



United Nations  
Educational, Scientific and  
Cultural Organization

联合国教育、  
科学及文化组织

**ICEE**

International Centre for  
Engineering Education  
under the auspices of UNESCO

国际工程教育中心  
联合国教科文组织支持

# The International Symposium of the Category 2 Institutes and Centres under the auspices of UNESCO in the field of Natural Sciences

## Brief Introduction to ICEE's Work

Associate Prof. QIAO Weifeng, Dr. XU Lihui, and Dr. FU Jie

ICEE, Tsinghua University

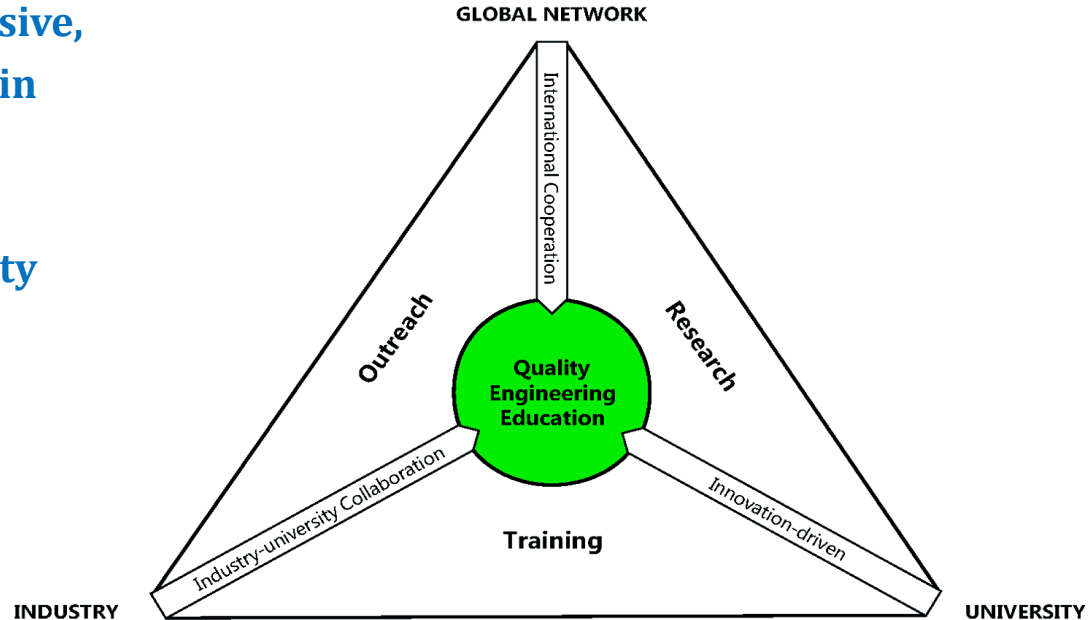
May 16, 2024, Kuala Lumpur

- ICEE = International Centre for Engineering Education under the auspices of UNESCO
- established by Chinese Academy of Engineering (CAE) and Tsinghua University
- Category 2 Center, unveiled in Beijing on June 6, 2016.



