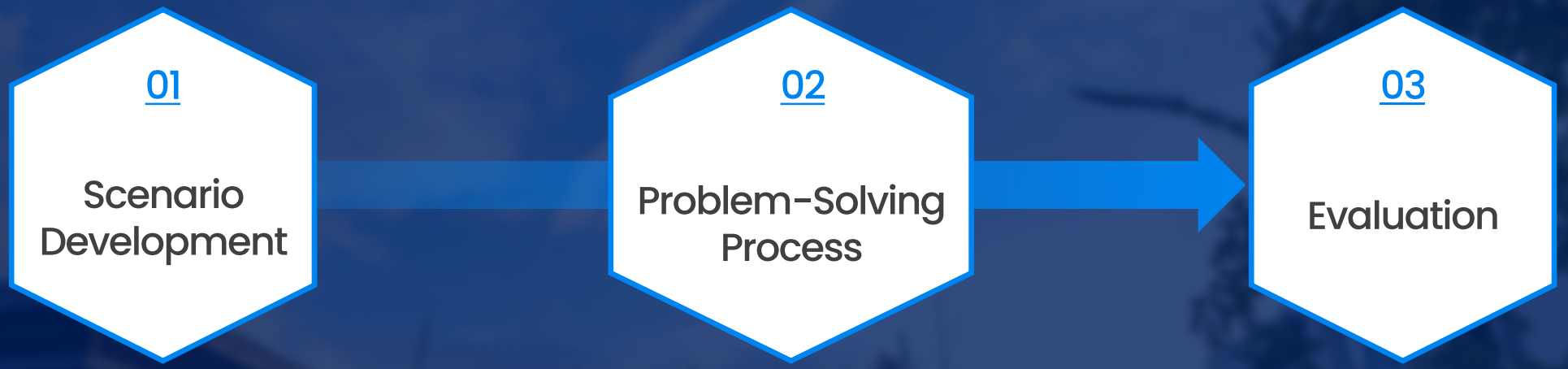
University

Professor + Student

Field Expert

IC-PBL : Process

Project-incorporated Curriculum



- Explore an Industry from the field for class contents
- Develop IC-PBL scenarios with hands-on subjects from the Industry

- Provide learners with relevant materials of industry
- Interim review of learner's report by industry manager

- Feedback and evaluation of the learner's final report
- Adoption and application to a solution in the industry

Innovative educational platform at HYU : IC-PBL

Types of IC-PBL: MECA

Merge

- In-class application from problems directly provided or requested by the real-life, such as industry and institution
- Evaluation and feedback are provided by the fields in the problem-solving process

Anchor

- In-class application from problems directly provided or requested by the real-life, such as industry and institution
- No intervention by the fields, but evaluation and feedback within class participants

Evaluate

- Instructor's design and development of timely, hands-on, and probable problems that are required to be solved in the fields
- Evaluation and feedback are provided by the fields in the problem-solving process

Create

- Instructor's design and development of timely, hands-on, and probable problems that are required to be solved in the fields
- No intervention by the fields, but evaluation and feedback within class participants

Field-Providing Problem (YES)

Field Intervention (YES)

Field Intervention (NO)

Field-Providing Problem (NO)

IC-PBL example[Type M] College of Engineering (Mechanical Engineering)

Course title: 'Smart Manufacturing'

· Choose one issue among the six RFPs suggested by CJ CheilJedang, and present a solution through the verification process as an expert.

· CJ conducts a demand survey to identify actual industrial field problems and establishes a pool of six project proposals.

· Students are divided into 6 teams and perform tasks on/off-line with 6 mentors of CJ.

· Internship privileges are given to outstanding students selected through evaluation of the final outcomes.

※ Evaluation by top management at CJ

※ Lecture by Vice President of CJ

※ Meeting between students and CJ mentor

IC-PBL example[Type M] College of Engineering [Electrical Engineering]

Course title: 'ICT convergence robot engineering'

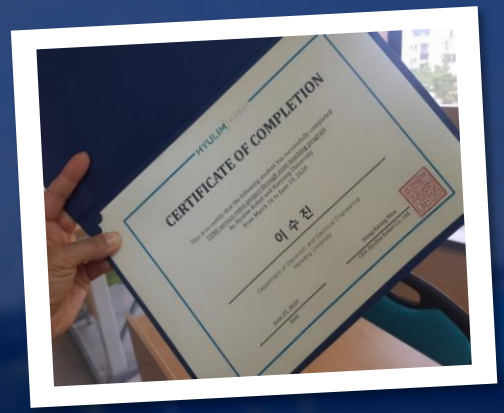
HYULIM ROBOT

· Propose a business model for a recently launched service robot, TEMI
· Each team is given a Temi, and develop a timely scenario for the non-face-to-face era using it.

