



Education

Special Interest Group

Newsletter

IChemE
Education Special Interest Group

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Words from the EdSIG's Newsletter Editorial Team...

If anyone would like to write an article for the newsletter about good practice, previous EdSIG events or school outreach, or anything else that you think our community would find it interesting - please do not hesitate to get in touch at specialinterestgroups@icheme.org.

From the editors:
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Good Practice Exchange

Ready-to-Use Teaching Resources for Major Hazards

Pradeep Murthy
IChemE EdSIG Secretary

Major Hazards in chemical engineering is an important learning component for students to understand the process issues, how to mitigate them, and how technical decisions, human behaviour and organisational factors combined can contribute towards them. The IChemE Safety Centre (ISC) and Safety & Loss Prevention resources online connect academic learning with real-world process safety.

Three resources described below offer complementary approaches, including learning from (1) a real major accident, (2) simulations, and (3) lessons learned.

1. The "Ammonia Refrigeration" Case Study

Delivered by Ewan Stewart, Chair of the IChemE Australia Board, this webinar examines the 1989 Jonava ammonia disaster and the process-safety lessons that remain relevant today.

The incident occurred at the Azotas fertiliser plant in Lithuania, where an ammonia storage tank ruptured, releasing around 7,000 tonnes of chilled liquid ammonia. Seven people were killed and 57 injured. The webinar examines the generally accepted thermal-overload theory, alongside the design and operational factors that contributed to the incident, including human error, excessive containment and emergency management.

For students, the case provides a concrete example of how equipment design, operational decisions and human

factors interact in a major accident. It demonstrates the importance of anticipating credible equipment failures and human errors through hazard, risk, and process control analysis, and designing and implementing appropriate safeguards and relief systems. By happenstance, this example is also relevant to the Food & Drink sector, where ammonia refrigeration is widely used.

2. "Learning by Doing" — ISC Case Study Suite

The IChemE Safety Centre Case Studies are interactive process-safety training tools that allow participants to experience realistic scenarios and make decisions without knowing the outcome in advance. This approach complements the Jonava example by enabling active participation in assessing of uncertainty, balancing competing possibilities and experiencing and acknowledging any such consequences of choices. It also helps demonstrate how technical, human, organisational and business factors combined can influence safety.

Such examples include:

- Coal Mine: design, construction and commissioning under budget and schedule
- Gas Plant and Tank Farm: balancing production targets with safe operations
- Offshore Platform: investigating incidents and identifying underlying causes
- Chemical Plant: applying inherently safer design despite cost and production pressures
- Underground Pipeline: managing business risk and assumptions in asset management

- Fun Park: human factors, competence and learning from previous incidents
- Safe Anyway: understanding gradual change, including possible “scope creep”
- Setting Sail: incident causation and the reliability of engineering controls
- Changing Moments: effective management changes and competent decision-making

For further reading, please refer to this [conference paper](#) by Kerin and Pollock (2019) about applying such case studies in an academic setting.

3. [“Safety 4.0” — Human Factors & Organisational Culture](#)

The Lessons Learned Database (LLD) provides a practical way to explore the human and organisational dimensions of major-hazard incidents. Inspired by Trevor Kletz’s observation that organisations can lose knowledge over time, such as through worker, technology, or management changes, it promotes root-cause analysis, organisational learning and sharing of lessons across various industries. The database covers sectors including oil and gas, petrochemicals, pharmaceuticals, power generation, water treatment, food and drink, pulp and paper, iron and steel, and industrial gases. In 2022,

a collection of 52 incidents was also published as an [e-book](#).

Its [one-page incident summary](#) identifies:

- Immediate/basic causes: what directly led to the incident?
- Critical factors: what conditions could have prevented or reduced its impact?
- Root causes: what were the underlying organisational failures?
- Lessons learned: what should be done differently in the future?

Together, the three resources create a natural learning progression, where students can first understand a real major accident, then experience the complexity of safety decision-making, and finally identify the human and organisational patterns that recur across incidents. This connects theory of major hazards with applied process-safety thinking.

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Reflections from the 36th European Symposium on Computer Aided Process Engineering (ESCAPE)

Dr Eleni Routoula

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Introduction to the event – the rise of AI

In late June, the European Symposium in Computer Aided Process Engineering (ESCAPE) took place in Sheffield. The conference showcased academic research and industrial perspectives within the remit of resilient sustainability, specifically looking into the design, development, use, and integration of adaptive and efficient tools and systems based on computer aided process engineering. ESCAPE offered expert views on several research areas such as modelling and simulation, clean energy systems, methods and tools, optimisation, pharmaceutical and biotechnological systems, circular economy, uncertainty, and process control. There was also a section devoted on education, knowledge transfer and entrepreneurship, that spanned over three days, with workshops and sessions delivered by professionals and academics.

It is crucial to note that across all presented talks and posters during ESCAPE (over 500 submissions in total), around 20% of them had direct relevance to AI, with researchers looking at the impact of, or working with, large

language models, generative AI, machine learning, and agent-based modelling.

