

Advance HE STEM Conference 2020

STEM graduates for a world of change

29-30 January 2020
theStudio, Manchester, UK

Session abstracts

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Day 1, 29 January 2020

Session 1, 10:50-11:30

Session 1.1: Listening for sustainability: Creating conversations for change

Professor Zoe Robinson, Keele University

Proposition 1

Workshop, Build

This workshop will practically explore developing listening skills for a more sustainable world. The workshop is based on a HEFCE-funded project which aimed to shift the emphasis of communication skills training to what we can learn through improved communication, listening, and respect for others with views different to our own. A more sustainable society requires us to listen to different, and frequently unheard voices, and to work in partnership with different parties, hence developing attributes of respectful, two-way communication is key to achieving the UN's Sustainable Development Goals. I promise no PowerPoint, just talking, reflecting, and above all, listening.

Session 1.2: Enquiry-based Education for Sustainable Development as the pedagogical framework for employability teaching in first year Geography curricula

Dr Dawn Theresa Nicholson and Ms Valeria Vargas, Manchester Metropolitan University

Proposition 2

Workshop, Work

This workshop will explore challenges and benefits associated with effective development of employability among first year geographers, through the integration of enquiry-based learning with Education for Sustainable Development. Recommendations from an in-depth evaluation will address particular challenges with first year learners, managing the benefits of EBL, and the potential for capacity-building.

Session 1.3: STEM graduates: A world of change in the age of fake news

Dr Frank Witte, University College London

Proposition 3

Interactive, Win

STEM graduates increasingly face a world in which the authority of institutions is in decline, where people fundamentally doubt, or even place suspicion on, 'experts' of all kinds. What does this mean for how they should be educated? And how well prepared are we, their educators, ourselves?

Session 1.4: How to promote Medical Parasitology teaching in healthcare programmes

Dr Antonio Peña-Fernández, De Montfort University

Proposition 4

Workshop, Buzz

The teaching of parasitology is being eroded in developed countries including those in Europe, despite the increasing number of food and water borne parasitic infections being reported in these countries. De Montfort University (DMU) has recently launched DMU e-Parasitology®, which has four sections for the appropriate teaching and learning of medical/veterinary parasitology: theoretical, with engaging e-learning units; a virtual laboratory, with techniques to detect parasites; a microscope with a library of real specimens for parasitology diagnosis; and clinical case studies. The workshop will show how to use this novel resource and strategies to enhance the teaching of parasitology.

Session 1.5: Curriculum design using Gold Standard Project Based Learning (GSPBL) to develop 21st Century skills for success in Industry 4.0

Corrina Cory and Ceri Howells, University of Exeter

Proposition 5

Workshop, Dare

Industry 4.0 demands STEM graduates with 21st Century skills to help them learn and unlearn rapidly evolving technology and solve complex global issues. Gold Standard Project Based Learning (GSPBL) is a globally applied type of PBL, developed by education experts at PBL Works [1] who work in partnership with High Tech High's and Google to deliver High Quality PBL [2]. A GSPBL Coach will showcase the process of designing and refining a project using an Engineering and Entrepreneurship module at the University of Exeter. Teams will be guided through their own project design process and potential areas for future project developments.

PLEASE NOTE: Should you wish to attend this workshop, you will need to bring your laptop with you.

Session 1.6: Embedding the SDGs into all disciplines: A simple, shareable workshop

Dr Vikki Burns, University of Birmingham

Proposition 2

Workshop, Shine

This session will showcase a simple workshop that can be embedded in any academic discipline to introduce students to the SDGs and how their discipline can contribute. Participants will experience elements of the student workshop directly, while also receiving guidance in terms of how to conduct the session themselves in their own degree programmes. It will finish by discussing possible ways for the workshop to lead into summative assessment opportunities.

Session 1.7: It's down to Me# to gain the GRIT to SHINE: A number of different approaches to student self-support

Dr Michael Loughlin, Nottingham Trent University

Proposition 4

Workshop, Evolve

In this session we discuss a range of different approaches to allowing students to develop the skills to manage their own learning and skill development in a self-sustaining manner. Some are in partnership with external organisations and we discuss the challenges facing the successful blending of such activities into a discipline-specific curriculum in such a way that they are palatable to students. Successes and missteps are reflected upon in seeking to remove the deficit model associated with seeking support and replacing it with the ethos that all students deserve to be here, and should take every opportunity to shine.