· Collaborate with Hyurim Robot Inc. to develop robot algorithm and to propose a new business model
· Team teaching by professors from College of Engineering and School of Finance
· Hyurim Robot Inc. provides training in hardware and software
· Excellent team selection after intermediate and final evaluation through participation of field experts
→ Awarding scholarships and
· Return of service robots and business models to Hulim Robot Co.

※ MOU between ERICA-Hyurim

※Meetings with Hyurim engineers



※ Certificate of Completion

Dept. of Electronic Eng., Course title: 'Machine learning-based power conversion system design' [Graduate school, Type M]

TASK

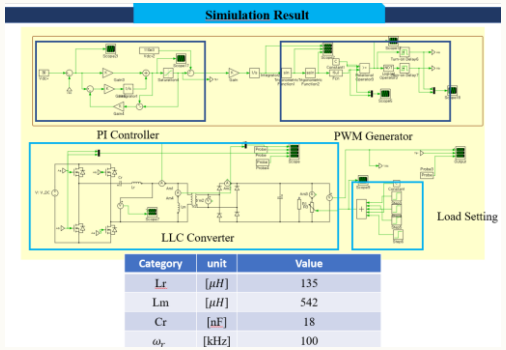
Recently, in line with the 4th Industrial Revolution, the demand for technology to optimize power conversion systems that handle electrical energy using machine learning has increased significantly. In particular, the demand for power electronics such as electric vehicles, new and renewable energy, and DC-Grid is increasing, and it is important to design the corresponding power conversion circuit and controller and connect them to an intelligent power grid to operate them. Students taking this course carry out the optimal design of a converter for high efficiency and high power density, which is an industrial problem at our partner company, Ejins, and even verify the performance by producing a prototype themselves.

Learning Activities

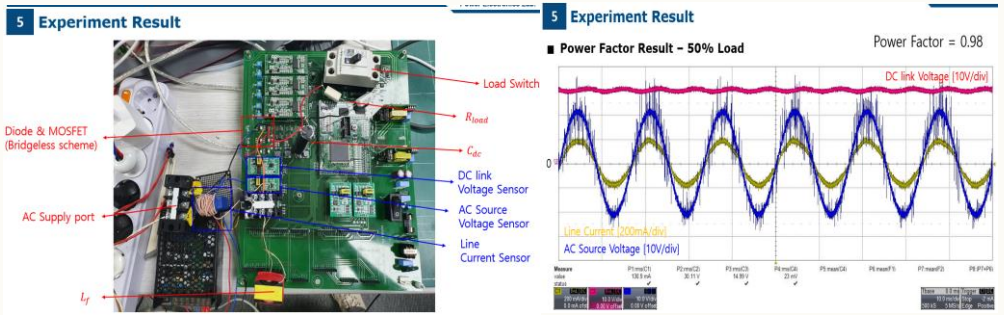
- Presentation of industrial issues of EV On-Board-Charger (OBC) and converter technology for new and renewable energy by Ejins Research Center Director
- Understanding the operating principles of high-efficiency, high-power density converters
- Consideration of problem solving results through optimal converter design, performance confirmation through simulation, and performance verification through experimentation

Result	· High-efficiency, high-power density power converter topology design and verification through simulation · Setting up an experimental environment using DSP and verifying performance through experiments

※ Evaluation of each group's presentation by Ejins Research Institute Director



※ Converter topology performance verification through simulation



※ Performance verification through H/W production and operation

Dept. of Marine Science and Convergence Engineering

Course title : 'Underwater sound engineering [Type M]

TASK

· Solve the marine plastic waste problem from the perspective of the oceanography and underwater sound engineering

Learning Activities

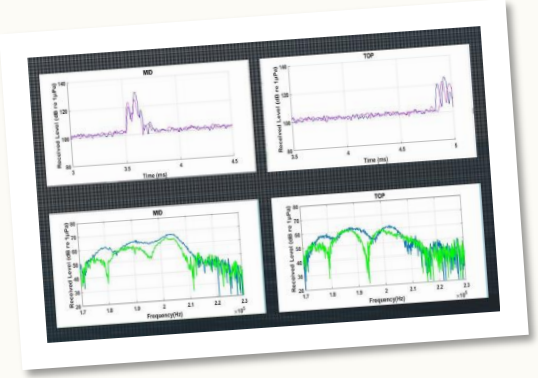
· Scenario development in conjunction with LIG Nex1

· Teaching Fellow and tutors support team discussions and water-tank experiments

· Proposal of plastic waste control system using RFID" presented by students is scheduled to be applied and registered for a patent