ESCAPE36 – Education-focused sessions

Each of the education, knowledge transfer and entrepreneurship sessions catered to various audiences, starting with a workshop on effective course development using flipped classroom approach. The sessions that followed showcased work presented by academic practitioners and were focused on Control, Design, and Digital Skills, and the very current topic of on AI in Chemical Engineering Education, each with a handful of submissions presented by academics from multiple institutions across the world.

There were many interesting ideas and concepts that floated in the room, sparking discussions across presenters and the audience. A notable example was the creation of an AI-based resource containing information on from specific textbooks, which students could use to acquire more in depth knowledge, similar to conversing with the book author rather than superficially reading the book. Another interesting practice-based example was work on the understanding of which computational tools were of preference when it came to chemical engineering students, with results indicating that students would venture out of what was formally taught in the classroom, depending on ease of use, access to support and information, and even based on which tool would support student employability.

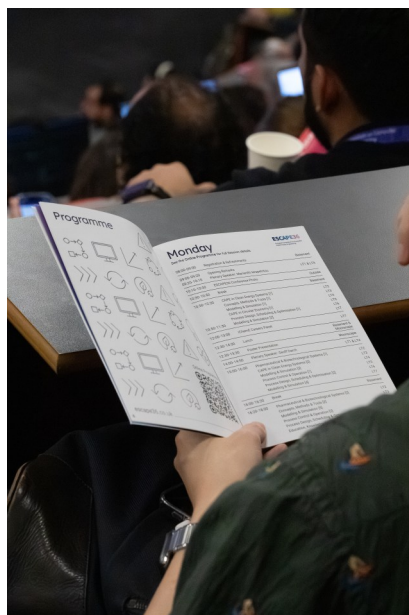
ESCAPE36 – Education in the era of AI

When it came to the AI-specific session, there were five sessions (with associated conference proceedings that can be accessed [here](#)), each with a particular focus, exploring different viewpoints and concepts. One paper showed results from a survey conducted to staff and students regarding their AI-related preferences and practices, aiming to understand behaviours and draw meaningful conclusions towards this new normal. Another session looked into workflow automation platforms, and how despite they can streamline admin tasks and support concept comprehension, they also introduce ethical and pedagogical risks, necessitating advanced mitigation strategies. The next session, presented by IChemE EdSIG members, looked into digital chemical engineering, aiming to identify and categorise the digital skills chemical engineering students learn through the curriculum and need when they graduate, using a collaborative approach of mapping digital skills of five IChemE accredited curricula and drawing trends and opportunities for improvement. The second last session was focused on reliability of GenAI platforms towards offering information, with a particular application concept in mind, fermentation. The presenter showed work around which platform of the ones examined was more reliable (factual accuracy, ability to solve relevant coding tasks, indicate deeper theoretical knowledge), reaching the conclusion that all platforms were satisfactory for educational purposes, assuming a level of criticality from the end user. The last session focused on the application of AI on educating students on a process safety topic with the aim of exploring the potential of reducing time- and resource-consumption. The presenter discussed the educational approach used, and showed potentially promising results that should however not replace traditional process safety procedures without developing further robustness.

Closure

Overall ESCAPE was a very good opportunity for researchers, educators, industrialists and practitioners to catch up with progress in this space, and it was very useful to see Education having such a presence at the conference. Given that AI and related fields are already well-embedded into industrial chemical engineering practices, it is only reasonable that education (curricula design) should ensure graduates are equipped for what the sector holds. The 37th ESCAPE is scheduled to take place between June 6-9th 2027 in Trondheim, Norway, more information will become available soon from EFCE.

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Reflections from the 2026 Young Engineer Award for Innovation and Sustainability Showcase Event

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Introduction to the competition – Yes to YEAIS

The YEAIS competition was introduced by the IChemE in 2024 to recognise and celebrate emerging ideas and innovation across the chemical engineering profession, from undergraduate and postgraduate students, as well as early career chemical engineers. This marked the third year of running the YEAIS competition, and having been involved with YEAIS from the very beginning I can confirm that this year was bigger and better in terms of applications received, quality of the posters and videos submitted, and coverage across the world.

Once first and second review rounds were completed the IChemE National Early Career Group, some judges and Regina, the fantastic IChemE YEAIS leader, disseminated to identify the category winners. The main showcase event was held on June 29th in Edinburgh, with a couple of other showcase events to follow in Malaysia and Australia for the celebration of the overseas winners.

This year, the entry categories were Digitalisation, Energy and Climate, Engineering Biology, Environmental Protection, Education, Food, Health and Wellbeing, Materials and Mining, Waste Valorisation and Water and Sanitation, showing a very good coverage across the profession. Having over 120 applicants at first stage (poster submission) and over 50 shortlisted for the second stage (video presentation), judges had their work cut out for them. Several IChemE members from all areas were judges, assessing entries across criteria such as alignment with Sustainable Development Goals and IChemE priorities, societal benefit potential, and communication abilities.