Session 2, 12:05-13:05

Session 2.1: Electric cars and lithium: A trans-disciplinary case study in Chile

Dr David Hassell, University of Bath

Proposition 1

Workshop, Build

This workshop showcases a case study bringing together postgraduate students from different disciplines for a practical experience of interdisciplinary work. Participants will be asked to address the complex and varied aspects of sustainability entangled with the ever-increasing demand for lithium to produce batteries. Taking the part of different stakeholders (business, state, local and civil society actors), they will be expected to negotiate a sustainable solution to address the main social and environmental issues. The case study, based on the real situation in the desert of Atacama, reflects on the multiple impacts of lithium extraction and the conflicting interests of stakeholders.

Session 2.2: Embedding sustainability into the curriculum: The passion, practicalities and problems

Dr Rachel Curzon and Mrs Deborah Phelpstead, Birmingham City University

Proposition 2

Interactive, Work

Embedding sustainability into the curriculum is not an easy target. Nor is futureproofing our graduates for a world where understanding and applying SDGs is essential. This session reflects on our journey (the practicalities and problems as well as the importance of passion,) shares ideas and aims to inspire change by offering a mechanism to achieve it. We have created an accredited course (the first of its kind in the UK) to support and guide staff to embed sustainability in the curriculum. Through this approach we hope to achieve bigger, more meaningful impacts across all disciplines over a shorter time frame.

Session 2.3a: Representation of sex differences in the Physiology curriculum: Room for improvement?

Dr Rachel Lord, Cardiff Metropolitan University

Proposition 3

Oral presentation, Win

Gender inequalities are present within Sport and Exercise Science Degrees. Sport and Exercise Science is perceived as a masculine domain, perhaps biased against women. This research aimed to gain information from students regarding their perceptions of the physiology curriculum and to establish whether changing the content delivery of a module changed the above perceptions. Level 6 students completed questionnaires and focus groups at the start and end of a module where the representation of sex differences was enhanced. Recommendations are made to enable a supportive learning environment and to maintain/achieve an inclusive curriculum both in this discipline and across curricula.

Session 2.3b: Social inclusion in STEM: Schemes, myths and suggestions

Dr Ismini Vasileiou, De Montfort University

Proposition 3

Oral presentation, Win

Social inclusion is a term very rarely used in STEM. Academics put emphasis on the content and employability aspect of a course, and almost never they identify areas and ways a session can become more interactive and inclusive. As such, social inclusion in STEM can be very high. Especially in areas such as Computer Science, the laddish culture can be so visible that can put off not only female students but also LGBT, disabled ones etc. In literature there is no widely known term for social exclusion, but nevertheless we see it quite often in academia.

Session 2.4: The modern academic and the graduates of the future

Dr Neil Speirs, Dr Andrew Cross and Professor Colin Graham, University of Edinburgh

Proposition 4

Workshop, Buzz

When designing new academic courses, strong pedagogical practice prompts us to address various themes beyond subject specifics - which in turn demands that we develop new critical literacies. These themes include: graduate attribute development, access and participation, understanding of curriculum across the sectors of education, meaningful and sustained community engagement and a knowledge of current educational policy. In this workshop participants will explore their thinking around these interdisciplinary themes that we have constructively engaged with over the last few years - and how they are directly related to innovative course design.

Session 2.5: The SDGs and Me: How the SDGs can help to inspire the next generation of Sustainability Leaders in STEM

Dr Julie Gwilliam, Cardiff University

Proposition 5

Interactive, Dare

The students of today are the leaders of tomorrow. So, if we want to see significant change in STEM education, research and practice we must start to embed sustainability throughout HE. The UN Sustainable Development Goals (SDGs) provide a useful framework for the sustainability lens and this workshop seeks to explore how STEM education might best engage with them as a framework for promoting student reflective practices. We seek to explore and identify existing and novel educationally embedded opportunities to develop students' decision making processes and future lifestyle and career choices that will lead to local, regional and global sustainability.

Session 2.6: Sustainability concepts in STEM: The importance of embedding SDGs

Dr Steven Rogers, Keele University

Proposition 2

Workshop, Shine

The sustainability of our planet is fundamental to our common future. This workshop will highlight how STEM in higher education is critical to sustainable debates. Our students need to be both aware of our shared role in solving economic, social and environmental issues and how to communicate their STEM knowledge to a non-specialist audience. This workshop is underpinned by work carried out across a Geology programme (at Keele University) which looked to consolidate the team's standing on sustainability issues and how to better articulate the importance between the subject area and the SDGs. This session is interactive, there is reflection, dissemination and even a bit of module design!