※ Meeting with LIGNex1

※ Water-tank experiment



※ Sonar test results

Department of Industrial Convergence, Course title: 'Service UX Design' [Type M]

TASK

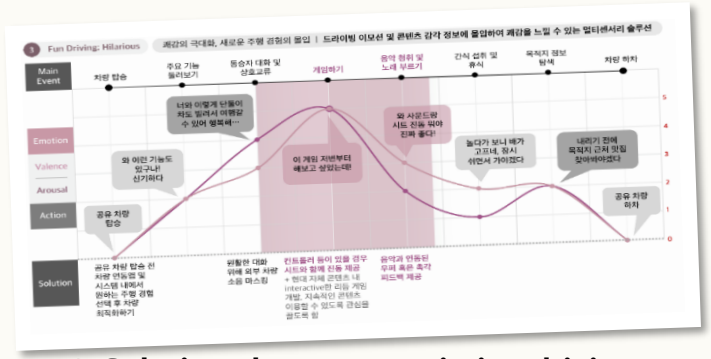
Hyundai Motor Company's Sound Research Design Lab is pursuing the development of concept designs and solution prototypes that can provide user emotional care in future mobility. Design emotional care content that reflects the user's characteristics, needs, and situation in future self-driving cars with artificial intelligence, hyper-realism, and hyper-connectivity as the core concepts.

Learning Activities

- Understand current technological trends in self-driving cars and experience future design concepts from domestic and foreign automobile manufacturers
- Derivation of autonomous driving service UX scenario
- Develop a prototype of a multi-sensor solution for user emotional care
- Final on-site presentation and feedback provided by Hyundai Motor Company Sound Design Research Lab executives and researchers

Result	· Development of a multi-sensor solution prototype for user emotional care • Creating and implementing future mobility user scenarios

※ Interior design (draft)



※ Solution that can maximize driving satisfaction (draft)

※ Mentoring Bulletin Board

In the AI era, education to strengthen connectivity with society is essential.

Creating value through cultivating talent that solves real-world problems

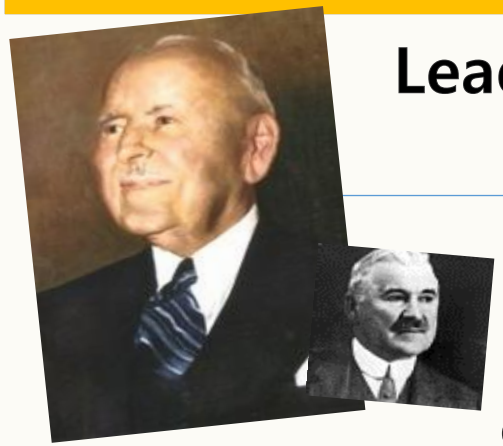
√ Examples of universities offering PBL education with strengthened links with industries

An example of a university where employment, graduate school advancement, and **entrepreneurship** are being promoted through **PBL education called SCOPE(Senior CapstOne Program in Engineering).**

Olin College of Engineering

2022 Us News & Report Ranking no. 3rd

ICON of industry-academia-linked education ：OLIN COLLEGE



Leading College in Innovative Engineering Education : Olin College of Engineering

Franklin W. Olin(1860~1951)

He played major league baseball during the summers to finance his education. He graduated Cornell University in 1886. He majored in Civil engineering.

