Education
Special Interest Group Newsletter

IChemE
Education Special Interest Group

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

In this issue, we're delighted to bring to you some fresh perspectives of ChemEngDayUK 2025 which took place in April at the University of Sheffield. The EdSIG sessions at the conference included insightful discussions and presentations from esteemed speakers, covering various themes including digitalisation and AI use in education and research.

In this issue, we feature an article contributed by **Dr Michaela Pollock** (University College London) on the insightful Education Panel Discussion on AI which took place at ChemEngDayUK. The discussion and article brings forth the critical need to review and reformulate various aspects of chemical engineering education in light of increasing AI advancement and adoption.

We also hear from two doctoral students who participated in ChemEngDayUK, each offering distinct perspectives on fostering critical transversal competencies, particularly those related to teamwork. **Meng Yuan** (University of Manchester) highlights the value of embedding a teamworking skills framework within authentic assessment practices. This approach enhances students' communication abilities and promotes peer learning. In contrast, **Ya He** (University of Sheffield) invites us to explore the potential of gamification as a means of cultivating interpersonal skills. The contribution challenges us to consider how playful, game-based elements might drive personal and social development within academic settings.

If you are interested in contributing an article on best practices, EdSIG events, or outreach for our newsletter, please reach out to specialinterestgroups@icheme.org.

From the editors:

Sze Pheng Ong, Pradeep Murthy and Abdul Wadood Sharif

Good Practice Exchange

Education Panel Discussion on AI at ChemEngDayUK 2025

Dr Michaela Pollock, Department of Chemical Engineering, UCL, EdSIG Chair

Prof Mo Zandi, School of Chemical, Materials and Biological Engineering, University of Sheffield

Dr Eleni Routoula, School of Chemical, Materials and Biological Engineering, University of Sheffield

The education sessions at ChemEngDayUK concluded with a panel discussion on 'AI use in research projects' where a range of stakeholder perspectives were represented in discussions chaired by Prof. Mo Zandi following his plenary talk on 'AI, Ethics, and Workforce Transformation: Preparing Engineers for Digital Manufacturing Challenges'. Academic perspectives were delivered by Prof. Emma Norling (University of Sheffield) and Dr. Duygu Dikicioglu (UCL) from engineering education in computer science and digitalisation in bioprocess engineering respectively. An industrial perspective was provided by Dr Jon-Paul Sherlock, Executive Director and API Commercialisation Site Lead for AstraZeneca whilst Dr Oli Johnson, adviser at the University of Sheffield Academic Skills Centre, considered development of resources for appropriate use of AI tools by staff and students. The student voice was contributed by Ricardo Cardoso, final year student (University of Sheffield) and digital engineer at Unilever and Elcim Cam, first year student (University of Bradford) and IChemE Student Ambassador.

Discussions covered a range of themes including consideration of academic misconduct and the need to explain the risks and improve student understanding of academic misconduct related to AI, much in the same way as academic integrity in general is discussed as part of student

training. Updates to formulation of assessment were considered moving forward. For example, to test student understanding through vivas in research projects, or presentations and quizzes to support other types of traditional assessments such as report writing and coursework. From an academic perspective, there was a focus on learning outcomes, relating the use of AI to intended learning outcomes and a focus on critical thinking, so that the output from AI is not simply accepted but also critically evaluated to consider if it is the 'correct' answer. Ultimately, discussions arrived at the aim and need of developing skilled users of AI, with the ability to save time on repetitive or mundane tasks, without deskilling the users.

Many of these themes highlighted the need to train academics on AI for use in teaching and research, and a student desire to learn how to use AI. Furthermore, all stakeholders were concerned over the ethical use of AI. As discussions proceeded, it was interesting to hear how use and requirement of AI within education and industrial settings could have a different focus and how job descriptions of the future could change as a result of the use of AI in industry. Following the event, the student panellists remarked:

"I believe AI is—and will continue to be—a vital ally in both education and industry. However, it's important to begin understanding its strengths, weaknesses, and potential risks. Universities should present AI as a tool, encouraging students to engage with it not just as a paragraph generator or an optimized calculator, but as a means of enhancing their thinking and creativity. Furthermore, children and teenagers—who now have access to these tools much earlier—should be taught what they're working with and how to use it responsibly and effectively." – Ricardo Cardoso (University of Sheffield)

"Despite having limited experience and knowledge compared to other panel members, I still got to express my opinions on the use of AI while learning the depths of it. It was enlightening to hear how AI is perceived by academics and in industry. I was glad to step out of my comfort zone and participate in this panel." – Elcim Cam (University of Bradford)

In a quickly changing landscape, the need to continue dialogue, share perspectives, educate and listen were overall conclusions. With this in mind, look out for future knowledge sharing on digitalisation and AI in the **upcoming Chemical Engineering Education Online Symposium – Digitalisation in Education**, on 8 & 9 September 2025 as discussed further in this EdSIG newsletter and online here.