Session 2.7: Metacognition: Enabling success by revealing the hidden world of thinking

Dr Jayne Dennis, Queen Mary University of London

Proposition 4

Workshop, Evolve

Metacognition is broadly defined as "thinking about one's own thinking". Metacognitive ability correlates with academic performance and can be enhanced through interventions embedded in teaching. This innovative workshop will explore how HE educators can use metacognition to enhance students' success at university and prepare them to be reflective and flexible graduates. We will use "think aloud" commentaries of problem solving to analyse cognitive processes. Participants will gain experience in this metacognitive technique and develop teaching activities to support their students' metacognitive development and prepare them for navigating a constantly changing world.

Poster Session A, 15:05-15:30, Grow

Session A1: Resilience amongst undergraduate students undertaking a health sciences inter-professional learning programme

Rebecca Rylance, University of Liverpool

Stress plays a significant role in the performance of all healthcare practitioners and particularly in healthcare students (Hodselmans et al, 2018). The effects of stress are often reflected in students' academic performance, inter-personal relationships and may contribute significantly to poor mental health (Thawabieh & Qaisy, 2012). The aim of the study is to examine the factors which contribute to student stress and how to promote resilience amongst healthcare students via inter-professional learning activities. This study reports the findings from two focus groups comprising of 2nd year students from Diagnostic Radiography, Nursing, Occupational Therapy, Orthoptics, Physiotherapy and Therapeutic Radiology undergraduate programmes. Data was collected and subsequently analysed utilizing Colaizzi (1978) thematic framework. Narrative data was grouped into three key themes: (1) Inter-professional learning activities (2) Challenges in Practice (3) Challenges in University. A further seven theme clusters were identified: (i) planned learning activities with other professional groups (ii) role of academic advisor (iii) mindfulness/relaxation (iv) confidence (v) loneliness/isolation (vi) financial difficulties (vii) academic writing. The findings offer an insight into the experiences of undergraduate health sciences students and will inform part of an ongoing resilience research project.

Session A2: Utilising Virtual Reality event production software to interactively assess Level 4 production students

Mr Jack Elderfield, University of South Wales

Proposition 4

Event Production degrees, due to their creative and engineering mix, have on average a higher than normal percentage of students with additional learning requirements, who may struggle to succeed in traditional assignment styles. This research aims to investigate whether the use of an interactive experience such as Virtual Reality (VR) as a summative assessment would improve student engagement.

Session A3: Developing HE practitioner confidence and skills to ensure effective online teaching and support for distance learning students

Dr Hannah Gauci and Dr Janette Wallace, The Open University

Proposition 4

As more HE providers are developing online courses, preparing HE practitioners new to online teaching is important to ensure effective student learning and support. Prior to their induction programme we surveyed new associate lecturers joining the STEM faculty at the Open University about their previous experience and confidence to tutor students online. From our findings we make recommendations for training to improve HE practitioners' confidence and skills for teaching in an online environment. Parallels are made for support that could be offered to students new to online learning.

Session A6: Facilitating students' engagement in self-reflection of skills development throughout their graduate journey, work placements and beyond

Dr Suzy Kean and Dr Rehana Karim, University of South Wales

Proposition 4

We will present work done at USW to formally implement Personal Reflective Logs for all students who undertake work placements in the subject area of Chemistry and Pharmaceutical Science. Through the use of personal reflection, these logs seek to embed student behaviours that will facilitate life-long personal and professional development. Students are formally introduced to these logs as a development tool during an industry specific first year Key Skills module. They are then encouraged and supported to provide personal reflections on their learning through a series of laboratory reports culminating in an authentic workplace application of the tool.

Session A7: Engineering Business Game Design Challenge

Professor Robert Kelsall, University of Leeds

Proposition 1

This poster will summarise the introduction of a novel group assignment challenge into Electronic/Electrical Engineering programmes at the University of Leeds. Students were required to design their own Engineering Business Game, which was to embody the key aspects of commercial engineering discussed within our 3rd year Professional Engineering Studies module. Experience to date indicates that this unusual assessment task has encouraged students to explore the interplay between diverse aspects of professional engineering including regulatory frameworks, risk management, supply chains, ethical and environmental considerations, and innovation, and to investigate behaviours and decisions which lead to sustainable and successful commercial engineering practice.

Session A8: Knowledge, skills and professional attributes: A challenge for flexibility in learning of Engineering HE provision

Mr Dave Knapton, University of Sunderland

Proposition 1

This session will investigate the interrelation of skills, knowledge and professional attributes in Engineering curricula for accredited courses. Dave's work reflects on the diversity of the educational pipeline and identifies some of the challenges which the HE sector must meet to ensure employers' needs are met. Attendees will also have an opportunity to reflect on their own practices across STEM disciplines where ideas for their own curricula development will be explored via an interactive survey.