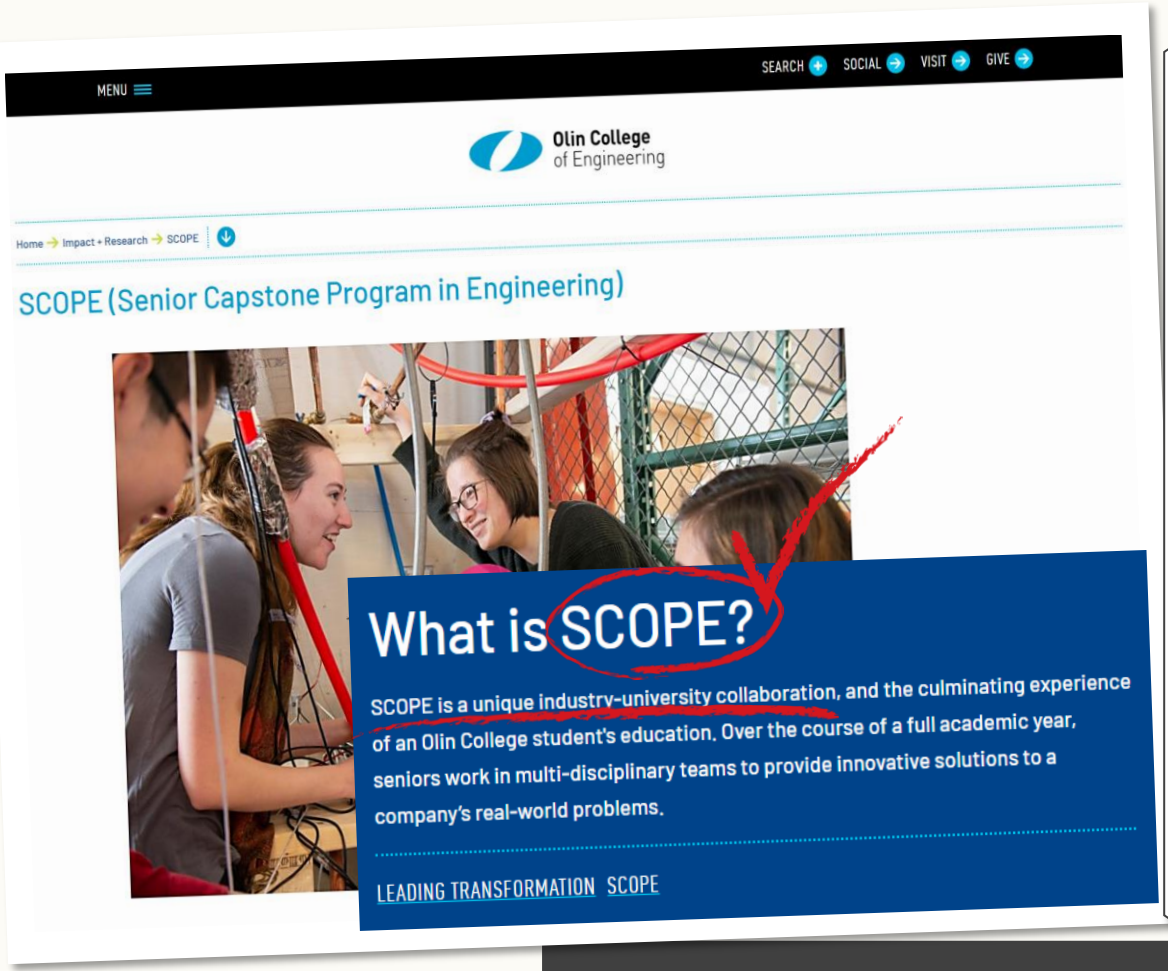
In1892, Olin started the company known today as the Olin Corporation, a Fortune 1,000 company.

In 1938, Mr. Olin transferred a large part of his personal wealth to a private philanthropic foundation. In two-thirds of a century of existence, the F. W. Olin Foundation awarded grants totaling more than $300 million to construct and fully equip 78 buildings on 58 independent college campuses. In 1997, the Foundation announced its intention to create Olin College, its most ambitious project. In sub-sequent years, the Foundation transferred its assets to the college, for a **total commitment of $460 million,** one of the largest grants in the history of American higher education.

In 1997, the F.W. Olin Foundation announced its intention to create Olin College.

The college welcomed its first freshman class in August 2002.

Olin College of Engineering : SCOPE Project



This approach creates engineering innovators, inventors, **entrepreneurs,** and leaders who apply the skills they've learned over their first three years at Olin **to an industry project in SCOPE.**

SCOPE is a culminating experience in which senior students work in multi-disciplinary teams to **provide innovative solutions to a company's real-world problems.** These industry partners pay a **sponsorship fee of $60,000** to engage Olin faculty and students and their cutting-edge technological and critical thinking skills

IP belongs to the sponsoring organization.

[Olin College of Engineering SCOPE project website]

- For companies, we provide **creative solutions and excellent talent** for projects with high future value.
- For universities, sustainable financial resources are created **through membership dues.**
- Students are provided with **practical experience** to apply the knowledge they have learned.

List of Companies Participating in 2017-2022 SCOPE Project

I 2017-2022 SCOPE Project Participating Companies [Olin College of Engineering website]

CUAHSI universities allied for water research
MANGATA
air partners breathe healthier
amazon robotics
BLUE ORIGIN
Ford
GE Healthcare
Johnson & Johnson
twilio
FidelityLabs
SANTOS FAMILY FOUNDATION U.S. Department of Transportation Volpe Center
Microsoft
MITSUBISHI ELECTRIC Changes for the Better
amazon robotics
TOYOTA
BOEING
AUTODESK
TATA MOTORS OFFICE OF HEAD OF DESIGN
TE connectivity
IRON MOUNTAIN
SONOS
WATTS Watts Water Technologies, Inc.
AUTODESK
AERODYNE RESEARCH, Inc.
Rockwell Automation
VALVE

SANTOS FAMILY FOUNDATION U.S. Department of Transportation Volpe Center
Boston Scientific
DASSAULT SYSTEMES
Pfizer
Raytheon
AGR THE ARTHUR G RUSSELL COMPANY
BLUE ORIGIN
DASSAULT SYSTEMES La Fondation MBARI

"According to company officials, Olin College of Engineering graduates are evaluated the same as people who have worked in the industry for 4 to 5 years."

