

# Engineering Education Working Group (EEWG) Presentation to the CAETS COUNCIL

Helsinki, 3<sup>rd</sup> July 2024

# EEWG Summary for the CAETS Council Meeting, 3<sup>rd</sup> July 2024 Helsinki

The CAETS Engineering Education Working Group (EEWG) was established in **March 2023**.

## Membership in EEWG:

- The EEWG includes 22 active academies and another 11 that have expressed some interest
- The participating Academies are from the countries of **Argentina, Australia, Canada, China, Denmark, France, Germany, India, Ireland, Japan, Korea, Mexico, Netherlands, Nigeria, Pakistan, Serbia, South Africa, Spain, Switzerland, United Kingdom, United States, Uruguay**
- Three meetings held in 2023 (27Apr23, 27Jul23, 27Oct23) and two (15Feb24, 09May24) in 2024, **all virtually**
- We have identified two topics for which sub-committees are preparing position papers for publication:
  - **The language of instruction in Engineering Education** – Native languages are central to culture and comprehension, but global languages such as English are important for collaboration, technology development, and employment. Many nations are considering this issue, where a broader view may help.
  - **The adoption of artificial intelligence (AI) / natural language processing (NLP) / machine learning (ML) in Engineering Education** – These technologies have many advantages but will require changes to training, pedagogy, and assessment. An international view of the challenges will be helpful to all nations.

## **Overall (long-term) objectives of our EEWG are:**

- (i) to create a community across the academies to be able to determine common points of interest concerning status updates on the current framework and priority areas,
- (ii) to create reports of best practices and policy recommendations to address the concerns and challenges perceived by our member academies in Engineering Education,
- (iii) to author specific reports related to education delivery methods (physical, virtual, simulation, hybrid), sustainable developmental goals (e.g., energy, water, etc.), engineering ethics, technology forecasting, and engineering pipeline/demographics,
- (iv) to develop a virtual platform for networking to facilitate cooperation and collaboration on engineering education among the member academies.

## **Immediate goals:**

- To learn from one another
- To create advisory and policy guidance to assist our member countries and potentially at an international level to improve the engineering education ecosystem.
- Our discussions may include topics on pedagogy, technology, equity/diversity/inclusion, ethics, and international cooperation.

# EEWG Summary for the CAETS Council Meeting, 3<sup>rd</sup> July 2024 Helsinki

- **EEWG Activities to date:**
  - The EEWG has met five times (thrice in 2023 and twice in 2024)
- **1<sup>st</sup> meeting on 27<sup>th</sup> April 2023** – 15 Academies participated (22 experts present)
  - Focused on the effects of Covid-19 on the engineering education ecosystem in each country and the ongoing influence of those changes
- **2<sup>nd</sup> meeting on 27<sup>th</sup> July 2023** – 15 Academies participated (17 experts present)
  - Focused on efforts to improve the effectiveness of engineering education in each country
- **3<sup>rd</sup> meeting on 27<sup>th</sup> October 2023** – 11 Academies participated (18 experts present)
  - Focused on issues around gender parity, international protocols, accreditations, and ethics in engineering education.
- **4<sup>th</sup> meeting on 15<sup>th</sup> February 2024 and 5<sup>th</sup> meeting on 9<sup>th</sup> May 2024:**
  - Focused on Language of Instruction and A/I in engineering education
  - Approved a work plan and outline for the A/I paper

# EEWG Summary for the CAETS Council Meeting, 3<sup>rd</sup> July 2024 Helsinki

## Meetings in 2023

- **3<sup>rd</sup> meeting on 27<sup>th</sup> October 2023** – 11 Academies participated (18 experts present)
  - Focused on issues around *gender parity, international protocols, accreditations, and ethics* in engineering education.
- **Concluding remarks:**
  - Development of a **uniform structure** for addressing issues on social responsibility, ethics, and problem-solving skills.
  - Involvement of more **industrial leaders** for implementation and collaboration.
  - Designing a **format** for collecting data and survey responses from representatives.
  - Summary of **best practices and references** to be compiled before the next meeting.

# EEWG Summary for the CAETS Council Meeting, 3<sup>rd</sup> July 2024 Helsinki

## Meetings in 2024

- **4<sup>th</sup> meeting on 15<sup>th</sup> February 2024 :**
  - Focused on **Medium of Instruction and Application A/I** in engineering education
  - Approved a **work plan and outline** for the A/I paper
- **Concluding remarks:**
  - Deeper exploration of existing topics with the goal of preparing position papers.
  - Agreement to develop position papers on the medium of instruction and A/I in engineering education.
  - Establish sub-teams to work on these papers.
  - Target the CAETS 2025 meeting in Australia for presenting completed work.

# EEWG Summary for the CAETS Council Meeting, 3<sup>rd</sup> July 2024 Helsinki

## Meetings in 2024

- **5<sup>th</sup> meeting on 9<sup>th</sup> May 2024:**
  - Focused on **Medium of Instruction and A/I** in engineering education
  - Approved a **work plan and outline** for the A/I paper
- **Concluding remarks:**
  - Establishment of a sub-team to create a position paper on the medium of instruction.
  - Further development of the position paper on AI in engineering education.
  - Data collection and drafting of the AI position paper by October 2024, with a final version by March 2025.
  - Presentation of the AI position paper at the CAETS 2025 meeting in Australia.

## **EEWG Summary on Medium of Instruction**

- There are very big differences between countries in their approach to languages of instruction:
  - English is the most common medium of instruction and the predominant language used in teaching and research for all Engineering disciplines.
  - However, many academies report using national languages in engineering education, particularly in the undergraduate years of university study.
  - When languages other than English are employed, the academies report difficulty providing appropriate teaching materials and see challenges in subject delivery by teaching staff.
  - The Academies wish to examine these issues in greater depth and publish a position paper under CAETS.

## **EEWG Summary on Application of A/I + M/L**

- All academies agree that the incorporation of Artificial Intelligence (A/I) in Engineering Education is important and necessary but experiences many challenges in its implementation.
  - Knowledge exchange between the Academies on this current topic is invaluable, as individual countries are working on policies for the use of A/I in engineering education.
  - The academies wish to prepare a paper publishing the current status on some of the controversial aspects of A/I in engineering education, such as learning methodology, ethics, propriety, intellectual property, and mode of assessment.
  - Preparation of a position paper is seen to be urgent, given the current international focus on the issue.

***The Engineering Academies have found the discussions and knowledge sharing about current topics to be very useful.***



# EEWG Summary for the CAETS Council Meeting, 3<sup>rd</sup> July 2024 Helsinki

## Plans for 2024 - 2025:

- ❖ We expect to continue to **meet quarterly** as a full team, with offline **meetings by sub-committees** working on specific position papers.
- ❖ We hope to have a draft of the **Artificial Intelligence paper by the year-end of 2024** and a publishable copy by **March 2025** with the intention of a larger discussion on the topic at **CAETS Brisbane in September 2025**.
- ❖ We are in the early stages of developing a work plan and outline for the **Medium or Language of Instruction** paper but hope to also be able to discuss the topic in **Brisbane**.
- ❖ Other topics we may engage in:
  - The need and process for **accreditation (for greater cooperation and mobility)**, the **level of funding needed** from the respective governments, and modalities and extent of **intellectual property sharing** possible in joint engineering projects and initiatives including **digital educational platforms** (database, short courses, demonstration, interactive portals) as a supplementary tool.