IFEES & the GEDC
Global Attributes

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The new aspects in Engineering Education

• A new technological fundament of Learning (not only in Engineering)
• A new learners’ generation that grew up with the Internet and is online at any time

• The increasing area of engineering
• Exponential acceleration of the developments in technology
• The changing focus of engineering
• An enormous need for high qualified engineering graduates globally
The first website at CERN - and in the world - was dedicated to the World Wide Web project itself and was hosted on Berners-Lee's NeXT computer in 1993.
20 years: Google

1998 - 2018
The Changing Landscape of Higher Education

**Objectives:** From acquiring new “knowledge” to develop new and relevant “competencies” and build individual “identities”

**Methods:** From “classroom” based teaching to “context-aware” personalized learning

**Assessment:** From “life-long” degrees and certifications to “on-demand” and “in-context” accreditation of qualifications

Demetrios Sampson
Sustainable Development Goals
Challenging Elements of Modern Education (1)

- The impact of globalization on all areas of human life.
- Exponential acceleration of the developments in technology as well as of the global markets, and necessity of flexibility and agility.
- Enormous (and accelerated) growth of the area of engineering.

Industry 4.0
Manufacturing 2025
Smart Industry
New Engineering Disciplines

- Software Engineering
- Information Engineering
- Data Engineering
- Medical Engineering
- Neuro Engineering
- Genetic Engineering
- Climate Engineering
- Management Engineering
- Social Requirement Engineering
- Systems Engineering as integrating discipline!

New tasks within traditional engineering:

- Online Engineering
- Remote Engineering
- Virtual Engineering
- Re-Engineering
- Reverse Engineering
Challenging Elements of Modern Education (2)

• The focus of Engineering shifting from more technical subjects to the subjects directed to Information Technologies and the daily life of mankind

• Increasing complexity of technical systems, which are more and more connected with non-technical systems

• Requirements of a sustainable and circular economy
Challenging Elements of Modern Education (3)

- A new technological fundament of learning, the so-called Technology Enhanced Learning (TEL)
- A new student generation that is online at any time and expects to be more active
- The enormous number of high qualified engineering graduates needed globally
How are students doing today?

Dramatic shift in the way they experience the world.

- They have not experienced life without mobile phones
- They have not experienced life without the Internet
- They communicate via social media more than in-person
- They do not want to memorize anything
- They like to get help online for their homework
- They like to seek help from their friends and colleagues

From Alaa Ashmawy
How are students doing today?

Significant shift in their attention span and learning habits.

- Their attention span is noticeably dropping
- They do not like to take notes on paper
- They carry smart phones, not notebooks, pencils, and calculators
- Instead of daydreaming in class, they text, chat and browse
- They take snapshots of the board
- They demand PowerPoint slides of the course material
- They communicate electronically more than in-person

From Alaa Ashmawy
New Engineers and Engineering Colleges

From Seeram Ramakrishna (NUS)
The problems

- Millions of engineering graduates every year …

  … but there are problems with the quality in the broad

- Decreasing innovation cycles of engineering ‘products’ (hardware, software, services), …

- Half of what students learn in their first year of study will be outdated at the end of their study, …

- It is estimated that today’s learner will have 10 and 20 jobs in their work life

  … but there is still focus on one-time education
A New Paradigm in Engineering Education

- Fundamental education in Math and Science
- Inquiry based Engineering Education (project and problem based)
- Including entrepreneurship, Critical Thinking, Business Management in the curricula
- Teach the students how to learn
- Pay attention to Ethics and Sustainability in Global Contexts
- Taking into account the latest findings in Engineering Pedagogy
ATTRIBUTES OF A GLOBAL ENGINEER

- Engineers need to be acquainted with cultures for an adequate design of product and services for global markets.
- Preeminence in technological innovation requires leadership in all aspects of engineering: engineering research to bridge scientific discovery and practical applications.
- Engaging into intercultural dialogue and interdisciplinary research enables them to critically analyze competitiveness and long-term productivity growth.
- Global perspective gives engineers an understanding of different cultures’ values, traditions and makes them more effective businesspeople.
- Engineers have to use the limited natural resources of the world to satisfy ever increasing human demands.
ATTRIBUTES OF A GLOBAL ENGINEER

- Cultural Sensitivity
- Global mobility
- Open-minded & ability to adapt
- Ability to behave ethically across cultures
- Social responsibility
- Research & analytical thinking
- Adoption of new technology
- Entrepreneurship
Revolutionizing Engineering Diversity

Expanded conception of diversity

- Women
- Racial and ethnic minorities
- LGBTQ+
- Low Income and First Generation to College
- Students with disabilities
A systematic approach to building inclusion

A multidimensional framework

Institutional Commitment
Access & Success
Inclusive Pedagogy
Affirming Climate
“A net gain. The World Economic Forum, in its Future of Jobs Report 2018, found that most large companies in its survey expect workplace roles to change as more tasks become automated. But these same companies expect a net gain in human labor. “Extrapolating from these trends for the global (non-agricultural) workforce employed by large firms … 75 million jobs may be displaced by the above trends, while 133 million additional new roles may emerge concurrently,” Mr. Wladawsky-Berger writes.

