International Association for Continuing Engineering Education

Quarterly Newsletter

WAVE

Winter 2026

In this issue:

www.iacee.org

Welcome to the WAVE Newsletter

Dear IACEE Members and Colleagues,

We are pleased to introduce WAVE, the reimagined quarterly newsletter of the International Association for Continuing Engineering Education (IACEE). This marks a significant evolution in how we share knowledge and connect with our community of engineering educators, university administrators, and learning and development professionals worldwide.

Previously, IACEE published content through a more frequent newsfeed, PULSE, alternating between monthly and bi-monthly updates. Following strategic discussions at the 2025 Summer Council meeting, we made a deliberate decision: IACEE will establish itself as the leading knowledge hub for continuing engineering education. To achieve this goal, WAVE will serve as a curated collection of timely, relevant articles that highlight the diverse work of our members—not just Council members, but the entire IACEE community across all regions of the world. These articles will support our members' professional growth while creating a comprehensive knowledge repository for our field. Moving forward, IACEE will publish four WAVE editions each year—Winter, Spring, Summer, and Fall—beginning with this inaugural Winter 2026 issue. During the other months, we will send you an informative PULSE newsfeed. We look forward to hearing how WAVE enhances your understanding of continuing engineering education practices worldwide.

This Winter 2026 issue features perspectives from three Council members on continuing engineering education in Germany, highlights the State University of New York's innovative partnership with Google to develop AI competencies among staff, students, and faculty, and presents insights from a World Engineering Education Forum panel featuring two of our Council members. Together, these articles provide a comprehensive view of skill development and knowledge advancement in our field. This edition of WAVE has been edited by Soma Chakrabarti.

In keeping with current trends in educational technology, we have transparently documented our use of AI tools throughout the editorial process. Building on this theme, our Spring 2026 issue will examine AI applications that can enhance the effectiveness of CEE professionals, educators, and administrators in their daily work.

We welcome your feedback on this inaugural edition. Your insights will help us refine WAVE to better serve the IACEE community.

Thank you for your continued engagement with IACEE.

Sincerely,
The IACEE Communications Team

Anita Chawla
First Vice President, Vice President for Professional Development, Communication, and Member Engagement

Camille Howard
Managing Director, Global Operations

Soma Chakrabarti
Secretary-General, Past President

Join us in Cagliari!

Our June 2026 event will be co-located with EUCEN in beautiful Cagliari, Italy. This unique collaboration will provide valuable opportunities for international connection and shared learning, with a dedicated half-day IACEE symposium designed to explore timely issues and emerging practices in continuing engineering education.

Editor's note:

In the production of this newsletter, we have used the following AI tools:

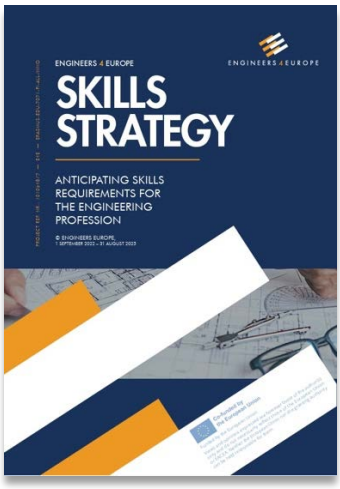
- Wispr Flow for dictation
- Zoom AI companion, Plaud AI, and Otter AI for interview recording and transcription
- Claude for brainstorming and writing
- Grammarly for writing correctness, clarity, and preservation of tone
- Image generation by ChatGPT Image Creator
- Gamma AI for image generation as a presentation, and then transferring to Word

If you have any questions or concerns, please let us know at info@iacee.org.

Thank you,
Soma Chakrabarti
Editor, IACEE WAVE Winter 2026

ENGINEERS' EUROPE Engineering Skills Strategy

A Conversation with Mr. Dirk Bochar, Secretary General of ENGINEERS EUROPE, and Council Member of IACEE



The world is entering a decade where engineering skills will determine whether major goals in climate, infrastructure, and digitalization can be achieved. In the European Union, demand for researchers and engineers is expected to grow significantly through 2035, driven by ongoing green and digital changes and demographic shifts. In response, ENGINEERS EUROPE has led the "Engineers for Europe" (E4E) project to create a practical European Engineering Skills Strategy, aiming to connect universities, continuing education providers, professional organizations, and employers around a shared skills agenda.

Why a European skills strategy now?

In our discussion, Mr. Dirk Bochar, Secretary General of ENGINEERS EUROPE, explained how the project started with a clear observation: a structural gap between what engineering employers expect and what universities provide. To understand this gap, the E4E consortium analyzed labor-market data, reviewed curriculum and competence frameworks, and held extensive consultations with employers, universities, and professional organizations.

This work aligns closely with the European Centre for the Development of Vocational Training or CEDEFOP's 2035 skills forecasts, which show significant employment growth and high projected job openings for science and engineering professionals across Europe, largely due to the replacement of retiring staff and new roles arising from green and digital investments. Together, these analyses confirm that Europe does not only face a short-term shortage, but a long-term structural challenge in engineering competence.

Four pillars of the E4E project

The E4E project was structured around four interlocking objectives:

1. **A European Engineering Skills Strategy**
   The project produced a 120-page strategy document, based on 161 recent bibliographic sources (none predating 2020), outlining current and emerging competence needs and providing recommendations for four stakeholder "families": policymakers, employers, institutions of higher (tertiary) education, and professional organizations.

