

Materials Education  
SYMPOSIA

**International**

# 15th International Materials Education Symposium

Clare College, University of Cambridge  
Cambridge, UK

**April 15-16, 2026**



This symposium is jointly coordinated by



&



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# 15th International Materials Education Symposium

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## Section 1: Agenda

TIME	EVENT	VENUE
<b>Tuesday, April 14<sup>th</sup>: Workshops &amp; Presenters' Dinner</b>		
9:00am	Registration Opens	At workshop venue
9:15am-12:00pm	Introduction to Ansys Granta EduPack	Department of Engineering, University of Cambridge
12:00-1:00pm	Lunch & Workshop Registration	
1:00-4:45pm	Teaching Materials and sustainable development with Granta EduPack and the Ansys Academic Social Impact Audit Tool	
7:00 PM	Presenters' Dinner <i>*by invitation only</i>	St John's College
<b>Wednesday, April 15<sup>th</sup>: Symposium Day One</b>		
8:15am	Registration opens*	Clare College Gillespie Centre, Memorial Court Queens' Rd, Cambridge CB3 9AJ
8:50-9:50am	Symposium Day One Session 1 Part 1	
9:50-11:10am	Coffee Break & Poster Session	
11:10am-12:10pm	Symposium Day One Session 1 Part 2	
12:10pm	Symposium Photograph	
12:20pm	Lunch	
2:00-3:30pm	Symposium Day One Session 2 Part 1	
3:30-4:00pm	Coffee Break & Poster Session	
4:00-5:20pm	Symposium Day One Session 2 Part 2	
7:00pm	Symposium Dinner	Clare College Trinity Ln, Cambridge CB2 1TL
<b>Thursday, April 16<sup>th</sup>: Symposium Day Two</b>		
8:45am	Registration opens	Clare College Gillespie Centre, Memorial Court Queens' Rd, Cambridge CB3 9AJ
9:15-10:05am	Symposium Day Two Session 3 Part 1	
10:05-10:50am	Coffee Break	
10:50am-12:10pm	Symposium Day Two Session 3 Part 2	
12:10pm	Lunch	
1:30-2:50pm	Symposium Day Two Session 4	
2:50-3:30pm	Closing Remarks/End of Symposium	

Please see **Section 5** for addresses and more venue details

## Symposium Day One: Wednesday, April 15<sup>th</sup>, 2026

Welcome Address	
8:50am	<b>Graham McShane</b> , University of Cambridge <b>Paloma Fernández Sánchez</b> , University Complutense, Madrid
9:00am	<b>Session 1: Designing for Social and Environmental Sustainability: Inclusivity, Equity, Materials, and Education</b>
9:00am	<b>Keynote: Barbara Pollini</b> , Aalto University <i>Teaching sustainability through material experimentation</i>
9:30am	<b>Christina Picken</b> , University of Manchester <i>Designing Greener Polymers - and Greener Polymer Scientists</i>
9:50am	<i>Poster Session Teaser</i>
10:20am	<i>Coffee Break &amp; Poster Session</i>
11:10am	<b>Hannes Geist</b> , INATECH, University of Freiburg, <i>Circularity mindset in materials education: Is the theory we teach mature enough?</i>
11:30am	<b>Tim Huber</b> , Luxembourg Institute of Science and Technology <i>Trashform: A Hands-On Materials and Sustainability Challenge for High Schools</i>
11:50am	<i>Session Discussion, Chair</i>
12:10pm	<i>Symposium Photograph &amp; Lunch</i>
2:00pm	<b>Session 2: Materials science within multidisciplinary education – holistic program review</b>
2:00pm	<b>Keynote: Joana Martins</b> , TU Delft <i>Biodesign Across the Curriculum: Experiences from an Integrated Product Design MSc</i>
2:30pm	<b>Barbara Del Curto</b> , Politecnico di Milano <i>Materials Education and Design Culture: An Educational and Exhibition Path Inspired by the Work of Horacio Pagani</i>
2:50pm	<b>Suazlan Mt Aznam et. al.</b> , International Islamic University Malaysia <i>Enhancing Conceptual Understanding Through Simulation-Supported Learning in Early Undergraduate Engineering Courses</i>
3:10pm	<b>Erika Tuneskog</b> , Chalmers University of Technology <i>Product development by additive manufacturing: A Project-Based Approach to Design Optimization for Additive Manufacturing</i>
3:30pm	<i>Coffee Break &amp; Poster Session</i>
4:00pm	<b>Paloma Fernández Sánchez</b> , University Complutense, Madrid <i>Lost in Translation: From Professor's Brain to Student's Eyes and Ears</i>
4:20pm	<b>Telesilla Bristogianni (presenter), Fred Veer (author)</b> , TU Delft <i>The relationship between dinosaurs, dodo's, giraffes, steel I beams and EduPack</i>
4:40pm	<b>Xiaolei Feng</b> , Nanyang Technological University <i>Do I have to memorise this?" Rethinking how we teach crystal structures</i>
5:00pm	<i>Session Discussion, Chair</i>
5:20pm	<i>End of Day 1</i>

## Symposium Day Two: Thursday, April 16<sup>th</sup>, 2026

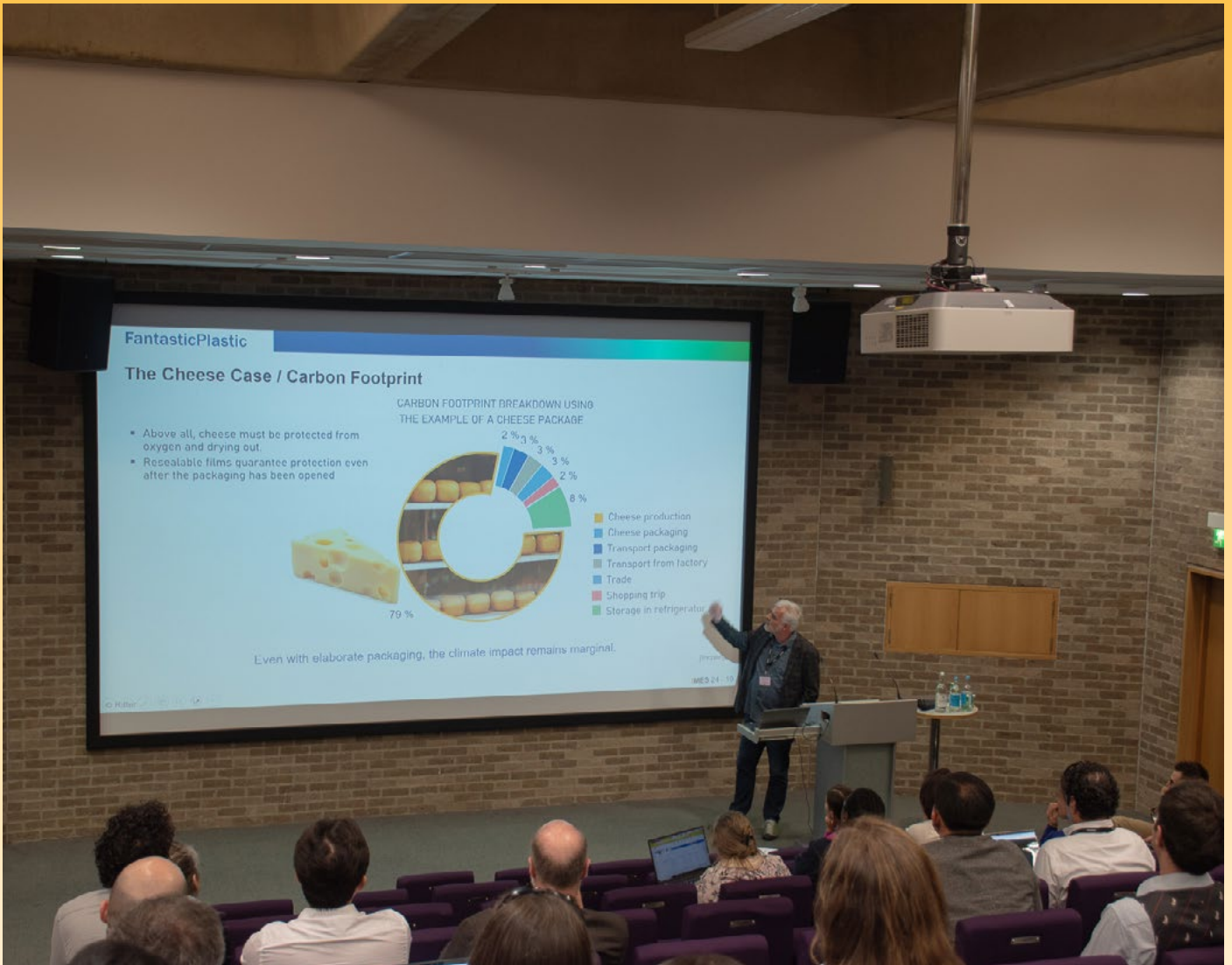
8:45am	Coffee and Snacks
9:15am	<b>Session 3: Knowledge, competences &amp; skills in Materials for employability in industry</b>
9:15am	<b>Keynote: Julian Dean et. al.</b> , Sheffield University <i>Including inclusivity into learning: A materials science and engineering tutor project</i>
9:45am	<b>Patricia Munoz Escalona et.al.</b> , University of Manchester <i>Integrating Sustainability Practices as a Platform to Develop Global Competences in Materials Science and Engineering Education</i>
10:05am	Coffee Break & Poster Session
10:50am	<b>Daphiny Pottmaier</b> , Nottingham Trent University <i>Building a Sustainability Lexicon for Employability: from Bill of Materials to Ecological Design Audits</i>
11:10am	<b>Itai Vutabwarova* and Kathryn Jackson</b> , University of Sheffield AMRC <i>Reframing Employability in Materials Education Through Industry Integrated Degree Apprenticeships</i>
11:30am	<b>Mary Beth Benbenek</b> , University of Cambridge <i>Learning outcomes and curriculum theories: Defining what students should know and be able to do</i>
11:50am	Session Discussion, Chair
12:10pm	Lunch Break
1:30pm	<b>Session 4: Risk, responsibilities, ethics and potential of AI in education</b>
1:30pm	<b>Steffen Ritter</b> , Reutlingen University <i>Homo Hapticus rediscovered – Why learning with real-life examples and haptic feedback increases your learning success</i>
1:50pm	<b>Zied Hosni</b> , University College London <i>Listening to Students about AI, Inclusion and Research: Towards Neuro-inclusive, AI-aware Materials Education</i>
2:10pm	<b>Claes Fredriksson</b> , University West <i>How to Introduce AI in Materials Teaching</i>
2:30pm	<b>Mengyan Nie</b> , University College London <i>Effective approach for teaching materials corrosion fundamentals with well engaged students learning experience</i>
2:50pm	Session Discussion and Q&A
3:30pm	End of Day 2