Where is the growth? Areas of growth include data analysts and scientists, AI and machine learning specialists, software and application developers, big data specialists, IT services, process automation, information security analysts, robotics engineers, and e-commerce and social media specialists, he says. Sales and marketing professionals, organization development specialists, innovation professionals, user experience and human-machine designers, and people and culture specialists, will be in demand, too. At risk: mid-level managerial and administrative jobs that are highly repetitive and lend themselves to automation.”
Mission

IFEES works to increase cooperation and mutual trust among engineering education stakeholders from across the globe. Our aim is to join forces and work towards shared objectives, accomplishing goals that are beyond our individual reach.

Vision

We are the collective voice and change agent for achieving relevance, excellence, equity, access and diversity in engineering education worldwide.
Some of our IFEES Members
Workshop Topics Include:

• Curriculum development and innovation
• Strategy, metrics, and accreditation
• Innovative teaching and learning
• New technologies and pedagogies

Who We Are:

• Global leadership training institute
• Faculty development to transform EE
• Choose workshop, tailor to local needs

Contact Information:

• IIDEA: Educating the Ideal Engineering Professor
• IFEES.net/IIDEA
• Secretariat: IFEES (Hans J Hoyer)
Capacity Building at Tsinghua University

- July 13-14, 2018 → 7th year of capacity building workshops at Tsinghua University (China)
- Facilitators annually come from Africa, Asia, Europe, North America and Latin America and share best practices; UNESCO has also facilitated workshops
- Topics range from authentic learning, to training for professional competency, situated learning strategies and more
- Workshop series each year are tailored to the needs and goals of the local university → globally competent, locally relevant
**Vision:** SPEED strives to empower students to become a factor of change in EE by providing them with the skills, knowledge, and resources necessary to become a global engineer and show them how they can think globally and act locally.

**Mission:** Through engineering education initiatives and collaboration with academia, industry, society and government, SPEED is committed to improving the future of engineering education whilst embracing the considerable engineering challenges being faced in the 21st century.
Mission
To serve as a global network of engineering deans, and to leverage on the collective strengths, for the advancement of engineering education and research.

Vision
To enhance the capabilities of engineering deans to transform schools in support of societies in a global economy.
1. Mobility: global exchange of programs, students, and faculty
2. Inter-institutional Research collaborations
3. Academia-Industry interactions
4. Membership growth and strategy and financial stability
Visión: aumentar las capacidades de los decanos de ingeniería para transformar las facultades en apoyo de la sociedad en una economía global.

Misión: Servir como una plataforma global de decanos de ingeniería, y aprovechar las fortalezas colectivas a modo de promover la educación en ingeniería y la investigación.

500+ Network
40+ Countries
THE AIRBUS GEDC DIVERSITY AWARD FOR ENGINEERING EDUCATION

A global award for projects that inspire students from all profiles and backgrounds to study and succeed in engineering.

Formal Partnership with GEDC since 2012

UNESCO Patronage in 2017

LinkedIn Group for diversity discussions

Award is open to projects teams working in an engineering school or faculty (not students)

Australia 2014 Award Recipient

Fadi Aloul, UAE 2015 Award Recipient

Yacob Astatke, USA & Ethiopia, 2016 Award Recipient

Taiwo Tejumola, BIRDS Satellite Project, Japan 2017 Winning Project

SaviaLab diversity initiative, Chile 2018 Winning Project

www.company.airbus.com/diversityaward
FURTHER COLLABORATIONS

MoUs

UNESCO
United Nations Educational, Scientific and Cultural Organization

Organization of American States
WFEO / FMOI

Partnership

THE WORLD BANK
IFEE AND GEDC CORPORATE PARTNERS

- Dassault Systemes
- Airbus Group
- MathWorks
- Quanser
- Liaison
- Siemens
- Phoenix Contact
- Total
- Granta
Peace Engineering

Prosperity

Sustainability

Social Equality

Cultural Diversity

Quality

Innovation & Entrepreneurship
GEDC 2019 Santiago, Chile
October 20-23, 2019

- Organized by the GEDC and hosted by Pontificia Universidad Catolica de Chile
- GEDC's first stand-alone conference in Latin America
WEEF 2019 Chennai, India

November 11 – 17, 2019

- Organized by IFEES, the Education Promotion Society of India, the Indo-Universal Collaboration for Engineering Education, and the Vellore Institute of Technology
- The tentative theme is Transforming Engineering Education through Disruptive Technologies in the Industry 4.0 Era.
Thank you for your attention

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George Mason University