2. **Four online micro-credential courses**
   The consortium created concise, fully online courses across four cross-cutting areas: digital skills, green/sustainability skills, entrepreneurial skills, and transversal "life" skills. These courses were co-developed with the universities of Porto, Leuven, and Dublin, as well as with a VET provider in Slovakia, and attracted significantly more than the targeted 750 participants. Each course provides a certificate of attendance rather than ECTS credits, positioning it as accessible CPD or short-course learning, rather than as part of a degree program.

3. **An Engineering Skills Council under the "Engineers for Europe" banner**
   To sustain dialogue beyond the project's funding period, ENGINEERS EUROPE convened a council representing the four stakeholder groups to monitor new competence needs and coordinate responses. Dirk notes that branding this group as "Engineers for Europe" rather than a "Skills Council" will help to engage industry leaders who may not respond to traditional skills-policy language.

4. **Pan-European dissemination and adaptation**
   The project organized 41 dissemination events in eight countries, reaching more than 1,200 stakeholders—well above the original target—while also stimulating interest

in adapting the model beyond Europe, including an invitation from the Peruvian engineering association.

Competence domains and the role of micro-credentials

Across its research and consultations, the project converged on four competence domains that must be integrated into engineering education and continuing development:

- Digital competence, aligned with the European Digital Competence Framework but tailored to engineering, including data handling, system integration, cybersecurity, and digital collaboration.
- Sustainability competence, incorporating life-cycle thinking, energy efficiency, circular economy concepts, and regulatory awareness—especially pressing in high-impact sectors such as construction.
- Entrepreneurial competence, covering opportunity recognition, resource mobilization, risk assessment, and value creation in engineering contexts.
- Transversal or "life" skills, such as cross-cultural communication, interdisciplinary collaboration, ethics, and a continuous-learning mindset.

Dirk Bochar and Hans-Ulrich Heiss of TU Berlin both emphasize the contested nature of "micro-credentials": definitions range from short online modules to extensive programs, and quality assurance varies across Europe. European policy efforts recognize this diversity and aim to establish common principles—such as clear outcomes, quality assurance, transparency, and stackability — while acknowledging that institutions have adopted different models. The E4E courses find a pragmatic middle ground: about 14 hours of structured learning, designed for European Qualifications Framework (EQF) levels 5–7, aimed at supporting immediate upskilling and reskilling for both students and practicing professionals.

Recognition, mobility, and the EEED

For both universities and employers, the comparability and recognition of engineering qualifications remain key challenges. Dirk describes the European Engineering Education Database (EEED) as a shared resource of Engineers Europe–ENAEE (the European Network for Accreditation of Engineering Education) listing recognized engineering programs. This database is widely used by prospective students (including Erasmus+ participants), institutions seeking visibility, and employers trying to interpret foreign degrees. Public information confirms that EEED (the EUR-ACE database) is the main reference repository for accredited engineering programs across Europe, maintained jointly by ENGINEERS EUROPE and ENAEE.

Alongside EEED, ENGINEERS EUROPE's EUR ING certificate offers a competence-based, privately issued recognition that now extends beyond the European Higher Education Area, supporting mobility for engineers from regions such as Latin America, Africa, and Asia who want to work in Europe. In a job market where engineers are scarce in nearly all EU countries, this combination of transparent program information and portfolio-style competence recognition can help employers make informed hiring decisions.

IMPLICATION FOR EMPLOYERS

For corporate L&D leaders in engineering-intensive sectors, E4E demonstrates the value of collaborative approaches to skills development that benefit both individual organizations and the broader European engineering ecosystem.

Co-Design Credentials

Partner with universities and professional bodies to create micro-credentials that address real industry needs.

Recognize Learning

Integrate micro-credentials into internal career frameworks and talent development pathways.

Engage Systematically

Contribute to European skills dialogues rather than treating training as a purely internal matter.

Implications for universities and employers

For university leaders and continuing education units, the E4E work suggests three practical directions:

- Embed the four competence domains throughout curricula and CE portfolios rather than isolating them in elective "add-ons."
- Develop short, high-quality micro-credentials that address clearly defined skills gaps and sit coherently alongside degree programs and CPD pathways.

- Actively use European infrastructures like the EEED and the EUR ING to make programs visible and support graduates' mobility.

For corporate L&D leaders, especially in engineering-intensive sectors, E4E points to the value of co-designing micro-credentials with universities and professional bodies, recognizing them in internal career frameworks, and contributing systematically to European skills dialogues rather than treating training as a purely internal matter.

Additional References (all accessed on December 1, 2025)

1. https://www.cedefop.europa.eu/files/4213_en.pdf
2. https://www.cedefop.europa.eu/en/data-insights/researchers-and-engineers-skills-opportunities-and-challenges-2023-update
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Continuing Engineering Education at TU Berlin, Germany

A Conversation with Professor Hans-Ulrich Heiss, Academic Director, TU Berlin Academy of Professional Education

Germany's infrastructure ambitions face a major challenge: not enough engineers with the right skills, in the right locations, at the right time. TU Berlin Academy for Professional Education is expanding its capacity to tackle this issue, focusing on infrastructure engineering and helping international engineers integrate into the German labor market.