## Section 2: Participants

Name	Affiliation	Presenting			Country
		Workshop	Talk	Poster	
Alexandre Kabla	University of Cambridge				UK
Alison Harvey	The University of Manchester				UK
Anett Papp	Széchenyi István University			X	Hungary
Andrea Dritschel	University of Dundee				UK
Anna Ziębowicz	Silesian University of Technology				Poland
Barbara del Curto	Politecnico di Milano		X		Italy
Barbara Pollini	Aalto University		X		Finland
Bogusław Ziębowicz	Silesian University of Technology				Poland
Cedric Heyen	RWTH Aachen			X	Germany
Christina Picken	The University of Manchester		X		UK
Claes Fredriksson	University West		X		Sweden/UK
Danchen Zhang	RWTH Aachen			X	Germany
Daniel Engstrom	The University of Manchester				UK
Daphiny Pottmaier	Nottingham Trent University		X		UK
Darshil Shah	University of Cambridge				UK
David Mercier	Ansys part of Synopsys				France
Davide Di Stefano	Ansys part of Synopsys				UK
Di Wu	New York Institute of Technology			X	United States
Dipankar Choudhury	Ansys part of Synopsys			X	United States
Dóra Márföldi	Széchenyi István University			X	Hungary
Erika Tuneskog	Chalmers University		X		Sweden
Flavia Papile	Politecnico Di Milano			X	Italy
Gerda Gaidukova	Riga Technical University			X	Latvia
Graham McShane	University of Cambridge				UK
Hannes Geist	University of Freiburg		X	X	Germany
Hans Glerum	Hague University of Applied Sciences				
Itai Vutabwarova	University of Sheffield AMRC		X		UK
James Hambleton	University of Cambridge				UK
James Russell	Royal College of Art				UK
Javier Orozco-Messana	Univeristy Polytechnic of Valencia			X	Spain
Jess Gwynne	University of Cambridge				UK
Joana Martins	TU Delft		X		Netherlands
Jörg Müssig	HS Bremen				Germany
Julian Dean	University of Sheffield		X	X	UK
Kaitlin Tyler	Ansys part of Synopsys	X		X	United States
Kasper Bowyer-Knight	Ansys part of Synopsys				UK
Kathryn Jackson	University of Sheffield			X	UK
Lakshana Mohee	Ansys part of Synopsys			X	UK
MariaPia Pedferri	Politecnico Di Milano				Italy

Name	Affiliation	Presenting			Country
		Workshop	Talk	Poster	
Mary Beth Benbenek	University of Cambridge		X		UK
Mauricio Dwek	Ansys part of Synopsys				France
Mengyan Nie	University College London		X		UK
Muntasir Hashim	Lloyd's Register Foundation				UK
Nicolas Martin	Ansys part of Synopsys	X		X	France
Nikolett Holm Szalai Thorup	VIA College Denmark				Denmark
Paloma Fernández Sánchez	University Complutense		X		Spain
Patricia Munoz-Escalona	The University of Manchester		X	X	UK
Rembo de Beer	Hague University of Applied Science				Netherlands
Robbert Boost	Hague University of Applied Science				Netherlands
Rob Thompson	University of Cambridge				UK
Rosie Lester	University of Cambridge				UK
Sergejs Gaidukovs	Riga Technical University			X	Latvia
Steffen Ritter	Reutlingen University		X		Germany
Suazlan Mt Aznam	International Islamic University of Malaysia		X		Malaysia
Tamman Kaid	Liverpool John Moore University			X	UK
Tatiana Vakhitova	SEFI Board				UK
Telesilla Bristogianni	TU Delft		X		Netherlands
Thanuja Goonetilleke	Sheffield Hallam University				UK
Thomas Hancocks	Royce Institute				UK
Tim Huber	LIST		X		Luxembourg
Wahidullah Azizi	Royal Academy of Engineering			X	UK
Xiaolei Feng	Nanyang Technical University		X		Singapore
Yinglu Tang	TU Delft			X	Netherlands
Zied Hosni	University College London		X		UK





### Section 3: Presentation Abstracts

## Teaching sustainability through material experimentation

Barbara Pollini  
*Aalto University*

In my presentation, I will reflect on how hands-on experimentation with materials can enhance students' sustainability literacy and sustainable-design thinking. Drawing on my experience in Material Design, I will share experimental material approaches that ground design students in material properties and ecological performance, preparing them to become innovators while developing both technical competency and environmental awareness. Moreover, I will share my most recent experience at Aalto University, where this approach evolved further, supporting the Aalto CHEMARTS' interdisciplinary educational program across design, chemistry, and materials science, and addressing living organisms in Biodesign education.

## Designing Greener Polymers - and Greener Polymer Scientists

Christina Picken\* and Lee Fielding  
*Department of Materials, University of Manchester*

From personal care and medicines, to transport and renewable energy, polymer science underpins the development of a sustainable future. Materials science students therefore require not only the chemical skills to engineer and characterise polymeric materials but the ability to evaluate the sustainability implications of the polymer design, production, application and end-of-life.

This project involved redesigning the lab practical for the joint 4th year MEng/MSc Control and Design of Polymerisations module using the 12 Principles of Green Chemistry (PGC) as a sustainability framework. The aims were to reduce the impact of the lab practical, introduce end-of-life considerations at the polymer design stage, investigate green solvent use, minimise hazards, and ensure students retained equivalent practical competencies.

The previous synthesis of polystyrene copolymers was replaced with the production of biodegradable poly(lactic acid) (PGC10) using biobased lactide (PGC7), organocatalyst 1,8-diazabicyclo[5.4.0]undec-7-ene (DBU; PGC9) and green solvent 2-methyltetrahydrofuran (PGC5). This change enabled ~50 students to compare two polymerisation systems while prompting discussion on sustainable materials design. Students refined skills including weighing solids, micropipette use, polymer isolation by filtration and polymer characterisation.

Compared to the original polystyrene practical, reactions temperature and time were reduced by 10 °C and 2 hours, leading to energy savings (PGC6). The designed protocol involved 18 fewer hazard codes and a threefold scale reduction, decreasing waste (PGC1) and reducing potential harm to the students and the environment (PGC3+12). Sustainability-focused learning objectives were strengthened through in-person discussions on degradable and biodegradable polymers and their role in future materials design.

This work demonstrates how lab-based training can build essential practical skills while embedding sustainable thinking, offering a transferable model for integrating green chemistry into materials education.

## Towards a net-zero society: Competence supply in collaboration with the industry

Ehsan Ghassemali\*, Madelene Zetterlind, and Stefan Brodin  
*Department of Materials and Manufacturing, School of Engineering, Jönköping University,  
Jönköping, Sweden*

Moving towards a net-zero society is impossible without taking tangible actions for a green transition in the materials and manufacturing sector, as one of the main contributors to greenhouse gas emissions. Specifically in Sweden, the goal is to achieve carbon neutrality by 2050. This ambitious goal is rather challenging to achieve if there is no effective supply of competence to the industry. In the long term, there is a need to intensify talent attraction and development in academia. To achieve short-term goals, however, it is essential to equip existing professionals in the industry with the necessary skills. Nonetheless, there are very limited and, in most cases, scattered educational packages related to climate action in the metal component manufacturing industry. This serious lack has led to improper competence development for current professionals and the upcoming generation of talent in the industry, who are not fully equipped with the knowledge of climate challenges in the field. Accordingly, within the flagship and nationwide CIRCUMET initiative, tailored and flexible competence supply courses are being developed for professionals in the industry, as the main target group. The activities are developed through close collaboration between three universities, 10 industrial partners, five industry associations, and a research institute. The aim is to ensure the actual alignment of pedagogical methods and course contents with current and future industrial needs. In our efforts, fighting climate change in the metal component manufacturing sector is pursued from different themes of (i) material/component circularity, (ii) high-performance metallic materials/components, and (iii) energy and resource efficiency manufacturing technologies. In this presentation, we will explore tangible examples of admission and validation routines, pedagogical methods, course content, and examination methods specifically tailored for professionals in the industry.

## Circularity mindset in materials education: Is the theory we teach mature enough?

Hannes Geist\* and Frank Balle  
*INATCH, University of Freiburg*

Economies are dominated by a linear model, where raw materials are extracted, transformed into products, used, and then discarded as waste. The circular model aims instead at designing product, component, and material flows in ways that retain, recover, and add to their value for as long as possible while minimizing adverse sustainability impacts. While the topic is of increasing industrial relevance and very motivating for many students, teaching circularity to students in material courses is still in its infancy. Considering the rapidly evolving discourse on the circularity of materials, we raise the question of whether the theory we can teach is mature enough to be taught.

Based on two examples, we show that most of the material-relevant circular economy theory is not very robust today and must be systematically improved. The first example is the concept of “Recyclability”. While it is a mature concept and included in standard materials software, its predominant understanding is Boolean, simply asking if a material can enter a recycling process. To be useful in the circular economy context, the concept had to be further developed and recontextualized. The second example is the concept of “Remanufacturability”. Existing theory on the remanufacturability of materials is mainly based on secondary data and assumptions of practitioners and researchers. We present results that complement and improve this existing theory with an inductive research approach based on the large-scale data collection in the automotive remanufacturing industry.

We conclude that the theory we can teach today is not mature, but still worth teaching! Based on the awareness of the quick continuing evolution of the topic, we suggest teaching the existing theory with a focus on training a circular mindset and lifelong learning skills. Finally, the topic demands the cultivation of a productive interrelation between teaching, research, and industrial practice.