## VISION:

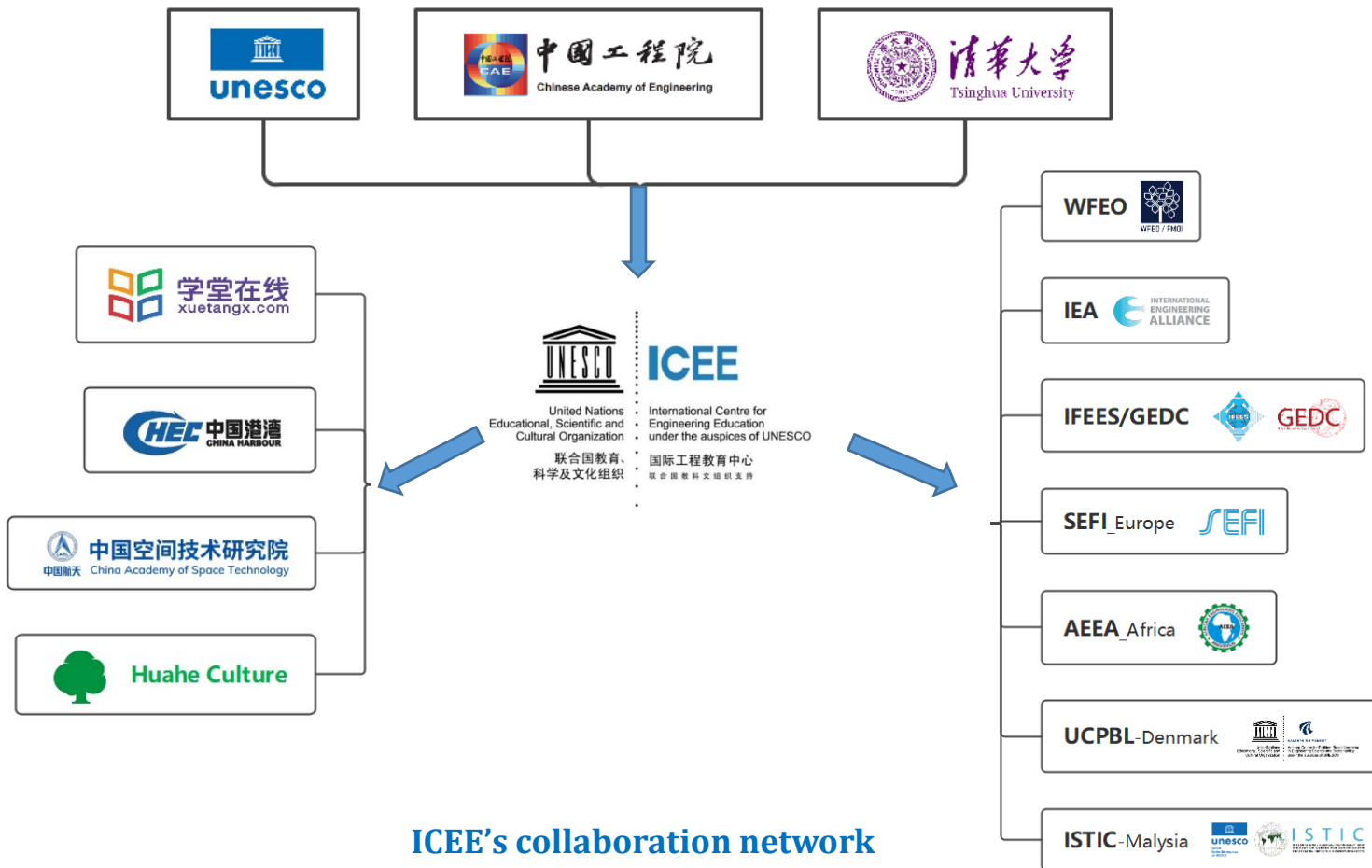
- to building an equal, inclusive, developmental and win-win engineering education community
- for the promotion of quality and equity in engineering education worldwide.



# ICEE overview



清华大学  
Tsinghua University

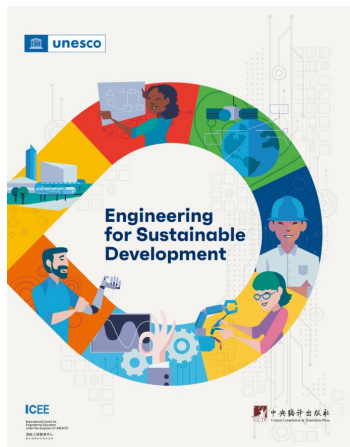


ICEE's collaboration network



## Four highlights of our work

### 1) Engineering Report II



UNESCO - ICEE

### 2) Online Education



ICEE - XuetangX

### 3) Engineering Capacity Building



ICEE -  
China Harbour

### 4) IEA GAPC benchmark review



INTERNATIONAL ENGINEERING ALLIANCE

GRADUATE ATTRIBUTES & PROFESSIONAL COMPETENCIES

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IEA-WFEO-ICEE-

## ERII is a teamwork outcome with great contributions from UNESCO



Scan the QR  
code to read

- “A flagship report of UNESCO” —— Report introduction
- “A standard setting-up milestone of UNESCO” ——Report preface from D.G. Azoulay

### *Timeline of editing engineering report*

- 4 years
- 3 languages main reports
- 6 UN languages executive summaries
- 4 advisory/steering committee meetings
- 40+ video conferences
- 200+ e-mails
- 45 authors from
- 35 organizations and institutions