A center rebuilding for impact

In a conversation with IACEE, Prof. Hans-Ulrich Heiss was honest about the academy's recent struggles. After significant personnel changes that reshaped its team structure, the academy is now rebuilding, enabling a sharper focus on Germany's most urgent engineering needs and laying the groundwork for gradual growth over the next two to three years.. This experience has clarified several governance lessons for continuing education units: the importance of thorough process documentation, redundancy in key roles, diversified partnerships that offer stability when individuals depart, and clear quality-assurance responsibilities that extend beyond specific people. For deans and CE directors, these are essential for maintaining strategic initiatives in unpredictable labor markets.

Germany's infrastructure skills gap

Hans-Ulrich emphasizes TU Berlin's priorities amid a national infrastructure crisis that cannot be overlooked. He points out that over 1,000 highway bridges in Germany require reconstruction or major repairs, and there is a shortage of more than 1,000 specialized civil engineers in road construction. Simultaneously, a joint study by the Association of German Engineers (VDI) and the German Economic Institute (IW) predicts that about 710,000 engineers will need to be replaced due to retirement by 2029, which is roughly 42% of the current engineering workforce. Reports on Germany's broader industrial and green transition strategies highlight that shortages in engineering and technical skills are already hindering the rollout of infrastructure and climate-related projects. In this context, the academy's emphasis on infrastructure engineering and workforce integration isn't just a niche; it's a national necessity.

Integrating international engineers

One of TU Berlin's flagship initiatives focuses on international engineers with strong technical degrees who are not immediately "job-ready" for German infrastructure projects.

Hans-Ulrich describes a survey of construction companies that asked about their experience with international hires: where they perform well, where they struggle, what additional preparation would help them become fully productive, and where the construction companies see further training needs for international hires. The responses reveal recurring gaps in three clusters:

Technical Norms and Tools

- DIN and Eurocode standards
- German calculation methods
- Locally dominant software
- Specific technical areas like frost protection

Professional Competencies

- German technical vocabulary
- Documentation practices
- Procurement rules
- Liability and warranty concepts
- Quality-assurance procedures

Organizational Culture

- Communication expectations
- Hierarchy and decision-making
- Safety culture
- Site documentation standards

Instead of creating a single, large program, TU Berlin Academy is developing modular continuing education that allows each engineer to target specific gaps: one might need 200 hours on German construction standards but less on project management; another might need intensive language and documentation support. Each module is co-designed with construction companies, uses real project cases (with at least 40% of time dedicated to hands-on work), and is offered in blended formats that combine intensive on-site sessions with online components. The initiative's start was financially supported by the Federal Highway and Transport Research Institute. For corporate L&D leaders, this model illustrates a way to make international recruitment viable: rather than expecting a "perfect fit" from abroad, invest in targeted, co-designed upskilling that explicitly addresses the institutional, regulatory, and cultural specificity of the destination market.

ECTS, micro-credentials, and quality

In the Conversation, Hans-Ulrich expressed skepticism about the term "micro-credential," noting that in European discussions it can refer to anything from a few hours to 1,000 hours of learning and is not a protected, consistently quality-assured label. He contrasts this with the European Credit Transfer and Accumulation System (ECTS), where one credit corresponds to 25–30 hours of student work and learning outcomes and assessments are well defined. In the United States, for example, ABET has begun recognizing selected micro-credential programs developed by universities and industry partners, illustrating one route to external quality assurance.

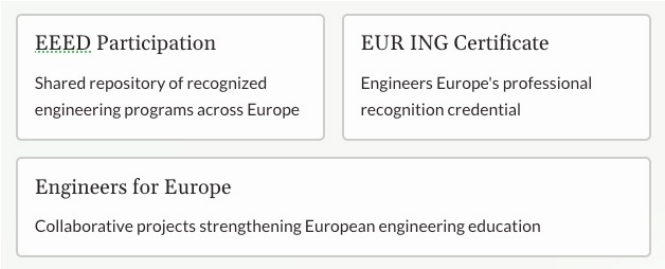
TU Berlin's practical response is pragmatic:

- For university-level offerings, it continues to use ECTS, which is familiar to students, regulators, and employers.
- For non-ECTS professional development, it issues certificates specifying hours, competencies, assessment methods, and any industry- or professional-body-validated learning, allowing employers to see exactly what has been learned.
- For company-specific pathways, it negotiates recognition with partner employers in advance, ensuring that successful completion translates into concrete workplace opportunities.

Quality assurance is structured at three levels: input (instructor expertise, up-to-date content, and resources), process (active learning, authentic assessment, and participant support), and output (evidence of competence, employer feedback, and tracking of participants' career trajectories). For both universities and employers, this kind of documented QA matters more than the specific label—micro-credential, certificate, or course.