[2019. Vincent Mano, former dean of Olin College of Engineering]

PBL-based educational innovation with active industry participation

Massachusetts Institute of Technology

MIT

Ranked 3rd in the 2024 QS World University Rankings

UROP MIT Undergraduate Research Opportunities Program

Examples of educational innovation platforms that have strengthened linkage with the real-world

About UROP

One of the first programs of its kind in the US, UROP began in 1969 and today the program supports nearly six thousand projects yearly with 93% of MIT graduating seniors participating in at least one UROP during their undergraduate years.

Information for

Students

Collaborate with renowned MIT faculty on the exciting, real-world research happening across the Institute. Start here if you're new to UROP.

Immerse yourself in real-world faculty research

MIT Undergraduate Research Opportunities Program

Student Advice & Resources

If you're excited by the possibility of doing real-world research with MIT faculty and researchers, then you're ready to UROP.

Flexible options. Endless opportunity.

We know that no two students are quite alike, and that's why there's no single way to UROP. Projects can happen both on-campus and in the community; as paid, credit, or volunteer; can last for a summer, a semester, or a year. And UROPs are available in every MIT department as well as centers and labs throughout the Institute. If you have a great idea you want to bring to life, chances are UROP can make it a reality.

All departments, centers, and labs at MIT participate, and university emphasizes to students that participating in UROP will help them find internships or employment.

Why UROP?

When you participate in a UROP, you're doing much more than working with faculty on research – you're creating opportunities that will last long after you complete your project or projects. Thinking about an internship? Your first job after graduation? A move into the health professions or graduate school? Every UROP is an opportunity to get closer to making your goals a reality.

MIT Graduating Student Survey (GSS)

https://ir.mit.edu/gss

Massachusetts Institute of Technology

★ It has been in operation since 1969 as an educational innovation platform in which **most students participate and most professors participate.**

★ There is an argument that education should be left to the autonomy of professors, but as in the case of MIT University, both students and professors naturally participate in the educational innovation platform prepared by the university, so it is necessary to **enhance students' competitiveness in entering the real-world (employment competitiveness, start-up, graduate school, etc.) through educational innovation.**

Educational Innovation = Competitiveness in Social Advancement (Graduate School, Employment, Entrepreneurship, etc.)

UROP by the numbers 2022-2023

- 93% of the MIT class of 2023 took part in UROP before graduating
- 3,000+ MIT undergraduates participated in UROP
- ~60% of MIT faculty served as UROP mentors
- $14,861,316 was allocated to support paid UROPs
- 65% of first-year students participated in UROP

PBL-based educational innovation with active industry participation

Stanford Univ.

Stanford University

Ranked 5th in the 2024 QS World University Rankings

Stanford Univ. PBL

Standford's PBL stands for

- Problem; Project; Product; Process; People-Based Learning
- A curriculum that allows students to experience and create innovations through on-the-job problems, projects, products, processes, and collaboration with colleagues.
- Thirty years ago, Stanford University itself asked, "How should the future of education be different?" In response to this question, Stanford University introduced PBL in 1993.

Mission

Experience-based education that allows undergraduates, graduate students, professors, and industry partners to collaborate, teach, and learn together through participation in problem-solving education based on interdisciplinary convergence , and to produce products desired by customers in the process of learning.

Mission

Our mission is to educate the next generation workforce by engaging graduate and undergraduate students, faculty, and industry practitioners in multi-disciplinary, collaborative, geographically distributed PBL activities. PBL is a process of teaching and learning that focuses on problem based, project centered activities that produce a product for a client. PBL will be based on re-engineering processes that bring people from multiple disciplines together.

Our R&D objectives are to continuously develop, implement, test, deploy, and assess radically new and innovative

- collaboration technologies
- learning technologies
- knowledge capture, sharing and re-use technologies
- workspaces
- learning and work processes

that support collaborative, cross-disciplinary, geographically distributed teamwork and learning.

Stanford Univ. PBL… Industry participation is active

Corporate Partnerships

Through the establishment of various industrial partnerships, students are provided with **experience in solving real-world problems and projects**

A win-win for universities and companies

Companies also have the opportunity to showcase their companies to talent from the world's top universities and apply their creative ideas to their businesses.