Student Development during Authentic Peer Marking Assessment in Chemical Engineering Education

Meng Yuan, Dr Thomas Rogers and Dr Salman Shahid

The University of Manchester, UK

"At ChemEngDayUK 2025, I had the opportunity to present a project on authentic peer marking assessment in chemical engineering education, a project developed by Dr. Thomas Rodgers and Dr. Salman Shahid, which I contributed to and presented at the conference. I am currently a first-year PhD researcher in Chemical Engineering Education at the University of Manchester and presenting at a national conference for the first time was both exciting and rewarding. It provided valuable insight into how educational research can shape teaching practices across institutions."

Figure 1. Meng Yuan Presenting at ChemEngDayUK 2025.

Team Communications	Team Management	Team Problem Solving	Team Review
C1. Exhibit empathy, active listening, and respect for diverse perspectives in interactions with group members to ensure all voices are heard and valued	**M1.** Develop leadership skills by effectively delegating tasks, making decisions, and motivating group members towards common objectives	**PS1.** Analyse information, evaluate ideas, and construct reasoned arguments through group discussions	**R1.** Develop clear expectations for how team members should interact, communicate, make decisions, and resolve conflicts together
C2. Foster an inclusive environment where all team members feel comfortable expressing their ideas and opinions	**M2.** Demonstrate effective time management skills to ensure tasks are completed within designated time frames, with contingency plans	**PS2.** Develop proficiency in conducting comprehensive research, gathering relevant data, and synthesizing information from diverse sources as a group	**R2.** Regularly assess team dynamics and effectiveness through self- and team-reflection
C3. Utilise various communication channels effectively, such as face-to-face meetings, virtual platforms, emails, and instant messaging	**M3.** Balance individual and group responsibilities to ensure that resources are effectively managed	**PS3.** Apply principles to identify, analyse, and propose solutions to (real-world) challenges collaboratively	**R3.** Engage in peer learning by sharing knowledge, providing constructive feedback, and observing different approaches to tasks
C4. Utilise conflict resolution strategies such as mediation, compromise, and consensus-building to address disagreements within the team.	**M4.** Foster a culture of experimentation and learning from failure to promote continuous improvement.	**PS4.** Collaboratively analyse strengths, weaknesses, and potential implications of the task results	**R4.** Reflect on individual and team overall performance to identify lessons learned and best practices for future projects

Figure 2. Teamworking Skills Framework.

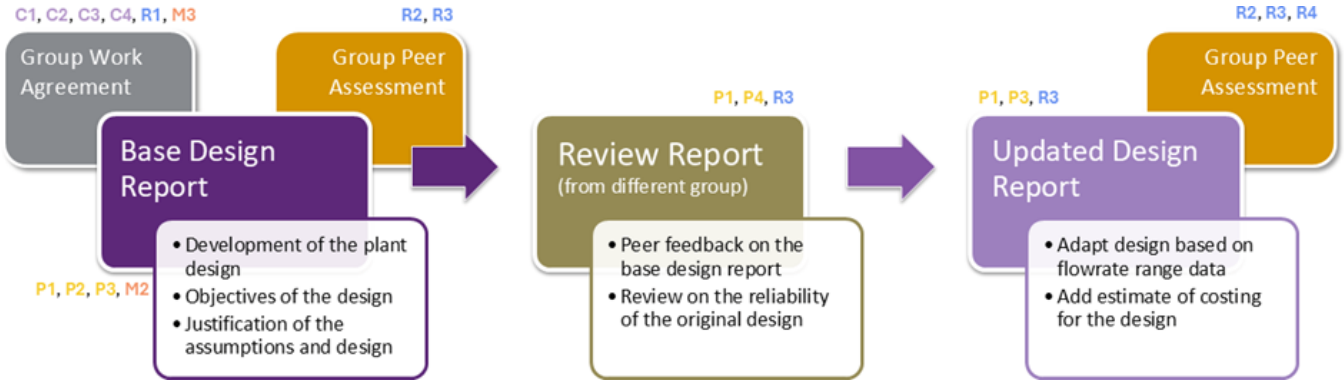

Figure 3. Project outline linked to the skills framework.