YEAIS Awards Showcase event

The showcase event spanned over the whole day, taking place in parallel with an IChemE Employer partners meeting held in an adjacent room at the Edinburgh International Conference Centre. The organisation of the showcase event was such that the first half was devoted to finalists, winners and runner ups, presenting their work and ideas and the second half was the award ceremony, where each award was presented by a different member of the IChemE community with direct relevance to the award category. Outside the two main sessions of the day, during breaks, the atmosphere was buzzing with old contacts reuniting, new contacts being developed, and interesting conversations taking place around the poster showcase. There was very good representation from various industries and several universities, with some people including the IChemE's past and present presidents sharing their time between the YEAIS event and the Employer Partners meeting.

While presentations were taking place, it was very interesting to see the maturity with which each presenter approached their topic, that being a research project, placement work, or even side project. The depth of thought was evident in the case of some ideas, as well as the relevance of the proposed idea to the world with its current challenges. Presenters were challenged through Q&A after each presentation by the attendees, some of which with substantial industrial and academic experience, and again, it was great to see that all presenters rose to the occasion with answers that indicated a good understanding of the potential of the work presented and the points for improvement.

Awards were presented by members of the IChemE community, in some cases past YEAIS winners and highly commended entrants, and in others, professionals of direct relevance to the area of practice the category represented, all of those with a high interest and investment into the new generation of chemical engineers and the potential it shows.

A shout out is owed to the overall winners, namely Laura Thompson, who won the Undergraduate student category and the Waste Valorisation and Circular Economy one, Gerooge Creasey who won the Postgraduate student and the Energy and Climate action category, and Sajid Hassan who won the Early Career Category and the Materials, Mining and Minerals one. Also, a special shoutout goes to the winners of the Excellence in Education, Skills and Training, a team of undergraduate students who presented their work on the design of an electric formula car, with a multidisciplinary team working on the technical aspects but also promoting awareness of women in engineering, the impact of partnerships and collaborations, and the use of a motorsport example to demonstrate clean energy use and circular design.

YEAIS – Looking to the future

The awards showcase was a great opportunity to catch up with leaders of the profession, as well as check out the incoming chemical engineers and get a feel of what they care about and what they want to see in the future. This competition is a great opportunity for applicants of all levels to show their work and their ideas, even if they have not fully materialised yet, see what other people and groups are working on, and most importantly, access a wide network of contacts, who can offer valuable advice on multiple levels, and who in a few years (or months) time become employers. This showcase is also an excellent opportunity to demonstrate how ideas can make a difference, especially in cases where the project has a higher maturity level, how creativity, determination and passion can take applicants (and idea readiness) a long way, and ultimately, how each individual and the IChemE as a whole has the potential to shape the profession. Looking forward to the next one!

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EdSIG Activities — upcoming events

Process Simulation Workshop

31st October 2026, 08.30 – 14.00 (MYT)

Free event

Faculty of Engineering Building, Universiti Teknologi Brunei

Process simulation is widely used throughout the modern chemical engineering industry, and graduates need to be ready to use this technology effectively when they enter the workforce. This workshop will demonstrate how to relate process design to process modelling and simulation environments, including how to set up models, run simulations and correctly interpret results, supporting lecturers in teaching process simulation as part of senior-level design courses.

The workshop will be presented by Dominic Foo, Professor of Process Design and Integration at the University of Nottingham Malaysia and an IChemE Fellow, as well as a journal editor and book author about process simulation.

Please register [here](#) to attend.

Hybrid debate: Is AI in Chemical Engineering a good thing or a bad thing?

25th November 2026, 18.00 – 20.00 (GMT)

Free (members), £5 (non-members)

Framatome Limited, College Road, Cranfield, Bedfordshire, MK43 0AJ and online

Join a live, moderated debate exploring whether AI is ultimately beneficial or harmful to chemical engineering. Dr. Peter Clough will argue that AI can deliver significant benefits through improved safety, green chemistry, waste reduction and process optimisation, while Dr. Ollie Folayan MBE will highlight risks including workforce displacement, data insecurity and ethical ambiguity. The 45-minute debate will be followed by 30 minutes of audience Q&A and will be moderated by Chris Park, Fellow of IChemE and MK Member Group Committee Member.

The debate will feature Dr Ollie Folayan MBE, President of IChemE and Head of Process Engineering at Costain, and Dr Peter Clough, Climate Leader at Teva Pharmaceuticals and an expert in AI, decarbonisation and process optimisation.

Please register to attend [online or in-person](#). The online presentation will be delivered via MS Teams.

Scratching the surface: Critical Thinking in Chemical Engineering Education

The IChemE Education Special Interest Group is running an online symposium on critical thinking in chemical engineering education, provisionally scheduled for mid-November and running across a morning (UK time).

The programme opens with a session on perspectives of critical thinking in the age of AI, made up of a series of flash presentations from academic, industrial and student voices, followed by a panel discussion. A second session turns to practice, with three longer presentations on experiences of critical thinking, AI and assessment in education, again followed by a panel Q&A. The event closes with breakout room discussions where participants will share their in interactive discussions before coming back together for a debrief. Audience polling and a shared whiteboard will be used throughout to gather views.

Full timings, speakers and registration details are to follow.