- June 2016 Concept note
- June 30, 2017 Project agreement
- September 26, 2017 Kick-off meeting
- March 8, 2018 Advisory / Steering committee meetings (Beijing-Paris)
- July 3, 2018 Steering committee meeting (Beijing-Paris)
- November 5, 2018 Steering committee meeting (Beijing)
- April 19, 2019 Decision on the first delay to Feb. 2020
- May 27, 2019 XutangX donation
- November 4, 2019 Decision on the second delay to Jun 2020
- October 21, 2020 Decision on Final deadline
- March 4, 2021 Launching report

## ICEE's contribution

### Original (Sept. 26, 2017)

#### Regional Trends in Engineering

- Africa
- Arab States
- Europe & North America
- Latin America & the Caribbean
- Asia & the Pacific



### Final (2021)

## 5.

#### REGIONAL TRENDS IN ENGINEERING

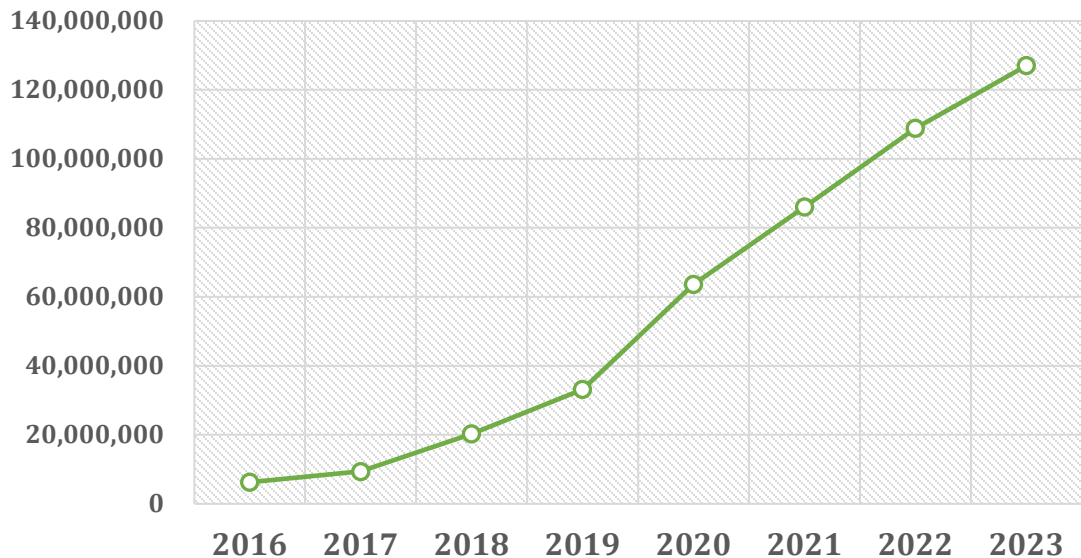
**142**

→ 5.1	<u>Major interregional trends</u>	144
5.2	Europe and North America	151
5.3	Asia and the Pacific	159
5.4	Latin America and the Caribbean	166
5.5	Africa	172
5.6	Arab States	180


 学堂在线  
xuetangx.com

- ICEE's first global partner and ICEE's online education platform
- **127 million** learners totally, as of Nov. 2023
- **2291** engineering courses, **20.3 million** learners totally

Xuetangx registered learners



UNESCO

ENGLISH

COVID-19 Global Education Coalition What we do Stories & Ideas Resources

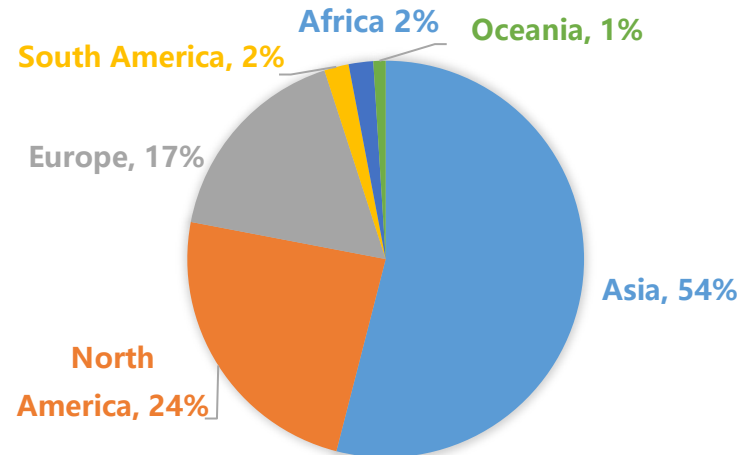
### Massive Open Online Course (MOOC) Platforms