U.S. and International Accreditation for Educational Excellence

In the AI era, education to strengthen connectivity with society is essential.

Creating value through cultivating talent that solves real-world problems

√ Effect of PBL on Entrepreneurship by Strengthening Industry-Academia Collaboration Education

Some numbers from Olin College of Engineering : Effects of PBL education

<Olin college of Engineering website>

Some numbers from Olin College of Engineering: ~ until now

Effects of PBL education

75%

of alumni have been involved in a startup venture

87%

of alumni report that they love their job

3,006

educators and business leaders have visited Olin

92%

six-year graduation rate

<Olin college of Engineering website>

Let's take a look at what Stanford and MIT, which are introducing **PBL as an educational method** linked to industry (society) in university education, are **producing results in startups.**

PitchBook Universities: Top 100 colleges ranked by startup founders

https://pitchbook.com/news/articles/pitchbook-university-rankings **September 11, 2023**

Great entrepreneurs can come from anywhere, but **some universities** have a truly exceptional track record of attracting and producing **future entrepreneurs**.

PitchBook's annual university rankings compare schools by tallying up **the number of alumni entrepreneurs who have raised venture capital in the last decade(2013~2023).** The rankings are powered by PitchBook data and are based on **an analysis of more than 150,000 VC-backed founders.**

...

The global list is below, broken down by **undergraduate, graduate and MBA programs**, with filters for school size, location and public or private funding status.

PitchBook Universities: Top 100 colleges ranked by startup founders

https://pitchbook.com/news/articles/pitchbook-university-rankings

September 11, 2023

(2013-2023) **Undergraduate**

Ranking	University	Founder count	Company count	Capital raised
1	Stanford University	1,435	1,297	$73.5B
2	University of California, Berkeley	1,433	1,305	$47.5B
3	Harvard University	1,205	1,086	$51.8B
4	University of Pennsylvania	1,083	993	$34.0B
5	Massachusetts Institute of Technology (MIT)	1,079	959	$46.0B
6	Cornell University	856	807	$30.0B
7	Tel Aviv University	825	692	$26.3B
8	University of Michigan	800	736	$25.3B
9	University of Texas	742	677	$15.8B
10	University of California, Los Angeles (UCLA)	639	615	$17.2B

PitchBook Universities: Top 100 colleges ranked by startup founders

https://pitchbook.com/news/articles/pitchbook-university-rankings

September 11, 2023

Ranking	University (2013-2023)	Founder count	Company count	Capital raised
1	Stanford University	2,731	2,135	$127.2B
2	Massachusetts Institute of Technology (MIT)	1,914	1,474	$75.2B
3	Harvard University	1,647	1,406	$75.9B
4	University of Cambridge	1,156	961	$29.3B
5	University of California, Berkeley	1,105	906	$37.2B
6	University of Oxford	981	827	$29.9B
7	Columbia University	912	821	$27.2B
8	Carnegie Mellon University	682	559	$24.1B
9	Imperial College London	678	561	$11.4B
10	Cornell University	595	507	$17.9B

Graduate

PitchBook Universities: Top 100 colleges ranked by startup founders

https://pitchbook.com/news/articles/pitchbook-university-rankings

September 11, 2023

Ranking	University (2013-2023)	Founder count	Company count	Capital raised
1	Harvard University	1,691	1,562	$75.6B
2	Stanford University	1,092	993	$52.5B
3	University of Pennsylvania	1,043	962	$37.7B
4	INSEAD	809	739	$22.9B
5	Columbia University	760	712	$24.8B
6	Northwestern University	696	662	$19.0B
7	University of Chicago	653	604	$19.3B
8	Massachusetts Institute of Technology (MIT)	649	590	$20.1B
9	University of California, Berkeley	447	413	$14.8B
10	London Business School	406	378	$8.6B

MBA

What are the ways to create sustainable student entrepreneurship?

Although there may be qualitative differences, most universities that operate entrepreneurship programs **to promote entrepreneurship among college students have the following programs in common**: Providing systematic and stable entrepreneurship education through dedicated professors with the ability to design and operate entrepreneurship education programs, operating a systematic entrepreneurship-related curriculum through the establishment of entrepreneurship-related departments and majors, operating a entrepreneurship-related convergence program combining various majors, and activating network linkage activities not only with experts within the university but also with entrepreneurs and experts outside the university, and actively utilizing external experts for university entrepreneurship education, providing legal support related to startups, supporting startup funds, providing startup space, etc.

What are the ways to create sustainable student entrepreneurship?

Although it is important for universities to operate various programs related to entrepreneurship, what is even more important is **to establish an educational innovation platform** that can lead to **teaching innovation** in major-related classrooms where students spend the most time while attending college.