## Trashform: A Hands-On Materials and Sustainability Challenge for High Schools

Tim Huber\*<sup>1</sup> and Jörg Müssig<sup>2</sup>

*Luxembourg Institute of Science and Technology<sup>1</sup> and <sup>2</sup>HSB - City University of Applied Sciences*

The Trashform project, funded through the FNR PSP Flagship scheme and led by the Luxembourg Institute of Science and Technology (LIST) in partnership with the City University of Applied Sciences Bremen (HSB), seeks to inspire students aged 16 and above in Luxembourg and Germany to explore sustainability, materials science, and entrepreneurship through design-based learning. At the core of the initiative is a competition in which students transform waste materials into functional or aesthetic prototypes and pitch their ideas to professionals in a “Dragons Den”-style format.

In this presentation, we will discuss the first year of Trashform, focusing on the development and testing of the educational framework and its implementation in pilot workshops. Around 100 students from five schools participated in one-day sessions introducing sustainable design thinking, ideation with waste materials, and rapid prototyping. The workshops were co-developed by LIST and HSB researchers together with educators to ensure adaptability across classroom and extracurricular contexts.

We will present key insights from student and teacher feedback, which highlight the project’s success in fostering creativity, engagement, and awareness of material circularity. Quantitative and qualitative data reveal strong enthusiasm for hands-on, interdisciplinary formats, as well as challenges such as maintaining engagement during longer sessions and managing the unexpected use of AI tools in student research.

Finally, the presentation will outline next steps for scaling Trashform to a national level, strengthening the LIST–HSB collaboration, and integrating more structured support for educators. By combining material science, design, and entrepreneurship education, Trashform demonstrates how co-designed learning formats can meaningfully engage young people in rethinking waste as a resource.

## Biodesign Across the Curriculum: Experiences from an Integrated Product Design MSc

Joana Martins  
*TU Delft*

The emerging field of biodesign—where designers collaborate with living organisms and biological processes—redefines materials science by enabling sustainable, responsive materials for product innovation. Despite rising interest in biodesign research and practice, its integration into design curricula remains underdeveloped.

At TU Delft's Integrated Product Design MSc, we address this by introducing biodesign across the curriculum. In this keynote, I will present two courses where biodesign is explored at different levels: from building fundamental biological understanding and hands-on laboratory experience in Fundamentals of Biodesign, to research-through-design exploration in the Biodesign Studio of Product Futures Studio. I will highlight the challenges and opportunities that designers and educators face when engaging with living systems in multidisciplinary education, drawing insights from our experiences.

## Materials Education and Design Culture: An Educational and Exhibition Path Inspired by the Work of Horacio Pagani

Barbara Del Curto<sup>1\*</sup>, MariaPia Pedeferrì<sup>1</sup>, and Luigi Ganzerli<sup>2</sup>  
*<sup>1</sup>Politecnico di Milano, <sup>2</sup>Pagani Automobili*

The project, developed on the honorary degree in Design & Engineering awarded to Horacio Pagani by Politecnico di Milano, gave rise to an educational format that integrates teaching activities, exhibition curation, and dissemination of materials culture. The aim was to demonstrate how knowledge of materials can become a central educational tool in the training of engineers, designers, and future innovation professionals.

The initiative unfolded through two complementary components. On one hand, a series of seminars in the form of dialogues between Horacio Pagani's representatives and professors and students of the Politecnico, focusing on the Pagani culture in its various meanings — particularly on the importance of materials, with attention to fiber-reinforced composites, light alloys, and functional finishes, which define Pagani's distinctive approach to design. The dialogues and case studies consistently referred to advanced materials and components used by Pagani, highlighting the direct relationship between material selection, mechanical performance, manufacturing processes, and product identity.

On the other hand, a thematic exhibition “The Forms of Air – From Leonardo da Vinci to Pagani Utopia” translated these contents into a visual and tactile experience. The materials and artifacts on display were selected to illustrate the evolution of composites, the role of structural form, and the dialogue between technological innovation and craftsmanship, as well as the use of materials as narrative tools in building product value. The exhibition offered students a tangible opportunity to observe and understand how technical decisions and aesthetic choices converge in contemporary design practice.

The integration between the course and the exhibition fostered an approach to materials education grounded in material literacy, experiential learning, and cross-disciplinary contamination. The experience demonstrated how collaborations with industry can enhance educational programs, supporting a critical understanding of the role of materials in defining performance, sustainability, and project identity.

## Enhancing Conceptual Understanding Through Simulation-Supported Learning in Early Undergraduate Engineering Courses

Suazlan Mt Aznam\*, Sa'adah Binti Ahmad, Ahmad Zahirani Bin Ahmad Azhar,  
Syazwani Binti Mohd Zaki, Hasniza binti Ibrahim  
*International Islamic University Malaysia*

Early-stage undergraduate students in Materials Engineering often face challenges when first engaging with fundamental courses such as Fluid Mechanics and Heat and Mass Transfer, where mathematical formulations derived from conservation laws and differential calculus must be interpreted to understand physical behaviour. At this developmental stage, many students have limited experience in visualising temperature gradients, heat flux pathways, pressure distributions, and boundary condition effects solely from analytical expressions or basic laboratory measurements. To strengthen conceptual comprehension, a simulation-integrated instructional approach was implemented in which traditional tutorial exercises and laboratory activities were supplemented with computer-based simulations capable of representing heat transfer and fluid flow phenomena in a more intuitive manner. Structural and thermal simulations are governed by established balance and conservation principles, enabling the visual representation of temperature fields, heat flux patterns, and deformation behaviour. Through this simulation-supported approach, governing equations, material properties, and boundary conditions were incorporated into engineering simulation environments, allowing theoretical constructs to be examined through temperature fields, heat flux contours, pressure distributions, and flow visualisation. A structured simulation activity was embedded within the tutorial and laboratory framework, prompting students to compare analytical, experimental, and numerical results, with performance in these tasks contributing to the students' overall course evaluation. Survey data from 123 respondents demonstrated strong positive outcomes, with more than 70% agreeing that simulations improved clarity in linking theoretical equations to physical behaviour and 71% indicating confidence in interpreting simulation output. Over 60% reported enhanced understanding of boundary-condition applications, and similarly high levels of agreement reflected the usefulness of simulations in supporting conceptual learning. Overall, integrating simulation-based visualisation early in the Materials Engineering curriculum provides measurable gains in conceptual understanding, reinforces laboratory learning, prepares students for higher-level courses, and cultivates early interest in simulation-supported engineering practice.

## Product development by additive manufacturing: A Project-Based Approach to Design Optimization for Additive Manufacturing

Erika Tuneskog\* and Lars Nyborg  
*Chalmers University of Technology*

Additive manufacturing (AM) is increasingly used in engineering, both for prototyping and for production of advanced components. While many students are familiar with AM, they lack hands-on experience with the full design and production workflow. At Chalmers University of Technology, we developed a project-based course in applied materials engineering that draws on pedagogical principles from applied mechanics, where students learn to apply complex physical models and theories to real problems through simulation-based exercises that reinforce conceptual understanding and connect theory to practice.

We aim to apply the same approach within the context of design and manufacturing for AM. The course structure is built around a sequence of challenges with increasing complexity. Students begin by learning about design optimization methods, software tools, digital workflows, and 3D printing, and they then apply these skills to design optimization in AM by completing the full process: problem definition, simulation setup, result analysis, preparation for production, manufacturing, and evaluation. Subsequent modules introduce design constraints, material behavior, and manufacturing limitations. Each phase is designed to require independent problem-solving and team-based collaboration.

The course admits students from diverse engineering disciplines and career interests. This mix reflects the interdisciplinary nature of AM and supports peer learning. The pedagogical intent is to simulate real engineering conditions, where tools are unfamiliar, instructions are limited, and solutions must be developed iteratively. This approach aligns with Swedish industry expectations, where adaptability and problem-solving abilities are valued in new graduates.

Course surveys indicate that students feel more confident in trying new software and use additive manufacturing for rapid prototyping after the course. Many students appreciate the combination of simulations and practical experience. Several mention that this combination is unique for the course. The results suggest that this approach prepares students for work in industry or research.

## Lost in Translation: From Professor's Brain to Student's Eyes and Ears

Paloma Fernández Sánchez

*Department of Materials Physics, Faculty of Physics, University Complutense, Madrid, Spain*

In this work, we aim to identify which concepts and theories in Materials Science pose the greatest learning difficulties for students, and to explore how these difficulties relate to the knowledge they have previously acquired. Our study is motivated by a recurring observation: students who answer a question correctly when it is presented in textual form often become confused or answer incorrectly when the very same question is presented in a graphical format.

In university teaching, instructors frequently rely on diagrams or visual materials that condense large amounts of information. While these representations may appear intuitive to experts, they are not always accessible to students. As a result, students may struggle to extract meaningful information from graphs, diagrams, or images, which can hinder their understanding of fundamental concepts in Materials Science.

In this work we will investigate how students' conceptual understanding may be improved by strengthening their skills in interpreting graphical information. The outcomes from the study of the main misconceptions detected will serve as starting point for the development of a Materials Concept Inventory similar to the well-known Force Concept Inventory.

## The relationship between dinosaurs, dodo's, giraffes, steel I beams and EduPack

Telesilla Bristogianni (presenter), Fred Veer (author)  
*TU Delft*

TU Delft decided to introduce compulsory inter faculty and interdisciplinary courses lasting an entire quarter at the beginning of the 2nd year of the master program. One of the courses is materials centered and is designed for non-material science students mainly from master program focusing on the built environment.

Part of the course is a Ansys Granta EduPack centered module focusing on materials selection. A grant was provided by Ansys to help develop this module.

Analysis of earlier courses showed that in practice materials selection in the built environment is very limited. This is explained by applying evolutionary theory to materials development. In essence materials fill a specific ecological niche in the technological universe. Materials develop until their behavior is optimized for that niche. A new material must compete within that specialized niche to succeed.

Students are asked to look not at specific options for new materials but at the ecological niches that exist. The choice is then to create a new ecological niche or compete with an existing solution in an existing ecological niche. Survival of the fittest is a complicated process and this explains why many new materials will never be successful.