European linkages and strategic direction

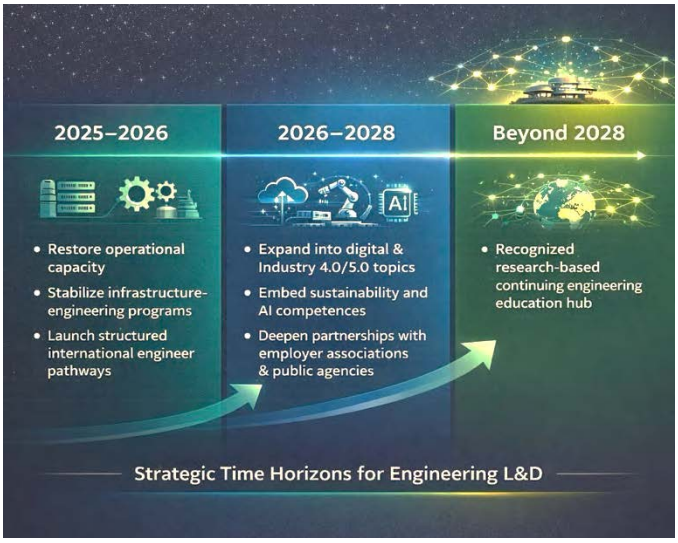
TU Berlin participates in the European Engineering Education Database (EEED), the shared Engineers Europe–ENAEE repository of recognized engineering programs, which supports international visibility and helps employers interpret degrees from across Europe. This positions the academy's offerings within a wider ecosystem that includes credentials like ENGINEERS EUROPE's EUR ING and projects such as Engineers for Europe (E4E).



[Gamma AI-generated image with descriptive prompt.]

Looking ahead, Professor Heiss outlines three time-horizons:

- 2025–2026 – restore full operational capacity, stabilize core infrastructure-engineering programs, and launch structured pathways for cohorts of international engineers each year.
- 2026–2028 – based on TU Berlin's expertise, expand into digital and Industry 4.0/5.0 topics, embed sustainability and AI competences, and deepen partnerships with employers' associations, agencies like the Federal Highway and Transport Research Institute, and major contractors.
- Beyond 2028 – become a recognized hub for research-based continuing engineering education in Germany, with visible offerings, and where appropriate, recognized across Europe.



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For the readership of the WAVE, both university leaders and corporate L&D professionals, the TU Berlin story offers a realistic blueprint: accept institutional constraints, focus on the most consequential skills gaps, co-design programs with employers, and anchor everything in transparent quality assurance and European (or a specific country or region's) recognition mechanisms.

A Discussion on Continuing Engineering Education in Germany

Prof. Dr. Thilo Harth
Head of University Didactics, Münster University of Applied Sciences
Council Member of IACEE

Prof. Dr.-Ing. Peter Vennemann is the current recipient of the teaching award at Münster University of Applied Sciences, Germany. He is a mechanical engineer and has been teaching fluid flow measurement technology, heat transfer, and energy system modeling since 2013. His teaching philosophy is rooted in enthusiasm, transparency, respect, and adaptability. He was honored for effectively providing modern engineering education through his attitude, didactic principles, and methodological strategies. For our newsletter, I asked him a few questions on continuing engineering education in Germany.

Thilo Harth (TH): The current E4E Skills Strategy Paper once again highlights the importance of soft, life, digital, and green skills, among other things, in engineering education at universities. It also identifies promising strategies. Such strategies include competency-based and challenge-based education, as well as curriculum reforms that incorporate the latest technological trends and competency requirements. With high technical demands, this task may seem like a mission impossible. Is that the case?

Peter Vennemann (PV): Yes, it's Mission Impossible, but is that so bad? Of course, we can't do everything. Even when it comes to what students work on in their bachelor's theses, we haven't covered everything in the modules. We can lay the foundations for students to keep developing throughout their lives. Threshold concepts are very helpful for understanding the essential technical core. Take the second law of energy conservation: once you understand that, a whole world of explanations opens up. Without that, it's pretty sad because you often find yourself struggling and unable to move forward. There are similar foundational concepts in all modules. In programming, it's object-oriented programming. These threshold concepts are like keys that unlock doors. What's behind these doors can then be expanded to include soft skills, life skills, problem-based learning, and other wonderful things that make studying truly interesting and varied—and also provide opportunities to discuss ethical issues, etc. We can do all of this through these specializations. But, of course, we can't do everything in our studies. Additionally, competency requirements are constantly evolving, and students need to continue their education even after graduation. We offer something for that as well.

TH: Continuing education at German universities is not yet very well developed. What are you doing in this area?

PV: We have actually developed a new method for planning energy systems together with students. In the past, variants were generated, compared, and the best one was chosen. Today, we build an energy system model that essentially includes all options from which the optimal solution is derived. These results cannot be achieved with the traditional method. This was largely developed by students, is already being used in research projects and industry, and is now part of continuing education courses in the VDI (Association of German Engineers) program. This is how universities should be. We have talented students who want more, are highly committed, and we provide a space for growth that others can benefit from.

TH: That fits in very well with your teaching concept. Does this "space for development" describe your objective of building competence through "doubt" and 'discovery' in the master's program?

PV: Yes, for me, "space for development" in the master's program really means encouraging discovery and doubt. In my teaching approach, I have divided competence-building throughout the program into specific phases. It starts in the bachelor's program with orientation, organization, and networking, and progresses to doubt and discovery in the master's program. These different focus areas provide guidance and target various skill areas. Competency-based education is actually very easy to implement based on this.

TH: Can this competency-based education also be linked to challenge-based learning?