- Alison – Online courses from experts, available in English, French, Spanish, Italian and Portuguese
- Canvas Network – Course catalogue accessible for free for teachers in order to support lifelong learning and professional development.
- Coursera – Online courses taught by instructors from well-recognized universities and companies.
- European Schoolnet Academy – Free online professional development courses for teachers in English, French, Italian and other European languages.
- EdX – Online courses from leading educational institutions.
- iCourse – Chinese and English language courses for university students.
- Future Learn – Online courses to help learners study, build professional skills and connect with experts.
- iCourses – Chinese language courses for university students.
- TED-Ed Earth School – Online lessons about nature made available continuously during a 5-week period between Earth Day (April 22nd) and World Environment Day (June 5th).
- UdeMy – English, Spanish and Portuguese language courses on ICT skills and programming.
- XuetangX – Online courses provided by a collection of universities on different subjects in Chinese and English.



## Gender equity and future outreaching potential

	MOOCs platform	Whole platform (including Moocs, Rain class, Xuetang Cloud)
<b>Leaners in whole platform</b>	25,579,707	127,043,051
●Female <b>49%</b>	12,534,056	62,251,095
●African <b>2%</b>	150,409	254,086
<b>Learners in engineering courses</b>	4,093,068	20,328,452
●Female <b>36%</b>	1,473,504	7,318,243
●African <b>1.2%</b>	49,117	101,642



## AI-Driven Digital Transformation in Higher Education

Online Education Dialogue

### "Navigating AI-Driven Digital Transformation in Higher Education"



Topic 1: Unraveling and Embracing AI in Higher Education: Practices Opportunities Challenges Future



Topic 2: Reimagining Teaching with Artificial Intelligence



Topic 3: Piloting AI driven Digital Transformation of Higher Education



Topic 4: The Impact of AI on the Role and Teaching Practice of Teachers in Higher Education



Topic 5: Leveraging AI for Digital Transformation in Higher Education: Teaching, Learning, and Management



Topic 6: Transforming Higher Education: Exploring the Roles, Challenges, and Future of Generative AI



Topic 7: AIGC in Enhancing Learning Experiences: Roles and Challenges



Topic 8: Fostering Governance, Advancing SDGs, and Empowering Higher Education through AI

● ICEE-Xuetangx co-organized **8** online education dialogue; **33,300+** attendees



- ICEE-China Harbour Global Leadership Development Base
- Training **2422** local employees, including **788** female in 2023



December 27, 2021



January 3, 2024

Company	Number of local employee training						Total
	high-level employee		middle-level employee		basic-level employee		
	Male	Female	Male	Female	Male	Female	
1 Zhen Hua Engineering Co.,Ltd.(Hong Kong)	4	0	8	2	448	50	512
2 Zhen Hua Harbour Construction Company Co.,Ltd(Macao)	2	0	8	0	58	42	110
3 South Pacific Division	6	1	55	46	178	201	487
4 Sri Lanka Division	2	1	21	3	84	28	139
5 Middle East Division	3	0	57	3	41	7	111
6 Eastern Africa Division	0	0	1	0	3		4
7 Central Africa Division	0	0	1	0	19	4	24
8 Western Africa Division	2	0	1	0	12	5	20
9 Southern Africa Division	1	0	1	2	19	12	35
10 America Division	10	1	31	13	169	108	332
11 Pakistan Office	4	0	6	0	65	6	81
12 Algeria Company	4	0	3	5	19	12	43
13 Malaysia East Coast Rail Link Project	5	1	15	5	98	26	150
14 Bogotá Metro Line 1 Project	2	1	18	5	40	32	98
15 Port City Project Company	2	0	7	3	46	23	81
16 Lekki Port Project Company	1	1	10	3	11	4	30
17 Jamaica North-South Highway Project Company	0	0	0	4	33	128	165
<b>TOTAL</b>	<b>48</b>	<b>6</b>	<b>243</b>	<b>94</b>	<b>1343</b>	<b>688</b>	<b>2422</b>