The project investigates the use of authentic assessment, which aims to evaluate students' ability to apply knowledge and skills in realistic, professional contexts. This form of assessment helps bridge the gap between academic study and future employment. A key dimension of authentic assessment is social context, which involves working in teams and developing accountability (Gulikers et al., 2004). These are skills that are highly valued in the chemical engineering profession. However, this aspect is often underexplored in assessment design and implementation.

Team-based authentic assessments can be challenging to run effectively. Some students prefer working independently, while others may encounter imbalances in workload due to free-riding or unclear team roles. Moreover, many students are not always aware of the specific professional skills they are meant to be developing during team-based activities.

To address these issues, we developed a framework that maps the stages of team development and the skills that can be cultivated at each stage, Figure 2.

This framework informed the design of an assessment centred on a wastewater treatment plant design project. Before beginning the project, student teams completed a group work agreement to establish expectations, minimise conflict, and provide structured guidance, particularly for those new to collaborative work.

The project consisted of several key components:

- A base design report, in which students developed and justified their process design
- Peer assessments through surveys and written reflections conducted within teams, supporting self-awareness and group development
- A review report, where each group marked and provided constructive feedback on a randomly anonymised report from another group, focusing on the reliability of the design and the justification of assumptions
- An updated design, allowing students to revise their project based on peer feedback and incorporate additional elements such as plant layout and costing

These activities helped students build core competencies in team communication, critical analysis, peer learning, and task review, as in Figure 3.

Feedback from participants highlighted that the review report was especially effective in encouraging them to reflect on their own work. However, several students noted that improved planning and time management could have enhanced their overall performance. In future iterations of the project, we aim to strengthen support for team management skills by revisiting the group agreement at key points and incorporating more structured planning guidance throughout the assessment.

References

Gulikers, J. T. M., Bastiaens, T. J., Kirschner, P. A., Gulikers, J. T. M., Bastiaens, T. J., & Kirschner, P. A. (2004). A five-dimensional framework for authentic assessment. Educational Technology Research and Development 2004 52:3, 52(3). https://doi.org/10.1007/BF02504676

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Promoting Team Collaboration through Game-Based Learning: Reflections from ChemEngDayUK 2025

Ya He and Professor Mo Zandi

University of Sheffield, UK

"At ChemEngDayUK 2025, the Education sessions—co-organised by IChemE's Education Special Interest Group (EdSIG) and the University of Sheffield—explored how engineering education must evolve to meet the demands of the next social and industrial revolution. With technological breakthroughs in AI, automation, digital twins, blockchain, and sustainable manufacturing continuing to accelerate, the challenge lies not only in teaching technical knowledge but in shaping talent that can thrive in uncertainty. Future engineers must be equipped with interdisciplinary thinking, adaptability, collaboration, and leadership skills. In this context, engineering education is shifting from traditional classroom instruction toward

more experience-based and skills-integrated approaches."

In alignment with this vision, we presented our recent work on designing and implementing a game-based workshop aimed at enhancing team collaboration skills among postgraduate taught (PGT) students in engineering programmes. The workshops were delivered at two Russell Group institutions — the University of Sheffield and the University of Manchester — and involved a total of 145 students from chemical and electrical/electronic engineering disciplines. Inspired by game theory and experiential learning principles, the workshop featured a hybrid of board and simulation game elements such as storytelling, visual aids, role-based tasks, and competitive challenges (Figure 1). These elements were used

Figure 1. Students participating in the game-based workshops

intentionally to promote communication, problem-solving, and peer engagement in a structured yet playful learning environment.

Figure 2 presents feedback collected from 110 participants, showing promising results. A majority (52%) expressed a strong willingness to participate in similar team-based activities in the future, while 47% felt they had gained new insights into teamwork dynamics. Participants highlighted that the games helped them better understand their own roles within teams and appreciate the importance of communication, trust, and teamwork strategy in collaborative settings. Several students commented that they found the interactive nature of the session more memorable and impactful than traditional classroom group work. These findings reinforce the value of incorporating gamified and teamwork-based learning into engineering education—particularly for PGT programmes with large international student populations.