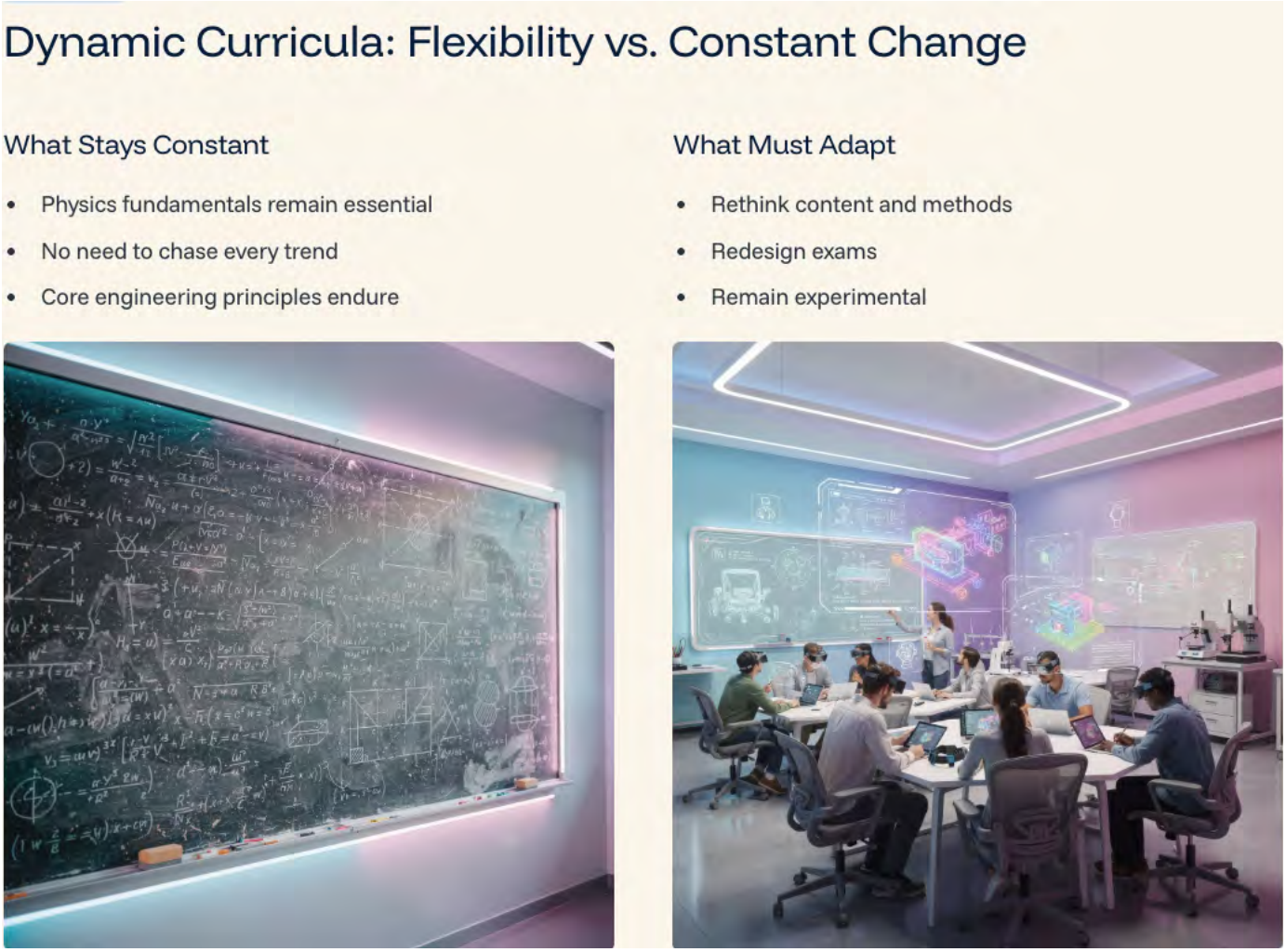
PV: This brings me back to the specializations I mentioned at the start. Interdisciplinary approaches focused on real-world problems are very valuable because they reflect practical challenges. Success in professional life comes from doing something truly new. Staying within your own discipline is relatively easy, but new insights often come from interdisciplinary questions. Many of humanity's tasks do not fit into a single discipline. Treat the energy transition as a collaborative effort, considering multiple perspectives. Interdisciplinarity isn't just nice to have; it's necessary and an effective way to approach challenge-based learning.

TH: I would like to return to the E4E Skills Strategy Paper mentioned at the beginning and conclude by asking about the curriculum reforms it calls for, which take into account the latest technological trends and competence requirements. In your opinion, are the curricula dynamic and flexible enough?

PV: A dynamic curriculum can mean many things. It can mean constant change or dynamic use. I tend toward the latter because the many choices already offer great flexibility. In addition, engineering studies involve a lot of physics: that won't change. We don't have to chase after every new application or trend. I'm thinking of the hype surrounding fuel cells in the 1990s, which didn't take off in the end. Nevertheless, we must be and remain adaptable and ready for change. Take the challenge of AI, for example. Here, we not only have to rethink the content of existing curricula but also redesign methods and exams. I believe that we should always be experimental as university teachers. The curricula actually offer enough scope for this.