The results of this teaching this approach to students is shown and how this influences their final course project. Some questions are put forward regarding the general approach to teaching materials science which are the result of evaluating this course.

## "Do I have to memorise this?" Rethinking how we teach crystal structures

Xiaolei Feng  
*Nanyang Technological University*

Understanding crystal structures is an integral part of Materials Science and Engineering education. Students often struggle to connect atomic-scale arrangements to macroscopic materials properties, however. Here, we introduce a scaffolded teaching method for developing understanding of crystal structures, ATOMS (Active Teaching of Occupied and Missing Sites). This is underpinned by constructivist principles, that emphasizes interstitial site filling within close-packed frameworks. Building on first-year fundamentals such as stacking sequences and coordination numbers, the approach integrates Pauling's Rules throughout, enabling students to understand why certain ions favor specific sites and how these choices determine overall stability. Case studies, including MgO (full octahedral occupancy) and perovskite (mixed occupancy), highlight the range of structural possibilities when filling tetrahedral or octahedral sites. Comparative discussions — such as fluorite versus anti-fluorite and fully versus partially filled tetrahedral sites — reinforce this approach. By focusing on a single structure and considering it in depth, before exploring variations, students gain both conceptual clarity and confidence, as evidenced by improved explanations of complex structures such as spinel. Ultimately, this "filling the interstitial-sites" scaffolded technique helps learners build on existing knowledge, fosters deeper engagement with crystallographic concepts, and broadens their capacity to apply fundamental principles across diverse ceramic materials.

## Including inclusivity into learning: A materials science and engineering tutor project

Julian Dean\*, Michael Trikic, and Colin L. Freeman  
*University of Sheffield*

To address challenges related to group work and inclusivity in materials science education, a project was designed and delivered to first-year Materials Science and Engineering students. Developed in partnership with the Institute of Materials, Minerals and Mining (IOM3) and supported by the IOM3 Education & Outreach Trust, the project aimed to enhance student engagement, collaboration, and inclusivity through the application of Universal Design for Learning (UDL) principles.

Conducted during the first semester, the project required students to work collaboratively in small groups to select an everyday object and investigate the materials used in its manufacture. Tutorial sessions were run alongside the project to develop teamwork and communication skills, culminating in reflective activities that encouraged students to identify their personal strengths and consider how these contribute to effective group work. This integrated approach allowed students to apply concepts of inclusivity and collaboration in an authentic and meaningful context. Each group communicated their findings through a presentation tailored to an age group of their choice, such as a quiz for primary learners, a podcast for secondary students, or a TED-style talk for A-level audiences. This flexibility provided multiple means of engagement, representation, and expression, consistent with UDL principles, and encouraged students to consider both the scientific and communicative dimensions of materials science. Finally they were asked to reflect on their ability to work collaboratively and how their skills have developed.

Student feedback was overwhelmingly positive, with many reporting that the project not only improved their understanding of materials and group dynamics but also helped them bond with their tutorial group. The project's open-ended and collaborative design fostered creativity, critical thinking, and peer learning while promoting equitable participation and valuing diverse perspectives. Overall, the initiative demonstrates how UDL-informed design can support inclusivity, engagement, and skill development in early-stage materials science education.

## Integrating Sustainability Practices as a Platform to Develop Global Competences in Materials Science and Engineering Education

Patricia Munoz-Escalona\*, Alison Harvey, Daniel Engstrom, and Christina Picken  
*The University of Manchester*

The World Economic Forum's (WEF) Education 4.0 Framework [1] has identified eight essential characteristics, defined as high-quality learning in education. These characteristics linked to skills and competences have become essentials to fulfil the industries requirements. The characteristics have been divided in two main groups : Group 1: Skills for adaptation: i) global citizenship skills, ii) innovation and creativity skills, iii) technology skills and iv) interpersonal skills and Group 2: Skills of leveraging innovative pedagogies: i) Personalized and self-paced learning, ii) Accessible and inclusive learning, iii) Problem-based and collaborative learning, and iv) Lifelong and student-driven learning.

To ensure graduate fulfil the industries requirements and succeed as professional the responsibility relies in a collaborative effort among universities, industries, and students. A strong partnership between university and industry is essential to develop a robust curriculum design, where academics through their teaching approaches and innovative assessments provide the necessary tools to achieve the skills and competences needed [2-3], while they motivate students to achieving specific goals. The aim of this research is to share good practice on a teaching initiative that integrates sustainability in practical laboratory sessions as a platform to develop global awareness in areas such as materials environmental implications and impact, whilst strengthening other skills and competences such as teamwork, communication, and critical thinking. Student engagement was measured through observation and informal feedback. The practical session delivered to joint 4th year and master's students of materials science and engineering degree programs, reinforced the importance of integrating sustainability considerations into material development and selection, whilst providing an innovative approach that increased students' engagement, and enhancement of their learning experience, skills and competences.

## Building a Sustainability Lexicon for Employability: from Bill of Materials to Ecological Design Audits

Daphiny Pottmaier  
*Nottingham Trent University*

This practice-based contribution from an optional for engineering courses shows how a sustainability language pedagogy can accelerate industry-ready competences in materials while directly improving interview performance. As reported by several final year students, this is the third year of the module in this format, their job interviews always include a question in sustainability. Anchored in Ansys Granta EduPack Eco Audit, students conduct comparative lifecycle analyses (embodied energy/carbon, cost, performance, end of life) and learn to translate technical evidence into concise, professional language (Carbon Footprint values). The design integrates three strands: (1) Core concepts (circular strategies, Scope 1–3 emissions, regulatory context such as REACH/RoHS, EPDs); (2) Applied Analysis (Eco Audit based scenario comparisons with treatment of trade offs, hotspot identification, and justification under constraints); and (3) CAD and Simulation Challenge (Geometrical and Physical modelling).

A credentialing layer strengthens external recognition: students complete NTU Sustainability in Practice (SiP) course alongside Ansys short courses to reach self-paced study hours. These micro-credentials are embedded into formative assessments. These past three years of implementations and adjustments have been indicating increased fluency of the students with critical sustainability specific terms (embodied carbon, life cycle, circularity, reparability index), stronger justification of material choices, and higher confidence in articulating value propositions to peers and apparently to employers. By teaching students to speak sustainability with evidence, the approach advances technical, analytical, and professional competences that are immediately legible graduate interviews.

## Reframing Employability in Materials Education Through Industry Integrated Degree Apprenticeships

Itai Vutabwarova\* and Kathryn Jackson  
*University of Sheffield AMRC*

Employability within materials education is increasingly defined by graduates' ability to integrate fundamental materials science with industrial decision-making, professional judgement, and contextual awareness of manufacturing constraints. However, traditional materials curricula often prioritise theoretical knowledge at the expense of authentic application, limiting graduates' readiness for industrial practice. This presentation investigates how employability can be systematically embedded within materials education through an industry-integrated degree apprenticeship model.

The study draws on a longitudinal case study of materials and manufacturing modules delivered over a ten-year period at the University of Sheffield Advanced Manufacturing Research Centre (AMRC). A programme redesign methodology is adopted, in which curriculum structure, assessment strategies, and learning activities were iteratively developed in collaboration with industrial partners. Core materials topics, including materials selection, process-structure-property relationships, and sustainability considerations, are taught through work-based projects and employer contextualised assessments aligned to real engineering roles.

Data sources include apprentice assessment outcomes, curriculum artefacts, employer feedback, and reflective evaluation by academic staff. Analysis focuses on how specific pedagogical interventions support employability-related competencies such as applied materials reasoning, engineering communication, and the ability to justify materials decisions under industrial constraints. The findings indicate that embedding materials science within authentic workplace contexts enhances students' capacity to transfer theoretical understanding into practice, while simultaneously developing professional skills valued by employers.

## Learning outcomes and curriculum theories: Defining what students should know and be able to do

Mary Beth Benbenek  
*University of Cambridge*

## Homo Hapticus rediscovered – Why learning with real-life examples and haptic feedback increases your learning success

Steffen Ritter  
*Reutlingen University*

The discussion surrounding the use of Artificial Intelligence (AI) and computer-based teaching methods currently dominates almost all academic conferences and meetings in higher education. Digital tools, simulations, and AI-driven approaches undoubtedly offer new opportunities for conveying complex content. At the same time, there is a risk that well-established didactic principles and active learning techniques may be overshadowed. This is particularly relevant as a significant portion of teaching content is still delivered in a traditional lecture format.

One traditional yet demonstrably effective method is learning with real objects – the so-called Object-Based Learning (OBL). This approach employs physical examples to make abstract concepts tangible and to foster sustainable understanding among learners. In materials science and engineering, OBL provides distinct advantages: direct engagement with materials, structures, and components creates a vivid link between theoretical knowledge and practical application. Both personal teaching experiences and findings from independent studies strongly confirm the effectiveness of this method. Students report higher motivation, improved conceptual understanding, and stronger connections between theory and practice.

The central thesis of this contribution is clear: OBL is not an outdated concept but an essential component of a modern teaching methodology mix. Digital and AI-supported approaches should not replace traditional methods but complement them. Combining established and innovative strategies enables sustainable and impactful higher education that meets the demands of digital transformation while addressing the needs of learners.

## Listening to Students about AI, Inclusion and Research: Towards Neuro-inclusive, AI-aware Materials Education

Zied Hosni

*Institute for Materials Discovery, University College London (UCL)*

Generative AI is rapidly reshaping how students search, write and analyse in materials-related disciplines. At the same time, research culture agendas at UCL and beyond emphasise inclusion, neurodiversity and assessment integrity. Yet we know little, from students' own perspectives, about how AI, inclusion and research training intersect in materials education.

In a large research-methodology course for ~170 taught postgraduate students in materials and related fields, I designed an ethics-approved, anonymous study combining a short online survey (via Qualtrics) with in-class reflective prompts. Students were invited (voluntarily and with no link to marks) to share how they currently use AI in research tasks, when they feel supported or excluded in assessment, and what they would want from future AI-assisted learning at Master's level. Items were co-informed by Universal Design for Learning (UDL) principles and AI-in-education guidance, and lightly checked with colleagues from agriculture and the humanities to ensure cross-disciplinary relevance.