In traditional courses often dominated by individual assignments and technical assessments, opportunities for interpersonal development can be limited. Yet, these are precisely the skills that employers now seek and that students, especially international ones, often find challenging due to linguistic and cultural differences. Moreover, game-based learning, when implemented thoughtfully, offers an efficient method to bridge that gap. It provides

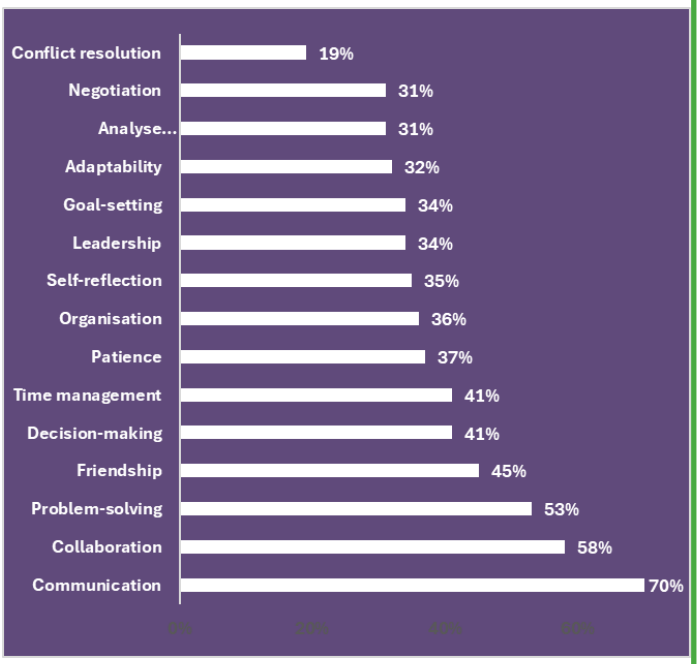

Figure 2. Student perceived improved skills after participating

not only a platform for skill-building but also a shared language of interaction, where differences can become strengths. While our current workshop focused on engineering, the core methodology, using structured play to foster teamwork is transferable for across disciplines and educational levels.

Ultimately, as the interaction between education and industry continues to grow, it is imperative that we equip our students not only with knowledge, but also with the ability to collaborate, adapt and lead. Human creativity remains the driving force behind all technological advances, and fostering that creativity through inclusive, engaging, and forward-thinking educational design is exactly how we train engineers not only for today's challenges, but also for tomorrow's.

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Upcoming Events

Chemical Engineering Curriculum: Days of Future Past

17th July 2025 at the Chemical Engineering Education Innovation Centre, The University of Manchester, Manchester, UK.

£20 for IChemE members

Explore the future of chemical engineering education in higher education (HE). This workshop will bring together HE academics and industry professionals to help shape the next generation of chemical engineers. During the workshop we will examine key challenges and emerging trends in chemical engineering education, discuss core competencies required for future chemical engineers, and explore the contents of the curriculum based on essential topics and modern educational principles, while fulfilling IChemE accreditation requirements.

This workshop will involve a mix of interactive sessions, discussions, and presentations.

To help with discussion on the day we are also running a survey on key topics that should be included within future BEng degrees, so if you can or can't make this event please can you spare 5-10 mins to complete this survey.

Don't miss out — secure your spot now! Register here.

Chemical Engineering Education Online Symposium – Digitalisation in Education

8th and 9th September 2025 | 8:15 – 11:00 (BST)

Free online event for IChemE members

Following on from the success of the previous Chemical Engineering Education Online Symposium, this year's Chemical Engineering Education Online Symposium focuses on Digitalisation in Education and offers an opportunity to explore new practices and gain insights into the future of digitalisation and AI in Chemical Engineering education. This two-day virtual symposium brings together academics, students, recent graduates, and industry professionals to share perspectives, best practices, and challenges in integrating digital technologies into the curriculum.

Themes

Day 1 – The Future of Digitalisation & AI in Education

Explore the transformative impact of AI and digital technologies on teaching and learning. Talks include AI and ethics, innovative approaches to AI in teaching, and perspectives on how AI integrates with IChemE accreditation.

Day 2 – Digitalisation – Preparing graduates to meet industry needs

Explore how current education prepares students for industry's digital demands. Discussions will focus on how we equip students to meet the needs of an increasingly digitalised workplace, alongside presentations on process simulation, cybersecurity, and the use of VR in chemical engineering education.

Register to join in here.