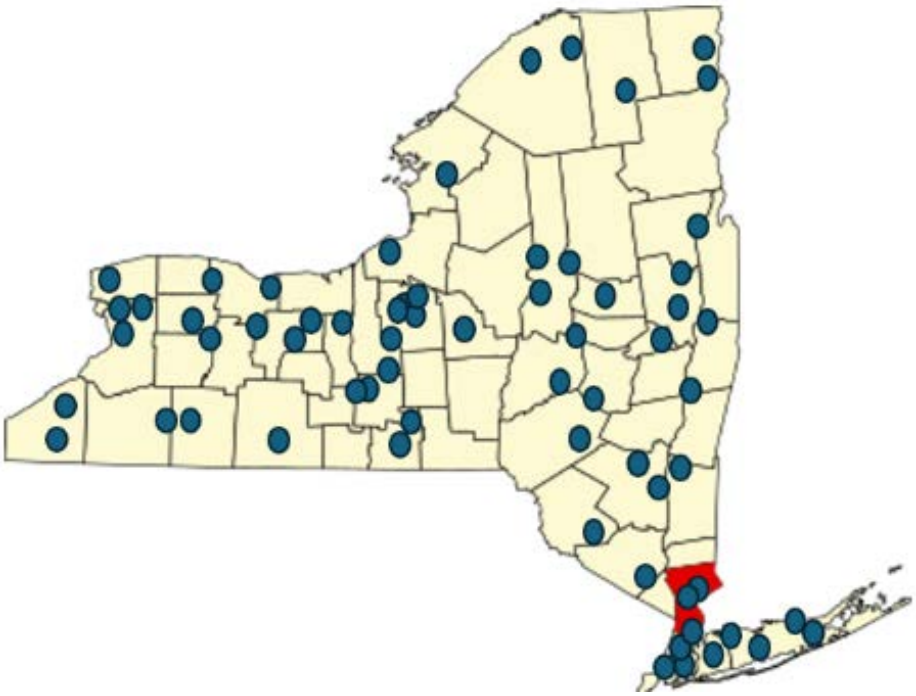
EDITOR'S NOTE

We asked the Gamma AI App to represent the concept on a slide, and the resulting images and bulleted lists are shown below.



State University of New York (SUNY) and Google Partner to Provide Artificial Intelligence (AI) Certificates System-wide

Amy Moore
Senior Learning Program Officer of Digital Innovation & Academic Services, The State University of New York; Program Director, School of Engineering and Applied Sciences, University at Buffalo; Council Member, IACEE



The above image is a map of New York State with numerous blue dots indicating the approximate locations of the State University of New York (SUNY) campuses. The system comprises 64 unique campuses across the state, ranging from urban to rural settings.

Affordable learning opportunities and ongoing engineering education are vital in today's tech-driven world. To support this, the State University of New York (SUNY), USA, recently launched an initiative offering free Google AI certificates to faculty, staff, and students across its 64 campuses. With more than 90,000 employees and students earning over 96,000 degrees each year, the SUNY system serves a large and diverse community. The impact is significant!

Through its partnership with Google, SUNY offers free AI learning opportunities to help reduce access gaps. System affiliates can access top-quality AI instruction, earn industry-recognized credentials, and become better prepared for a changing workforce. By providing its network of communities with fair access, the initiative equips every student with AI tools, enabling them to graduate with the skills needed for global progress in intelligent systems.

By promoting a culture of ongoing education through its partnership with Google, SUNY is equipping its faculty, staff, and graduates with the tools to respond to global innovation trends, collaborate internationally, and contribute to worldwide research and development. As emerging technologies such as artificial intelligence and automation transform industries globally, continual skill development becomes essential to stay adaptable and competitive.

Available courses include Google AI Essentials and Google Prompting Essentials. Enrollees can learn at their own pace, earn a certificate, and demonstrate mastery of practical AI skills relevant to education, work, and research. Additionally, there are pilot faculty initiatives that integrate a select group of Google Certificates into credit-bearing courses and award academic credit for AI-related curriculum.

Along with Google, SUNY is developing system-level AI equity and capacity, fostering future leaders in technology-driven education, industries, and societies.

IACEE Professional Development Initiative: Usage of AI tools by CEE and L&D Professionals

Effectively using Artificial Intelligence (AI) tools in daily tasks is now a vital requirement in many roles. Similarly, implementing automation to save time and support employees is becoming more common. But how are professionals in Continuing, Professional, and Online Education actually using these tools? Is their work being positively affected by automation or increased productivity, or has the work been simplified? The other key question often raised is whether these AI tools or applications might eventually replace our jobs. In a webinar, we discussed these outcomes, and on February 5th, IACEE Council members Amy Moore, Anita Chawla, Robert Prakash, and Soma Chakrabarti will explore this topic at the Conference for Industry and Education Collaboration in New Orleans, LA. We will share the report in the next WAVE with more information on how AI is changing the landscape of continuing engineering education.

Bridging the Skills Gap: Preparing Engineers for Skill-Based Organizations

Report on a Panel Discussion at the WEEF 2025 in Daegu, South Korea

IACEE Council Members, Dr. Patricia Caratozzolo and Dr. Soma Chakrabarti, Participate in the Panel at the World Engineering Education Forum 2025: A Report on the Discussion

From left: Patricia Caratozzolo, Jessica Silwick, Yashin Brijmohan, Khairiyah Mohd-Yusof, Yun (Hilary) Lu, and Soma Chakrabarti, as Brijmohan speaks.