Data collection is scheduled for Term 2 (Jan–Mar 2026); full descriptive and thematic analysis will be complete before the symposium. I will report patterns of AI use, perceived barriers (e.g. unclear expectations, accessibility, integrity worries) and enablers (e.g. transparent AI-use rules, flexible assessment), with illustrative quotes and comparisons across disciplinary backgrounds.

The study offers a simple, replicable methodology for listening to students about AI and inclusion. Findings will inform neuro-inclusive, AI-aware assessment patterns and the design of future adaptive, interdisciplinary Master's pathways in materials, agriculture and human sciences, and will be shared as open, reusable guidance for materials educators.

## How to Introduce AI in Materials Teaching

Claes Fredriksson\*<sup>1</sup> and Nick Ball<sup>2</sup>  
*<sup>1</sup>University West and <sup>2</sup>Retired, Ansys*

It seems inevitable that Artificial Intelligence (AI) will affect engineering-related education profoundly. This can, however, be problematic in many ways. Assignments and essays designed for individual learning, for example, may be obsolete. Materials knowledge and critical thinking need to be preserved as shortcuts to results are so easily accessible. This contribution explores how traditional knowledge and understanding can be maintained while using AI as a responsible tool.

A computer lab with the EduPack software, mainly based on experimental data, has traditionally been used to complement Materials Science and Engineering textbooks. We here benchmark AI against results that Advanced Materials students generate using EduPack in a mandatory computer lab. This is used to study how students might employ AI in their learning.

The tasks were given to around 20 master's students examined by a guided in-person computer lab with a required assignment. The students were asked to critically correct and compare the AI output with results using EduPack. The simple computer lab task as basis for both reference problem and AI assignment concerned: design of a structural component made out of Aluminium for an aerospace application, with certain mechanical constraints. In particular: Suggest a suitable Alloy, including a processing route, possible challenges in production and suitable alternative materials. The impact of AI tools in teaching of mechanical engineering is discussed based on these results.

A brief overview of AI and Machine Learning (ML) in material selection is given. Results mainly from ChatGPT and Microsoft Copilot are analyzed and show that the responses from both platforms are mainly correct and very useful. The assignment results are summarized, and selected examples highlight the importance of understanding the Aluminium manufacturing process, even if AI is used. Results from a survey conducted in a similar assignment show that this hybrid approach to AI is appreciated.

## Effective approach for teaching materials corrosion fundamentals with well engaged students learning experience

Mengyan Nie

*Institute for Materials Discovery, University College London (UCL)*

Awareness and understanding of corrosion fundamentals become more and more crucial for next generation of materials scientists and engineers who are involved with any materials selection, design and discovery in any industrial sector of energy, transportation, healthcare and communication construction. This talk is to address how to effectively deliver materials corrosion concepts as well as how to use AI-assisted peer-assessment tool to encourage students' engagement with lab report preparation for further consolidation of their understanding of corrosion concepts.

Corrosion concepts were often delivered for general material science and engineering students in limited teaching hours by different approaches: 1) Lectures covering corrosion theories with some relevant case studies; 2) Demonstration of galvanic corrosion by characterizing electrochemical cells with pure metals through lab practices; or 3) combination of both lectures and demonstrations. In the past years, we redesigned corrosion lab practices by introducing corrosion product indicators in the simulated seawater solution to selectively visualize cathodic and anodic reactions, which significantly help students understand the corrosion concepts by correctly identifications of anodic and cathodic reactions. Furthermore, introducing AI-assisted feedback tools for lab reports not only further consolidated students' understanding of corrosion concepts with a 10 marks increase of the average mark for the same assessment, but also helped students develop transferable skills in constructive feedback and peer assessment. The AI assisted feedback tool also significantly improved the engagement with corrosion lab practices and lab report preparations.



## Section 4: Poster Overview and Abstracts

## Poster Overview

#	Poster Presenter, Affiliation, and Title
1	<b>Danchen Zhang*</b> , <b>Cedric Heyen</b> , and <b>Thomas Gries</b> , RWTH Aachen University <i>Bridging the Gap Between Niche Technology and Research Recruitment: The Evolution of a Soft Robotics Gripper</i>
2	<b>Anett Papp*<sup>1</sup></b> and <b>Dóra Márfoldi<sup>2</sup></b> , <sup>1</sup> Széchenyi István University and <sup>2</sup> Szimbio Lab <i>BioCraftsmanship – A Holistic Pedagogical Framework for Biodesign and Ecological Literacy</i>
3	<b>Dipankar Choudhury<sup>1</sup></b> , <b>Andrew Gryguć<sup>2</sup></b> , and <b>Rajesh Bhaskaran<sup>3</sup></b> <sup>1</sup> Ansys part of Synopsys, <sup>2</sup> University of Waterloo, <sup>3</sup> Cornell University <i>Teaching Core Concepts and Problem Solving in Engineering through Integrated Virtual Laboratory Exercises</i>
4	<b>Sahil Parag Sura</b> and <b>Kaitlin Tyler*</b> , Synosys Academic and Research Alliances (SARA) Program <i>Standard Tests, New Tools: Teaching Tensile Testing with PyMAPDL-Generated Synthetic Data</i>
5	<b>Hannes Geist<sup>1</sup>*</b> , <b>Nicolas Martin<sup>2</sup></b> , and <b>Frank Belle<sup>1</sup></b> , <sup>1</sup> University of Freiburg and <sup>2</sup> Synosys Academic and Research Alliances (SARA) Program <i>Transforming eco-audit tool methodology for circularity and sustainability in engineering design</i>
6	<b>Patricia Munoz-Escalona*</b> and <b>Sepideh Aliasgharia</b> , The University of Manchester <i>Advancing Learning Through Research-Integrated Education in Materials Science</i>
7	<b>Julian Dean<sup>1</sup>*</b> and <b>Dan A. Allwood<sup>1,2</sup></b> , <sup>1</sup> University of Sheffield, <sup>2</sup> FlashyScience <i>FlashyScience - an innovative web-based virtual laboratory for educators in physics</i>
8	<b>Javier Orozco-Messana<sup>1</sup>*</b> and <b>Ronan Daly<sup>2</sup></b> , <sup>1</sup> Universitat Politècnica de Valencia, <sup>2</sup> University of Cambridge <i>Inkjet-Printed Functional Ceramics for sustainability</i>
9	<b>Flavia Papile*</b> and <b>Barbara Del Curto</b> , Politecnico di Milano <i>Materials Selection for Fashion Designers: a preliminary mock-up tool</i>
10	<b>Yinglu Tang</b> , TU Delft <i>Instilling a materials science way of thinking into future aerospace engineers</i>
11	<b>Hudair Samad</b> and <b>Kathryn Jackson*</b> , AMRC University of Sheffield <i>Escaping the Lecture Hall: Enhancing Calculus Engagement in Engineering Education through Gamified Narrative</i>
12	<b>Tamman Kaid</b> and <b>James Ren</b> , Liverpool John Moores University <i>Integrated Approach for Developing Data of Complex Porous Structures at Different Scales for Interdisciplinary Teaching and Training</i>
13	<b>Sergejs Gaidukovs</b> , Riga Technical University <i>Start-up and Innovation curricula as a part of Materiscience program</i>
14	<b>Gerda Gaidukova</b> , Riga Technical University <i>"Outcomes on teaching "Development of Innovative Products and Entrepreneurship" Course for Chemistry and Materials science students</i>
15	<b>Ehsan Ghassemali</b> , Jönköping University <i>Next-generation Minds Exploring Technology in Metals (NetxtMetals)</i>
16	<b>Wahidullah Azizi</b> , Royal Academy of Engineering <i>How Engineering Capacity Improves Safety: Insights from the Global Engineering Capability Review - Second Edition</i>
17	<b>Di Wu<sup>1</sup>*</b> and <b>Shahin Vassighn<sup>2</sup></b> , <sup>1</sup> New York Institute of Technology, <sup>2</sup> Florida International University <i>Material Atlas -Knowledge sharing platform for sustainable coastal construction</i>

## Poster Abstracts

1

### Bridging the Gap Between Niche Technology and Research Recruitment: The Evolution of a Soft Robotics Gripper

Danchen Zhang\*, Cedric Heyen, and Thomas Gries  
*Institut für Textiltechnik of RWTH Aachen University*

Introducing advanced niche topics like 4D textiles and soft robotics in a standard curriculum often fails to capture student engagement due to the abstract nature of the technology. This visibility gap creates a significant bottleneck for recruiting young talent into specialized research fields. To address this, we developed an interdisciplinary Summer School format that acts as both an educational platform and a strategic recruiting pipeline. The core philosophy shifts from pure solution finding to active problem framing. By integrating perspectives from design, 3D printing, and economic feasibility, students learn to identify where niche technologies offer genuine added value. A prime example of this success is the Soft Robotics Gripper project initiated during the 2025 Summer School. Tasked with utilizing complex multi material setups, a small cohort of students engaged in a rigorous trial and error prototyping process. They navigated the specific behaviors of stimuli responsive materials to build a functional gripper prototype. Crucially, the impact did not end with the final presentation. The project provided a seamless transition from education to high level research. The gripper concept was adopted by the Institut für Textiltechnik (ITA) and is currently undergoing further development to include sensor integration for smart industrial applications. This evolution from a student prototype to a sensor integrated research focus validates the Summer School model. It demonstrates that offering students hands on ownership of complex problems effectively bridges the gap between classroom theory and future research careers.