The best way to **continuously lead students to entrepreneurship** is to expose them to **real-world problems** by having them carry out **projects given by companies or institutions** through **educational innovation platforms** such as Olin College of Engineering's SCOPE, Hanyang University's IC-PBL, and PBL of Stanford and MIT.

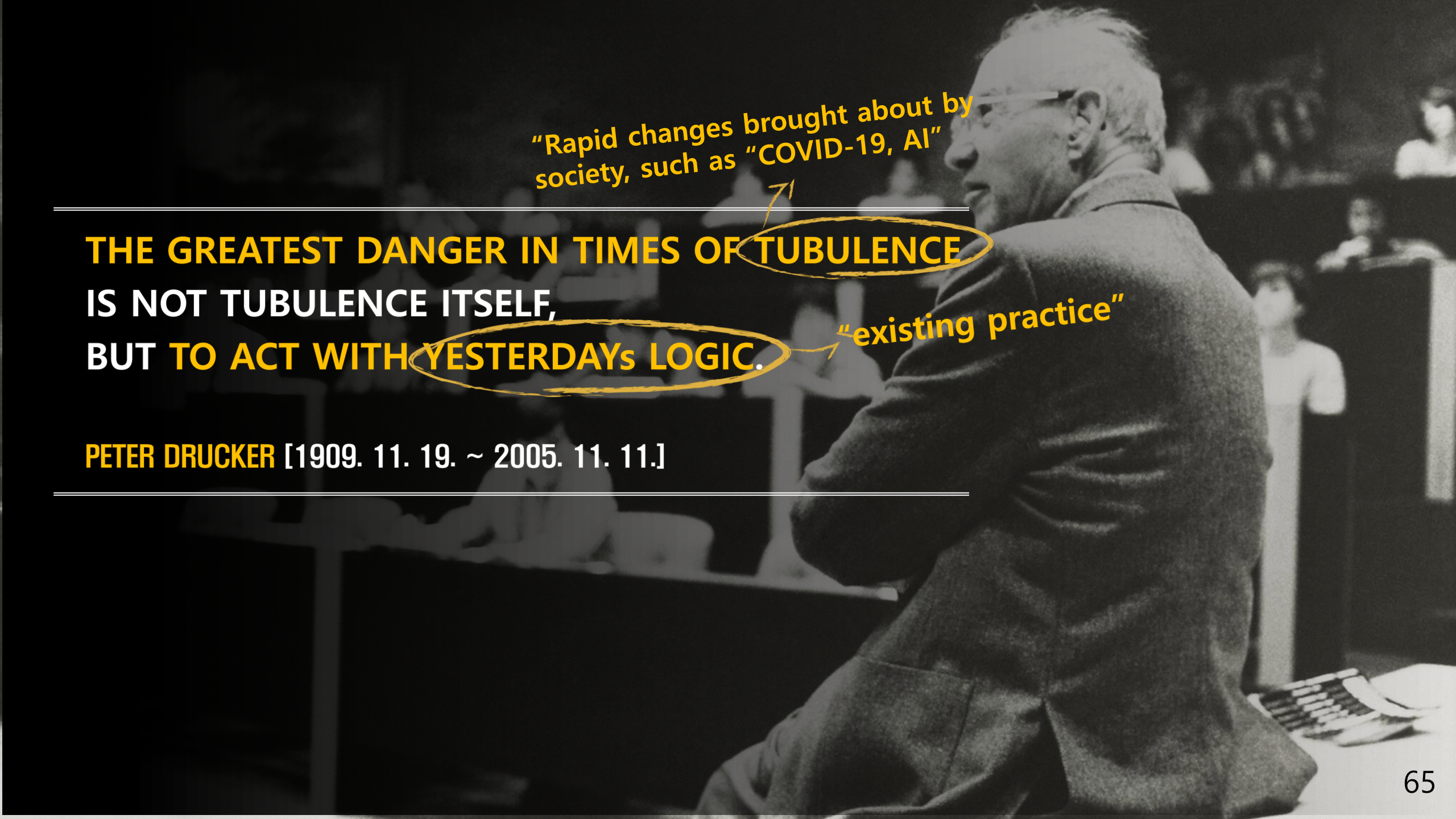
What are the ways to create sustainable student entrepreneurship?