The engineering workforce is undergoing a fundamental transformation. As organizations shift from traditional job-centric models to dynamic skill-based structures, engineering education faces mounting pressure to prepare graduates for rapidly evolving workplace demands. At the World Engineering Education Forum (WEEF) 2025 in Daegu, South Korea, a cross-sector panel convened to address this critical challenge, bringing together perspectives from academia, industry, and accreditation bodies. Drawing on AI-driven labor market intelligence, problem-based learning, industry–university partnerships, policy frameworks, and credential quality assurance, the panel explored how engineering education and employer systems must evolve together as organizations move from rigid job descriptions to dynamic, skill-based models.

From Jobs to Skills: The 4R Lens

The session chair, Dr. Soma Chakrabarti, secretary-general of IACEE, framed the conversation around the shift from traditional job-centric structures to "skill-based" organizations (such as Rolls-Royce, Unilever, or Ericsson) and their implications for day-to-day work, recruitment, and professional development. This shift can be read through Josh Bersin's 4R model (Recruit, Retain, Reskill, and Redesign), making skills the primary unit of analysis for both education and employment systems. Panelists noted that many engineering programs still rely on static, degree-based, content-heavy curricula, even as employers reshape internal talent structures around dynamic skill profiles. The widening gap isn't just about knowledge but also about practice-ready skills, including problem solving, teamwork, metacognition, and lifelong learning habits that help engineers thrive in environments where roles and technologies change within months rather than years.

AI Skills Intelligence: Shaping Skills as a Common Language

Dr. Patricia Caratozzolo from Tec de Monterrey's Institute for the Future of Education introduced Shaping Skills, an AI-driven platform designed to create a shared language of knowledge,

skills, and abilities (KSAs) across academia, industry, and policymakers. Using machine learning and natural language processing on live job postings, the platform refreshes sector-specific taxonomies approximately every 3 weeks, reflecting real-time labor market trends rather than relying on static classifications such as O*NET or ESCO.
Unlike taxonomies that list tens of thousands of skills, Shaping Skills distills competencies into manageable structures of roughly 150 elements per sector. Since its inception, the project has attracted over €450,000 in funding, been piloted in information technology, automotive, and healthcare, and serves as one of the first AI-driven KSA platforms tailored to Latin American labor markets.

For skill-based organizations, this intelligence directly supports the 4R model: it clarifies which skills are emerging, which are declining, and where gaps exist by role, sector, and geography. Caratozzolo illustrated how the platform can surface practical needs, enabling curriculum designers to respond quickly rather than waiting for traditional revision cycles.

Traditional Taxonomies

- Tens of thousands of skills listed
- Static classifications
- Infrequent updates
- Generic frameworks

Shaping Skills Approach

- ~150 elements per sector
- Real-time labor market data
- Updates every 3 weeks
- Sector-specific taxonomies

Pedagogy for Adaptive Competence: Problem-Based Learning

Dr. Khairiyah Mohd-Yusof, professor of Engineering Education at Purdue University's College of Engineering, focused on how problem-based learning (PBL) cultivates deep technical understanding alongside adaptive competencies. Working from an inductive, medical-school-inspired model, she described courses in which students encounter authentic problems first, recognize their knowledge gaps, and learn to seek, integrate, and apply new knowledge.

Effective PBL depends on constructive alignment -- tight coherence between learning outcomes, activities, and assessment -- and on careful scaffolding of complex skills into subtasks within students' zones of proximal development. In her process control course, students reported disliking the discomfort of "not knowing," yet research showed they achieved strong technical learning while developing metacognitive abilities and confidence in tackling unfamiliar industrial scenarios.

Mohd-Yusof illustrated PBL's flexibility by describing problem sequences that mirror an engineer's trajectory, from interviewing for an internship to joining a technical services team and working in consulting contexts, showing how scenario design can track evolving skill demands without requiring wholesale curriculum overhauls.

Industry Frameworks and Micro-Credentials: Powerful but Not a Panacea

Representing industry, Yun (Hilary) Lu of Siemens Digital Industries Software described a strategic framework that interlocks three components: nurturing students' digital mindsets, enabling hands-on practice with industry-grade software through the Xcelerator Academy platform, and offering micro-credentials that signal verified competencies in areas such as sustainability and digital engineering.

Over several years, Siemens has co-developed nine micro-credential courses with ABET-recognized processes. Siemens Digital Industries Software is the first industry company whose micro-credential development process has been formally recognized by ABET, enabling employers to identify graduates whose digital badges align with specific role requirements in their skill-based talent systems. However, Caratozzolo cautioned that micro-credentials, while flexible and powerful, are not a panacea. Sustainable impact arises from combining targeted credentials with updated pedagogical models, AI-informed curriculum design, and institutional cultures that support lifelong learning rather than relying solely on badges.

Policy, Mobility, and Organizational Frameworks

Dr. Yashin Brijmohan, a faculty member at Utah State University's College of Engineering, drawing on his role as chair of the Africa, Asia, and the Pacific Accord and his experience with international accords such as those within the International Engineering Alliance and the Washington Accord, shifted the lens to policy and organizational systems. He argued that effective skills development requires intentional policy frameworks at multiple levels, such as licensing and mobility agreements, national continuing professional development (CPD) regulations, and organizational learning policies, to create enabling environments for engineers.