2

### BioCraftsmanship – A Holistic Pedagogical Framework for Biodesign and Ecological Literacy

Anett Papp\*<sup>1</sup> and Dóra Máröldi<sup>2</sup>  
*<sup>1</sup>Széchenyi István University and <sup>2</sup>Szimbio Lab*

As we navigate the complexities of the Anthropocene, the designer's role shifts from controlling inert matter to facilitating living systems. Design education lacks a consistent methodological framework that integrates ecological literacy and biological material agency, resulting in a gap between technical competence and ecological ethics. This study introduces "BioCraftsmanship," a novel pedagogical framework that reclaims the embodied knowledge of craft to mediate the relationship between humans and living organisms. Unlike standardized models, BioCraftsmanship fosters ecological literacy through a "making-with" approach, positioning biological growth as a co-creation process rather than a raw resource. Using a practice-led research methodology, we laid down the foundations of the BioCraftsmanship model based on the "Hand-Head-Heart" framework. This approach integrates the hand as manual engagement and sensory exploration of bio-based materials; the head as systems thinking and cognitive mapping of metabolic life cycles, biological systems, and circular economy principles; and the heart as an ethical commitment to multispecies care and material agency. The model was tested through an original case study including sensory games, technical tasks, and speculative design exercises. Qualitative analysis of participants' reflections and material outcomes revealed that the BioCraftsmanship approach successfully shifted learners' perspective from vertical material "control" to horizontal "collaboration." Participants demonstrated increased awareness and an enhanced understanding of "metabolic time", the slow, unpredictable growth cycles of organisms, which is essential for co-creating with such materials. The results suggest that low-tech, multisensory experimentation effectively internalizes abstract sustainability concepts into professional values, fostering a deep recognition of material agency. BioCraftsmanship offers a scalable pedagogical framework for multidisciplinary materials education that bridges biology, materials design, traditional making, and ethics. Positioning the designer as a facilitator rather than a master, it provides a tangible method to teach responsibility, material agency, and humility in the Anthropocene. This model has broader applicability in design education, equipping future designers with the transdisciplinary skills needed to transition to a regenerative economy..

## Teaching Core Concepts and Problem Solving in Engineering through Integrated Virtual Laboratory Exercises.

Dipankar Choudhury<sup>1</sup>, Andrew Gryguć<sup>2</sup>, and Rajesh Bhaskaran<sup>3</sup>

<sup>1</sup>Ansys part of Synopsys, <sup>2</sup>University of Waterloo, <sup>3</sup>Cornell University

Industry-standard simulation tools provide an important platform for bringing industry knowledge and applications into engineering education, connecting naturally and in a meaningful manner with conventional theoretical material. In addition, a simulation-integrated framework prompts students to interrogate systems directly, complementing traditional laboratory environments, which often encourage passive data collection, where students follow prescribed steps and trust the apparatus to produce the “correct” result. By varying material selections, exploring extreme or non-ideal boundary conditions, and visualizing quantities that cannot easily be measured, students gain deeper insights and are more involved in the learning process. This problem-based learning approach in the classroom, utilizing engineering simulation tools, has been adopted by two major universities that have collaborated with a leading engineering simulation company to develop methodologies and industry-relevant learning modules that are used in the undergraduate curriculum at these universities. The software tools provide a platform to bring industry knowledge into the curriculum and are used to illustrate, augment, and apply theoretical knowledge gained in the classroom.

Here, examples are provided on how the exploratory environments of the simulation tools enable insights into complex physical behavior and build confidence through inquiry-driven experimentation. Data from a large cohort of participants across mechanical, mechatronics, civil, biomedical, and systems design programs show consistent increases in self-reported confidence, curiosity, and conceptual clarity after only a few short workshops. In design courses, these same models naturally evolve into open-ended design challenges. Examples are also provided on how the problem-solving approach based on virtual laboratories can be augmented by learning modules that are available for free on the simulation company's website. The modules use problem-based learning with a uniform high-level structure ending with verification and validation, where learners check their results by connecting with the underlying theory.

## Standard Tests, New Tools: Teaching Tensile Testing with PyMAPDL-Generated Synthetic Data

Sahil Parag Sura and Kaitlin Tyler\*

*Synopsys Academic and Research Alliances (SARA) Program*

ASTM E8 tensile test is fundamental to material sciences, but physical demonstrations lack to visualize internal stresses while numerical simulation though being an excellent option, would typically exceed the lecture duration. This Phase 1 introduces a machine learning surrogate trained on PyMAPDL-generated synthetic datasets. Drastically reducing the computational time from hours to few seconds. This serves a novel method which is backed with finite element based numerically generated data to explore the response for E8 tensile test for various materials.

PLANE182 dogbone simulations generate engineering stress-strain curves plus 100-step displacement/Von Mises contour sequences for engineering alloys, exploring bilinear isotropic hardening to 20% post-yield—the preface to full plastic behaviour analysis. KernelRidge regression predicts complete tensile curves from Young's modulus, Poisson's ratio, yield stress, and optional plastic tangent modulus (uses provided value, or safe 2% E default). Image compression reconstructs visualization frames matching PyMAPDL fidelity. Titanium Grade 2 validation shows 0.2% error (ML: 346.0 MPa vs PyMAPDL: 345.4 MPa). The pipeline delivers publication-ready outputs—CSV data, stress-strain plots, frame sequences—matching PyMAPDL fidelity with rapid speedup.

This teaching tool enables real-time materials exploration, replacing lengthy simulations with instant synthetic ASTM E8 results. Phase 1 validates metals to 20% post-yield; subsequent phases target full nonlinear plasticity, strain hardening, necking, and ASTM D638 polymer testing.

## Transforming eco-audit tool methodology for circularity and sustainability in engineering design

Hannes Geist<sup>1\*</sup>, Nicolas Martin<sup>2</sup>, & Frank Balle<sup>1</sup>

<sup>1</sup>University of Freiburg and <sup>2</sup>Synosys Academic and Research Alliances (SARA) Program

The eco audit method, developed by Prof. Michael F. Ashby more than 15 years ago, is timelessly popular in education and industry. It allows its users to assess the life cycle consequences of material selection options on climate change, energy usage, and costs. These simple and intuitive assessments can be performed by engineers rapidly and iteratively, providing decision-support for eco-informed material choice.

In a collaborative research project of ANSYS and the Department of Sustainable Systems Engineering (INATECH) at the University of Freiburg, the audit tool methodology is currently further developed for circularity and sustainability. The further development focuses in two key directions:

1. Going beyond linear life cycle thinking: Predicting the consequences of different material options over multiple use and life cycles, connected by processes like remanufacturing, refurbishment, repair, upgrading, or closed-loop recycling. That way circular design as a key task of circularity engineering is supported.

2. Going beyond eco and cost impacts: Circular design is a means towards the ends of sustainability, resilience, better quality and competitiveness. Based on one streamlined life cycle inventory (LCI), the future audit tool methodology will allow to assess implications of design choices in multi-cyclic systems on the environment, economic competitiveness, social sustainability risks, circularity performance, criticality, legal compliance and risks of rebound effects.

On the poster, intermediate results of the further development will be presented. The goal is to collect feedback from educators who visit the poster on which of the many sustainability and circularity aspects addressed by the proposed future audit tool methodology would be interesting for their teaching activities.

## Advancing Learning Through Research-Integrated Education in Materials Science

Patricia Munoz-Escalona\* and Sepideh Aliasgharia

*The University of Manchester*

Preparing the next generation of materials engineers requires educational approaches that effectively connect theoretical understanding with practical, research-driven experience. This contribution presents a teaching and learning framework that integrates real-world research themes, such as hydrogen-material interactions and the performance of diamond-like carbon (DLC) coatings, into undergraduate and postgraduate materials science curricula. By embedding authentic research case studies into coursework, laboratory modules, and project-based learning, students gain a deeper appreciation of the relationships between structure, processing, and performance in functional materials. The approach combines experimental analysis techniques (e.g., SEM, XRD, EBSD, and nanoindentation) with data interpretation exercises and sustainability discussions, promoting both technical and critical-thinking skills. These skills are part of the skills for adaptation highlighted in the World Economic Forum's (WEF) Education 4.0 Framework, which have been defined as essential characteristics of a high-quality learning. Preliminary feedback indicates that students show greater engagement and improved conceptual understanding when exposed to contemporary research contexts. This model demonstrates how research-informed teaching can enhance materials education, foster curiosity, and better prepare students for the emerging challenges of hydrogen and advanced energy technologies.

## FlashyScience - an innovative web-based virtual laboratory for educators in physics.

Julian Dean<sup>\*1</sup> and Dan A. Allwood<sup>1,2</sup>  
<sup>1</sup>University of Sheffield and <sup>2</sup>FlashyScience

We show an innovative web-based virtual laboratory platform designed to enhance science education in physics, engineering, and materials science. Originally developed by academics at the University of Sheffield, it enables students to conduct realistic laboratory experiments through a browser interface, simulating instruments, measurement techniques, and experimental procedures. By allowing learners to manipulate variables, collect and analyse data, and repeat experiments, the virtual experiments foster critical thinking, problem-solving, and a deeper understanding of scientific principles and has proved very popular with both staff and students. While FlashyScience focuses on secondary school (GCSE, A-level) it also covers introductory university levels. We have designed it to align closely with curriculum requirements and provide comprehensive supporting materials, including instructional guides, background theory, and worksheets. These resources support both independent study and structured classroom instruction, ensuring accessibility and pedagogical effectiveness. The platform is particularly valuable in contexts where physical laboratory access is limited, such as remote learning environments or large-class teaching scenarios, reducing logistical and financial barriers while maintaining high-quality practical science experiences. Beyond accessibility, virtual experiential learning can work extremely well by incorporating realistic measurement variability and experimental uncertainties. We have seen this to encourage students to interpret and evaluate data critically, promoting a deeper engagement with the scientific method rather than a focus solely on obtaining correct results. By integrating technology, pedagogy, and curriculum objectives, virtual experiments provide a scalable and flexible approach for modern science education, supporting skill development, inquiry-based learning, and active student engagement. Overall, we show how virtual laboratories can complement traditional teaching methods, bridging gaps in resources and providing an inclusive platform for students of all abilities and backgrounds by developing essential scientific competencies in a safe environment. Combining realistic simulations with curricular relevance, and pedagogical support makes it a practical and innovative tool for educators seeking to enhance hands-on learning in contemporary STEM education.