## Cases of training local engineers in Africa



**Collaboration Among Four Countries:  
Jointly Shaping a Professional Team for  
Port Operations in Nigeria**



**West African Traffic Pulse: Highway  
Expansion and African Talent Cultivation  
under Chinese Standards**



**China's Imprint on African Roads: A New  
Model for Standardized Training of Highway  
Operational Talents**



**Southern African Pipeline Project: Creating a  
Highly Localized Professional Project Team**



**North African Port Project: A New Paradigm  
for Cultivating Independent Female Marketing  
Engineers**



**Promoting East African Hydraulic Engineering  
Education: Cultivating Future Engineers for  
Tanzania**



# 4 IEA GAPC benchmark review

- Announcement of approval by IEA in consultation with UNESCO (ICEE), WFEO and its members and partners.
- 4 experts from ICEE participated in reviewing **Graduate Attributes and Professional Competencies Framework (GAPC)** of International Engineering Alliance(IEA), during 2019-2021.
- 7 accords/agreements of IEA and its member organizations across **30+ countries/regions/economies** will implement this update benchmark.



### Working group Chair

- Prof. A. Bulent Ozguler (MUDEK), Turkey

### IEA working group members

- Prof. A. Bulent Ozguler (MUDEK) (Chair), Turkey
- Prof Mitsunori Makino and Ms Akiko Takahashi (JABEE), Japan
- Prof Barry Clarke (ECUK), UK
- Ms Bernadette Foley (Engineers Australia), Australia

### WFEO working group members

- Dr Marlene Kanga – (WFEO President, 2017-2019), Australia
- Mr WANG Sunyu (Vice Director General, ICEE Tsinghua University), China
- Dr Charlie Than, (President, Myanmar Engg. Council), Myanmar
- Dr Michael Milligan (ABET) – representing IFEEs, USA
- Mr KANG Jincheng, Strategic Specialist, ICEE, China
- Mr QIAO Weifeng, Asst Professor Inst. Of Education Tsinghua University and ICEE, China
- Mr XU Lihui, Research Associate, Inst. Of Education Tsinghua University and ICEE, China



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### PREAMBLE

The International Engineering Alliance is pleased to announce that all Accords and Agreements have approved revisions to its Graduate Attributes and Professional Competencies (GAPC) international benchmark. The review, supported by UNESCO, was undertaken by a joint IEA-WFEO Working Group who engaged extensively with IEA signatories, WFEO members and WFEO partners representing academics, industry and women globally. They reflect requirements for new technologies and engineering disciplines, new pedagogies and values such as sustainable development, diversity and inclusion and ethics. They are well positioned to support the engineering role in building a more sustainable and equitable world.

Our thanks to UNESCO and WFEO for their constant support and endorsement and to the GAPC Working Group members, who commenced this work three years ago and who have worked tirelessly to bring this to fruition.

VERSION: 2021.1  
The documents presented in this compendium are current as of 21 June 2021.



### IEA Constituent Agreements

Washington Accord	International Professional Engineers Agreement
Sydney Accord	International Engineering Technologists Agreement
Dublin Accord	APEC Engineer Agreement for International Engineering Technicians

### Graduate Attributes and Professional Competences

Approved Version 4: 21 June 2021

This document is available through the IEA website: <http://www.ieagrements.org>

### Executive Summary

Many accrediting bodies for engineering qualifications have developed outcomes-based criteria for evaluating programs. Similarly, many engineering regulatory bodies have developed or are in the process of developing competence-based standards for registration. Educational and professional accords for mutual recognition of qualifications and registration have developed statements of graduate attributes and professional competence profiles. This document, which is a revised version that takes into account the present-day state of engineering activities, presents the background to these developments, their purpose, and the methodology and limitations of the statements. After defining general range statements that allow the competences of the different categories to be distinguished, the paper presents the graduate attributes and professional competence profiles for three professional tracks: engineer, engineering technologist, and engineering technician.

- In my understanding in our center, **CAPACITY** mainly means:

**C**ollaborative

**A**ctions for

**P**ersonal

**A**bilities through

**C**ollective and

**I**nstitutionalized

**T**raining especially for the

**Y**outh



## ● Shoulder to shoulder, Hand in hand



## ● 2024

- **Tsinghua-CAE-UNESCO: The Fourth International Forum on Engineering Education** (for sure)
- **ISTIC-ICEE: *International Forum on Women in Science, Technology, and Innovation*** (in discussion)
- **ICEE-IFEES-SFEI: IIDEA workshop restart** (in consideration)
- **UNESCO-ICEE: Engineering Education Database (UNEED)** (try to move forward)



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# Thank you !!!

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QIAO weifeng  
冰岛