Brijmohan highlighted the rise of mandatory CPD requirements embedded in law, which may require practitioners to update

skills in areas like sustainability that were not covered in older undergraduate programs. At the organizational level, well-designed policy frameworks around mentorship and structured learning pathways can significantly shorten the time needed to develop engineers for licensure or new roles within skill-based organizations. He stressed the importance of "translators" who can bridge language gaps among engineers, HR leaders, and education researchers, ensuring that both national frameworks and company-level talent structures are truly skills-informed rather than creating cognitive overload with extensive lists of hundreds of skills.

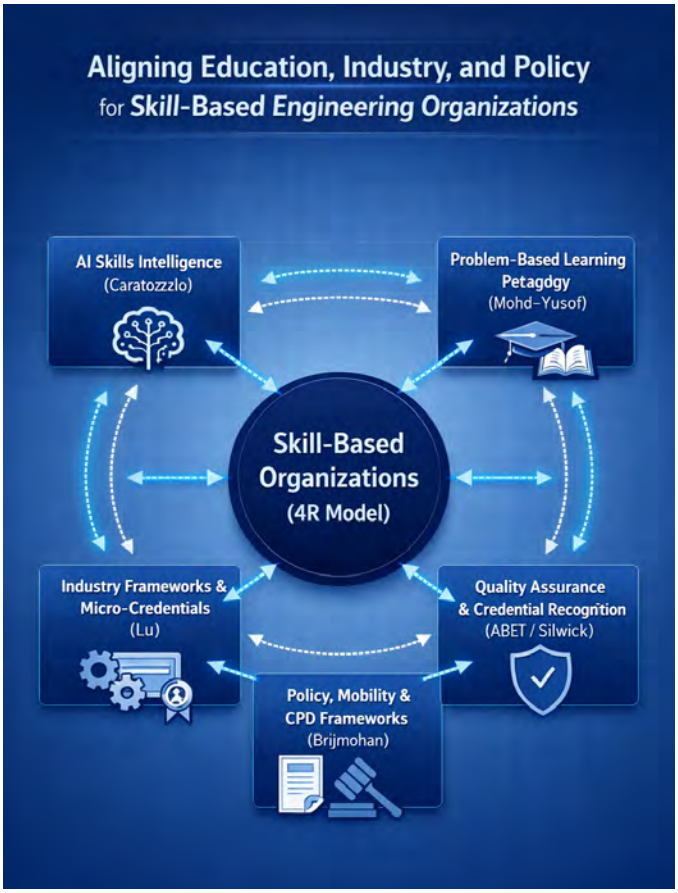
Quality Assurance: ABET's Role in Credential Recognition

Jessica Silwick, COO and CFO of ABET, explained why ABET entered the credential recognition space after decades focused on program accreditation. With rapid technological change and growing skill gaps, credentials have become essential to the learner journey, and leaving their quality unregulated would disserve learners, employers, and society.

Silwick described a nearly 10-year journey involving multiple pilots to develop a process that maintains ABET's rigorous quality standards while recognizing that credentials need to adapt faster than traditional programs. The resulting framework is fully virtual, operates on a four-month review cycle with quarterly application windows, and emphasizes key quality elements: credential designer expertise, alignment of learning goals and assessments, evidence of knowledge transfer, and robust continuous improvement processes. Recognition lasts three years instead of six, reflecting the need for quick iteration, and is designed for global use. Silwick highlighted the strategic role of embedded credentials by describing universities where all graduates earn both a degree and a tailored credential in artificial intelligence aligned with their discipline, providing employers clearer proof of AI-related skills.

Integrating the Pieces for Skill-Based Organizations

Throughout the session, panelists stressed that no single intervention can fully prepare engineers for skill-based organizations; instead, multiple innovations must work together across the 4R model. AI-driven platforms provide real-time insights into skill needs and gaps. Problem-based learning builds deep technical and adaptive skills. Industry–university frameworks and micro-credentials provide recognizable signals of specific capabilities. Policy frameworks create supportive environments for lifelong learning. Quality assurance builds the trust needed for employers and learners to invest.



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As Caratozzolo put it, anticipating change is the best way to shape it. The panel suggested that the engineering community now has many of the necessary tools; what remains is aligning technology, pedagogy, organizational design, policy, and accreditation to support truly skill-based engineering organizations.

This conversation will continue at the 50th Conference for Industry and Education Collaboration (CIEC 2026) to be held in New Orleans, Louisiana, USA, on February 3-6, 2026. The panelists will be:

- Dr. Héctor G. Ceballos, Tecnológico de Monterrey
- Shannon O'Donnell, Siemens Digital Industries Software
- Octavio Heredia, Arizona State University
- Holly Maglin, Dominion Energy
- Dr. Roberto G. Valenti, MathWorks

The session will be moderated by Dr. Soma Chakrabarti (IACEE).

About IACEE

The International Association for Continuing Engineering Education is a professional organization that supports educators, university administrators, and corporate learning and development professionals worldwide who are engaged in lifelong learning in engineering. It was founded in 1989, stemming from a UNESCO working group and a world conference, with support from regional engineering education organizations.

Learn more about IACEE and get involved: www.iacee.org

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