## Inkjet-Printed Functional Ceramics for sustainability

Javier Orozco-Messana<sup>1\*</sup> and Ronan Daly<sup>2</sup>  
<sup>1</sup>Universitat Politècnica de Valencia and <sup>2</sup>Ifm, University of Cambridge

Preparing engineering students for emerging sustainable technologies requires hands-on experience with multidisciplinary systems that integrate materials science, energy conversion, and printed electronics. Functional ceramic platforms for energy generation and storage offer a rich educational context aligned with the needs of smart cities and IoT deployment.

Under faculty supervision, students engaged in the design and fabrication of a dual-function energy tile combining a Cu<sub>2</sub>O/ZnO solar cell with a Ni(OH)<sub>2</sub>-rGO-PPy supercapacitor. Key learning objectives included:

- mastering electroless metallic coating of non-conductive ceramics;
- applying inkjet printing techniques to functional materials;
- utilizing the tile's internal porosity for embedded energy storage; and
- performing electrochemical and photovoltaic characterization.

Students implemented an optimized transparent conductive layer, infiltrated graphene-based supercapacitor materials into the porous substrate, and electrodeposited a p-n oxide heterojunction.

Through experimental analysis, students observed:

- Good conductivity and strong adhesion on transparent layer ( $10^6 \pm 2.2 \mu\Omega \cdot \text{cm}$ ; 7.2 MPa)
- >30× improvement in areal capacitance with hybrid electrodes ( $1.05 \rightarrow 32.77 \text{ mF/cm}^2$ )
- cycling performance gains up to  $16.68 \text{ mF/cm}^2$  at 200 cycles
- solar cell operation with JSC  $\approx 317 \mu\text{A/cm}^2$  and VOC  $\approx 240 \text{ mV}$

These results required interpretation of SEM, XRD, and CV characterization techniques and demonstrated successful system-level integration.

Students gained applied competence in functional ceramic processing, renewable-energy device fabrication, and data-driven evaluation of performance. The project illustrates how problem-based research experiences can simultaneously advance technological innovation and workforce readiness for sustainable, energy-autonomous building materials.

## Materials Selection for Fashion Designers: a preliminary mock-up tool.

Flavia Papile\* and Barbara Del Curto  
*Politecnico di Milano*

The fashion industry is currently facing the need for a profound transformation of its production systems, particularly regarding textile materials and their phases of production, use, and end-of-life (Ellen MacArthur Foundation, 2017; Textile Exchange, 2023). Material selection represents a critical step in this transition, as it directly influences environmental impacts and the implementation of ecodesign strategies (Gwilt, 2014; Clark, 2008; UNEP, 2023). However, in fashion design practice, fabric selection is still largely guided by experiential evaluation of physical samples, making it difficult to establish standardized procedures. As a result, manufacturers typically provide heterogeneous and non-standardized datasheets, which limit transparency and comparability across materials (Niinimäki & Hassi, 2011; Papile & Del Curto, 2025; European Parliamentary Research Service, 2024; Zhang, 2024). To support a sustainable transition within the fashion sector, designers must develop a more systemic understanding of fabric materials, integrating technical properties, environmental parameters, and design requirements. While such decision-support approaches are well established in other industrial sectors (Ashby, 2017), they remain underdeveloped in fashion design, where structured tools for material selection are still lacking (Fletcher & Tham, 2019; IPCC, 2023). This contribution proposes the development of a preliminary mock-up tool aimed at facilitating material selection for fashion design practitioners. The tool seeks to create a coherent interface that links material properties, ecodesign strategies, and the specific needs of fashion design practice. By providing an organized and comparable set of information, it aims to support more informed decision-making processes and foster design practices that are both sustainability-oriented and better aligned with emerging industry standards.

## Instilling a materials science way of thinking into future aerospace engineers

Yinglu Tang  
*TU Delft*

How important is material science to future aerospace engineers? As a material scientist and teacher, I have found challenges in teaching materials science in an aerospace engineering faculty at Delft University of Technology. It is desired that our future graduates would be able to ask the right questions about materials to their fellow materials engineer colleagues in a multi-disciplinary work place. How do we design our curriculum and syllabus such that students are well equipped for that? This talk is about my experience of teaching materials for aerospace and space applications as well as integrating lab work to at master level. The integration of materials science teaching into manufacturing and structural modelling is explored in the department of aerospace structures and materials. The question of assessing whether a materials ways of thinking has been developed in the students' framework is also discussed.

## Escaping the Lecture Hall: Enhancing Calculus Engagement in Engineering Education through Gamified Narrative

Hudair Samad and Kathryn Jackson\*  
University of Sheffield AMRC

Traditional calculus instruction often struggles to engage engineering students, creating a disconnect between abstract concepts and application. This study investigates Educational Escape Rooms (EERs) as a pedagogical intervention, underpinned by social constructivism and flow theory, to transform passive learning into an immersive experience.

Twenty-eight first-year engineering undergraduates at the AMRC Training Centre (Sheffield, UK) participated in a "rogue AI" themed activity. Working in randomised teams, students solved sequential, scaffolded tasks requiring the application of kinematic principles, differentiation, and integration. A mixed-methods design assessed the experience via post-activity surveys and correlation matrices.

The intervention yielded highly positive outcomes, with Motivation and Competition receiving the highest mean ratings ( $M=8.29/10$ ). Analysis revealed a strong synergistic cluster between motivation, competition, and enjoyment ( $r > 0.77$ ). Furthermore, structural scaffolding strongly correlated with problem-solving ( $r=0.82$ ), suggesting the activity successfully supported cognitive development alongside affective engagement.

This study demonstrates that gamified EERs effectively bridge the gap between engagement and cognitive rigour. By leveraging narrative and competition, the model reduces mathematics anxiety and offers a scalable, high-impact framework for wider STEM education.

<https://www.youtube.com/watch?v=zCa67SRDyhA>

## Integrated Approach for Developing Data of Complex Porous Structures at Different Scales for Interdisciplinary Teaching and Training

Tamman Kaid and James Ren  
Liverpool John Moores University

Porous structures at different scales are a complex issue relevant to different disciplines from materials, chemistry to manufacturing. Porosity is the main feature for low density materials for cushioning, energy absorption, thermal or sound absorptions. Many secondary particles and precipitation in complex alloys also exhibit porous features. Porosity is also a common defect in many manufacturing process. Increasingly processes such as additive manufacturing are utilised to produce porous structures with targeted properties and some advanced technologies such as ice-templating are used to produce hierarchical porous structures at different scales. In all cases the key features of the porous structures could direct affect the local or overall properties and performances of the materials concerned. This is a challenging topic for engineering teaching and learning and materials focused projects.

In this work, we explored the development of a data-led modelling framework integrating image and feature analysis, predictive simulation and machine learning system to analyse the link between porous structures to the properties. Typical cases are analysed focusing on effects of pore shapes and distributions on the mechanical, physical properties and functional properties.

A joint study has been conducted through structured interdisciplinary teamwork and knowledge integration for feature analysis, model design and analysis. The team consists of academics and PhD students from different disciplines (Materials & Manufacturing, Chemistry, Computer/Data science, Education). Analysis of the approach through case studies and reviews showed that the integrated approach provides a comprehensive yet flexible system for users from different backgrounds. The efficiency of such an approach in fostering teamwork, data competence and problem-solving capacity in materials at various levels is analysed. The key factor and critical issues of using such an approach in education and training are also systematically analysed. The effects of integration of data from different disciplines (Materials, Chemistry and Computing) on T/L is analysed.

## Start-up and Innovation curricula as a part of Materiscience program

Sergejs Gaidukovs  
*Riga Technical University*

I would like to discuss the updated RTU Materials Science Master's programme, which aims to prepare forward-thinking, highly qualified specialists and leaders in materials science and high-value-added technologies, including nanotechnology, while providing a solid foundation for doctoral studies. The programme includes an 18-ECTS traineeship that brings together students from different fields to jointly develop a large-scale design and research project, strengthening academic research activities and giving students hands-on experience in long-term interdisciplinary collaboration. During the traineeship, students assess real R&D solutions developed in university laboratories, participate in accelerators, and meet venture capitalists and business angels to evaluate the potential of their ideas for start-up creation. Their journey throughout this process will be presented considering students feedback.

## Outcomes on teaching “Development of Innovative Products and Entrepreneurship” Course for Chemistry and Materials science students

Gerda Gaidukova  
*Riga Technical University*

Here, the outcome of the 5-year teaching of the “Development of Innovative Products and Entrepreneurship” course at RTU is presented. SDD701 aims to provide students with in-depth knowledge of new product development, technology transfer, entrepreneurship, and the commercialization of research results, while strengthening their ability to apply this knowledge in practice, whether launching a business, creating a company, or leading a team. Building on five years of teaching experience, the course has evolved into a dynamic, practice-oriented environment where students evaluate real R&D outcomes from university laboratories, transform them into product concepts, and assess their feasibility for market entry. Within the 18 ECTS training framework, students develop key skills such as identifying customer needs and translating them into product features, applying creative methods, analysing production processes, preparing product specifications for economic assessments, and interpreting technical and economic indicators. They also learn to plan and organise investment-attraction activities, prepare investment plans, structure and evaluate information, and present their ideas effectively. Participation in innovation accelerators, industry-led workshops, and meetings with venture capitalists and business angels provides direct exposure to the start-up ecosystem, empowering students to turn scientific ideas into viable business opportunities and preparing them for leadership in high-tech entrepreneurship.

## Next-generation Minds Exploring Technology in Metals (NetxtMetals)

Ehsan Ghassemali  
Jönköping University

Materials and manufacturing industry plays a vital role in the economy, especially in Sweden, where it contributes ~20% to the GDP. Nonetheless, it is a major emitter of greenhouse gases, accounting for ~23% of CO<sub>2</sub> emissions in the US and 880 million tonnes of CO<sub>2</sub> equivalents annually in Europe. Metallic materials are among the major contributors to these figures. Achieving a Net-Zero society requires cutting emissions from material and manufacturing, demanding not only technological advancements but also a new generation of skilled professionals. Today, the metal industry faces a talent crisis, with EU surveys showing that 74% of SMEs struggle with skills shortages. Swedish universities are also seeing a steady decline in students choosing metal-related majors. Despite strong university-industry collaborations in Sweden, attracting young talent remains a challenge. NextMetals, as a collaborative effort between academia, industry, local schools, science centres, and industry associations, aims to tackle this by sparking interest in metals among pre-university students via school-integrated activities, science centres, and community outreach. Challenges like gender equality are the core of our development actions. Inspired by national and international initiatives (e.g., the Järnkoll student campaign and DiscoverMaterials in the UK), the project is a pilot in Jönköping province, a key Swedish metal hub, and will expand nationally through partners such as the Swedish Foundry Association. Tangible actions include training teachers at local schools and science centres on the topic of metals, preparing the “NextMetals box” containing metallic tools and toys for educational purposes, and preparing portable materials for education in schools and science centres. Additionally, this initiative involves public seminars and activities for children and their families. We aim to enhance the societal appeal of the metal sector, laying the groundwork for a sustainable, Net-Zero society.