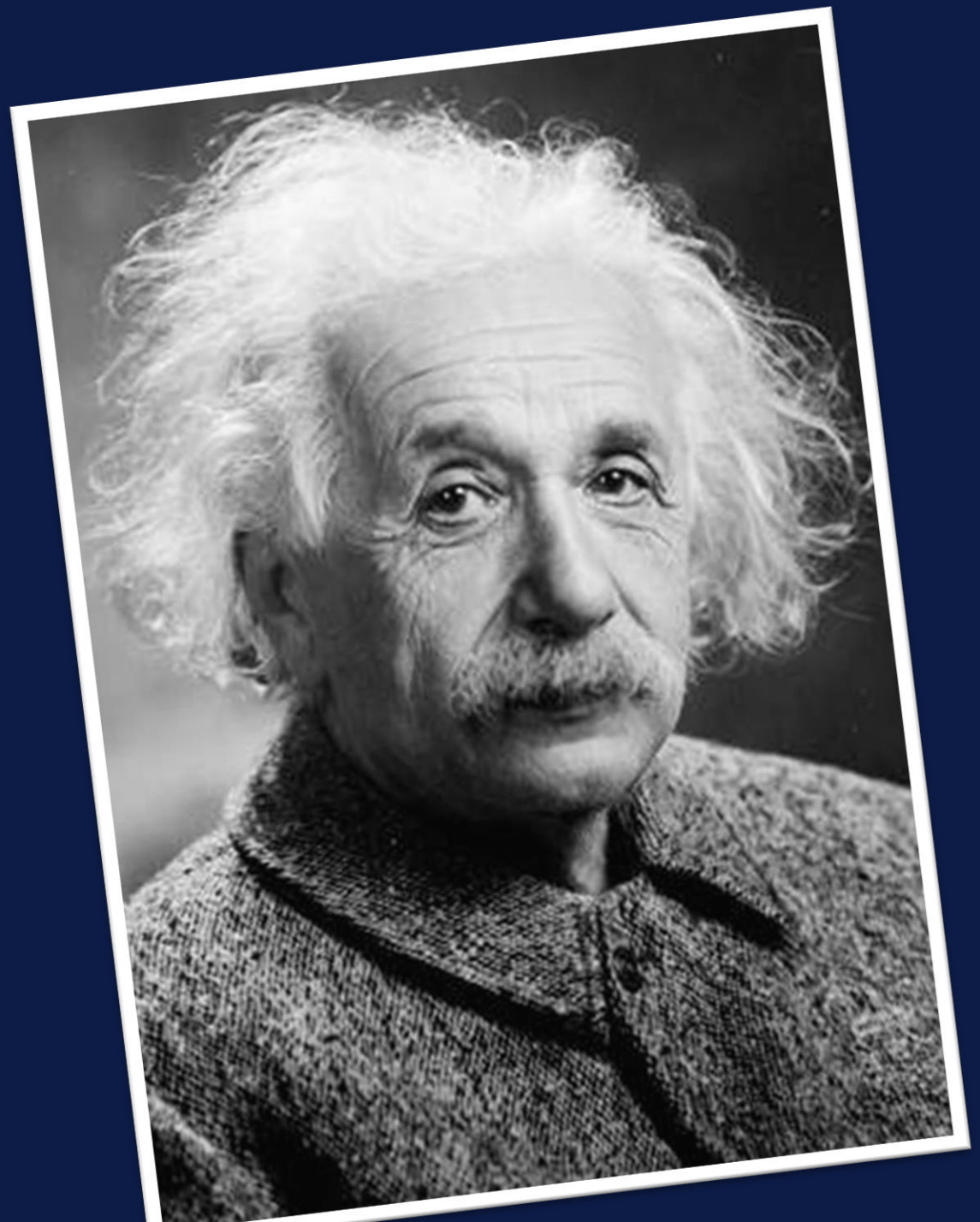
Class to Society(Labor Market, Startup, Social Innovator, etc.)!!!

Without lecture innovation, various slogans about educational innovation have no choice but to remain just slogans. The reason that educational innovation is often just a slogan and cannot be applied in lectures is **because teaching innovation requires the instructor's efforts.**

Regardless of the major, students can **start a business right away** based on an idea **while attending school** or become **competitive in employment** through **educational innovation** that solves real-world problems related to their major.

Students who have received good training to solve real-world problems related to their major through education such as PBL in university **can also start a business if they find a good business-related item at work after getting a job at a company.**


"Rapid changes brought about by society, such as "COVID-19, AI"
THE GREATEST DANGER IN TIMES OF TUBULENCE
IS NOT TUBULENCE ITSELF,
BUT TO ACT WITH YESTERDAYs LOGIC.
"existing practice"
PETER DRUCKER [1909. 11. 19. ~ 2005. 11. 11.]



Insanity

Doing the same thing over and over again and expecting different results.

Albert Einstein (1879~1955)

ขอขอบคุณสำหรับการฟัง.