## How Engineering Capacity Improves Safety: Insights from the Global Engineering Capability Review Second Edition

Wahidullah Azizi  
Royal Academy of Engineering

*Background and motivation:* Countries and organisations must allocate limited resources to maximise safety, sustainability, and economic development, yet these decisions are often hindered by insufficient evidence on the strength of national engineering systems. The Global Engineering Capability Review (GECR) 2025 – Second Edition addresses this challenge by offering a globally comparable evidence base. It introduces diagnostic tools and benchmarks that help stakeholders identify engineering capacity and capability gaps, enabling more strategic and informed investments. The review also provides capacity-gap analyses for 39 countries and thematic spotlights, including AI and mining, that illustrate approaches to building and sustaining engineering capacity.

*Methodology:* The GECR 2025 applies a systems-based approach and introduces the Engineering Capacity Index (ECI) 2025, which integrates 76 indicators across ten capacity areas and three stakeholder groups: professional engineers, government, and the engineering industry. Global and regional benchmarks support comparative capacity-gap analysis. To assess engineering capability (outputs and outcomes), the review introduces the Safety and Quality Index (SQI). The Engineering Capability Matrix highlights where capacity inputs fall short and where targeted investment is required to strengthen safer engineering practice.

*Results:* There is a correlation between increased engineering capacity and national safety. Of the 115 geographies evaluated, twelve scored ‘advanced’, while 44 ranked ‘high’ or ‘adequate’, indicating moderate risk. The remaining 59, many low- and middle-income countries, fell into ‘low’ or ‘inadequate’ categories, highlighting elevated risks to life, property, and the environment. The findings emphasise an urgent need for strengthened engineering capacity to reduce harm and promote safer and more sustainable development.

*Conclusions:* The GECR 2025 presents a practical diagnostic tool for policymakers, educators, industry, and professional bodies to diagnose areas in most need for investment into capacity-building. Its systems-based, evidence-driven approach provides a pathway toward safer and more sustainable engineering outcomes. Explore the ECI 2025 Interactive Dashboard.

## Material Atlas: Knowledge sharing platform for sustainable coastal construction

Di Wu<sup>1\*</sup> and Shahin Vassighn<sup>2</sup>

<sup>1</sup>New York Institute of Technology, <sup>2</sup>Florida International University

The escalating impacts of climate change and sea level rise are heightening the imperative for effective coastal resilience strategies. While traditional approaches to reliance have focused on coastal hardening, such as seawalls and bulkheads, there is a growing interest in advocating for softer strategies. These include not only nature-based solutions like mangrove plantations and living shorelines but also developing innovative materials such as concrete mixes that have a much lower carbon footprint. However, despite these advancements in materials and methodologies, the intricate issues confronting coastal areas compel a multidisciplinary approach to effective problem-solving. It requires the integration of expertise from social and natural sciences, engineering, and design which is frequently hindered by siloed knowledge areas entrenched in various academic and professional disciplines. This paper introduces an ongoing project, “Materials Atlas”, a knowledge-sharing platform aimed at fostering interdisciplinary communication and innovation for sustainable and resilient construction along the coastlines. Utilizing natural language processing algorithms such as applying API from GPT to LangChain, the platform extracts material formulae and properties from existing research papers and patents. This data is then organized and categorized through supervised machine learning and classification techniques. To enhance the user experience and data visualization, a visual graph database maps out relationships between various materials and their potential applications in coastal construction to form a visual knowledge graph. The Materials Atlas serves as more than a repository of data; it invites researchers to contribute their datasets, making it a dynamic, living resource. While the focus remains on advancing the understanding of traditional and novel cementitious materials, the platform also serves as a gateway to explore bioactive materials and hybrid solutions. It aims to breakdown interdisciplinary barriers and serve as a nexus for researchers and practitioners. The following paper delineates the methodology employed for the development of the Atlas, its various components and stages. The ultimate objective of this endeavor is to expedite the formulation of comprehensive, effective, and sustainable coastal resilience strategies. This is achieved by synthesizing insights from multiple disciplines including science, engineering, and design, thereby offering a multidimensional approach to address the challenges associated with coastal regions.



## Section 5: Maps, Contact Details, and Venue Information

## / Key Event Locations

Location	Address
<b>Symposium Venue and Accommodations</b>	<b>Clare College Gillespie Conference Centre</b> Memorial Court, Queens' Rd, Cambridge CB3 9AJ, UK
<b>Presenters' Dinner Location Invitation only!</b>	<b>St. John's College</b> St. John's Street, Cambridge CB2 TP1
<b>Symposium Dinner Location</b>	<b>Clare College</b> Trinity Ln, Cambridge CB2 1TL
<b>Workshop Location</b>	<b>Dyson Building, Department of Engineering</b> Trumpington Street, Cambridge CB2 1PZ

## / WiFi Access

To access WiFi while on the University of Cambridge campus, you can a log-in here:

<https://help.uis.cam.ac.uk/service/wi-fi/connect-uniofcam-guest>

## / Event Location Details

### Symposium Venue and Accommodations

The Symposium will be held at **The Clare College Gillespie Conference Centre** in the University of Cambridge.

#### Directions:

- *From the rail station:* Cambridge rail station is about 1.5 miles from the College—a 10-minute taxi-ride, although it may take longer at peak periods (ask for “Memorial Court, Clare College”). For bus connections, take a bus to the city center.
- *From the bus station:* Cambridge bus station is about a 15-minute walk, or 5-minute taxi-ride (ask for “Memorial Court, Clare College”) in clear traffic from Clare College.
- On arrival, report to the Porters' Lodge at the Memorial Court.

### Workshop Venues

The workshops on Wednesday, April 3rd will be at the Department of Engineering in the Dyson Building.

### Presenters' Dinner

The presenters' dinner will be hosted at St. John's College. Invitation only!

- Pre-dinner drinks will start at 7
- Dinner will be served in the Dining Hall

### Symposium Dinner

The symposium dinner will be hosted at Clare College

- Pre-dinner drinks will start at 7
- Dinner will be served in the Dining Hall



## Section 6: Workshop Details

## Teaching materials & sustainable development with Ansys Granta EduPack

Instructors: Kaitlin Tyler and Nicolas Martin

From space shuttles to hip implants to toothbrushes, every physical product is made from materials. Engineering and design students need to understand how materials compare to one another and how best to choose the right material for the application.

Ansys Granta EduPack™ is a teaching software for materials education. Designed to enhance student learning, Granta EduPack includes a database of materials and process information, materials selection tools and a range of supporting resources.

In this workshop, during the first part attendees will learn the basic functions of Granta EduPack, explore materials selection via the Ashby Selection Methodology. During the second part, we will cover how to support students in being decision-makers with a holistic view on sustainability. The foundation of this part is Ashby's 5-Step Methodology for Sustainability Assessment, a well-established active-learning approach to introducing sustainable thinking in the classroom.

### Software Access and Previous Experience:

Access to Granta EduPack will be provided in the workshop- no need to bring a personal computer. No previous experience with Granta EduPack is required for part 1, Previous experience with Granta EduPack is recommended for part 2.

### Workshop Learning Objectives:

By the end of this workshop, participants will be able to:

- » Perform the basic functions of Granta EduPack
- » Understand how the Ashby Selection Methodology can be implemented in Granta EduPack
- » Gain knowledge and understanding of Sustainability Assessment 5-step Method (Ashby 2016)
- » Gain knowledge and understanding of Social Impact Audit Tool with its streamlined analytics of potential social impact in product-related decisions
- » Know How to spark discussion on social sustainability with students by exploring different scenarios and analyzing social hotspots' heatmap
- » Learn about experience from instructors and students from higher education establishments around the world on the use of the SIAT

### Proposed Agenda: (Full day workshop)

Time	Activity
9:00-9:15am	Arrival, Check-in, Coffee & Tea
9:15-10:15am	Workshop Part 1: Introduction to Granta EduPack and Basic Granta EduPack Functions: Browse, Search, Chart/Select, and Eco Audit
10:15-10:30am	Coffee Break
10:30am-12:00pm	Basic Materials Selection
12:00-1:00pm	Lunch
1:00-1:30pm	Introduction to sustainable development for design and materials engineering
1:30-2:00pm	Introduction of Case study and hands-on Part 1
2:00-2:30pm	Case study hands-on part 2
2:30-3:00pm	Coffee Break
3:00-3:30pm	Introduction to Social Audit and SIAT Tool
3:30-4:15pm	Case study hands-on part 3
4:15-4:45pm	Group discussion & Final Remarks

### Reference Materials:

[\*Materials Selection White Paper | Ansys\*](#)

[\*Material Property Charts in Ansys Granta EduPack\*](#)

[\*Paper: Social Life-Cycle Assessment and Social Impact Audit Tool | Ansys\*](#)

[\*Materials and Sustainable Development | ScienceDirect\*](#)



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## Schedule

### Pre-Symposium Workshop:

Wednesday, July 29<sup>th</sup>

### Symposium:

Thursday, July 30<sup>th</sup> to  
Friday, July 31<sup>st</sup>

### Session Themes

- Materials and Sustainability
- AI and Machine Learning in Materials Education
- Student Engagement and Materials Curriculum Development

## Abstract Submission & Early Bird Registration OPEN NOW!

Abstracts submission for talks close April 15<sup>th</sup>!



Learn more @ [www.materialseducation.com](http://www.materialseducation.com)