Session A9: Relating competence hierarchies to Bloom's taxonomies

Dr David Bowers and Mr Oli Howson, The Open University

Proposition 4

Bloom's taxonomies have long dominated the framing of academic education. Learning outcomes are expressed using "Bloom" verbs, and related to "Bloom" levels. And yet the thrust of both the Wakeham and Shadbolt reviews was that employers find some graduates wanting: they are not work ready. In short, they are not "competent". This session will explore the relationship between competence hierarchies – widely used in medical fields - and Bloom's ubiquitous taxonomy. It will consider the extended competence hierarchy underpinning the Institute of Coding's emerging accreditation standard, and how skills-based competence could prepare graduates to take control of their future learning and development.

Session A10: Can virtual laboratory software enhance 'wet-lab' teaching?

Miss Danielle Evans and Dr Ian Bailey, University of Surrey

Proposition 4

Pre-practical exercises have been shown to support laboratory skill development in undergraduate science. As pedagogy evolves for the digital age, the exploration of virtual learning software is a natural step to facilitate student self-efficacy, and student satisfaction. At the University of Surrey, virtual laboratory software was incorporated into the first year Biochemistry modules as repeatable, flexible, formative tasks. This intervention was rigorously evaluated using a mixed-methods approach involving: software use, student self-efficacy, and academic achievement across the teaching year 2018/2019. In this session we will discuss the impact of this software on the students and staff.

Session 4, 15:30-16:30

Session 4.1a: Learning Saphriogestics: Teaching students the knowledge and abilities for jobs that don't yet exist

Jens Sutter, University of Strathclyde

Proposition 1

Oral presentation, Build

TBC

Session 4.1b: Developing global STEM graduates through interdisciplinary project-based learning (PBL) and design thinking

Dr Goudarz Poursharif, Dr Panos Doss, Dr Rebecca Broadbent and Dr Gillian Knight, Aston University

Proposition 1

Oral presentation, Build

To enable us to address future environmental challenges, HEIs should be ensuring we develop globally-aware STEM graduates, with the skills and understanding needed to be future change agents. This presentation details our approach to integrating key knowledge and skills related to this broad requirement into Engineering curricula at Aston University. Interdisciplinary PBL and design thinking are used as catalysts to develop critical thinking and transferable skills, through an elective module comprising a mix of tutor and peer-led sessions, students are intellectually challenged within a supportive learning environment. Using evaluation data collected from participants, alongside reflections of staff who facilitated this module, the efficacy of the learning opportunity is evaluated.

Session 4.2a: Making a difference through useful learning with Vertically Integrated Projects for Sustainable Development

Dr Scott Strachan, University of Strathclyde

Proposition 2

Oral presentation, Work

Vertically Integrated Projects for Sustainable Development (VIP4SD) at the University of Strathclyde challenges multidisciplinary teams of undergraduate students to work with academic researchers on long-term research projects. Each of Strathclyde's VIP4SD projects seek to address the UN's Sustainable Development Goals by combining the pedagogical approaches of research-based education (RBE) and Education for Sustainable Development (ESD), with the aim to equip students with the skills and competencies required to tackle these global goals. This presentation will outline RBESD, our ongoing work to evaluate student competencies, and the benefits of using the VIP model in STEM education as an approach to ESD.

Session 4.2b: Sustainability matters: How can we engage our students in thinking about sustainability issues?

Dr Sarah Aynsley, Miss Sarah Briggs and Dr Audrey Skidmore, Keele University

Proposition 2

Oral presentation, Work

The term sustainability encompasses diverse areas relevant to healthcare and the training of medical students. Renewed emphasis both specific to healthcare and the introduction of the UN's Sustainable Development Goals has emphasised the importance of increasing awareness of sustainability through education. Aligned with Keele's own commitment we devised a small group teaching event with a supporting keynote lecture. We further developed the session into an integrated workshop drawing on contemporary issues in sustainability and local social issues, making explicit links to the SDGs and education for sustainability theory. This successfully encouraged engagement and broadened students' understanding of sustainability issues.

Session 4.3a: Enhancing employability through curricular cross-cultural internships

Dr Gita Sedghi, University of Liverpool

Proposition 3

Oral presentation, Win

To support our undergraduate students to become creative and culturally rich graduates in a connected world, we are fostering cross-cultural internships to increase the proportion of mobile students. The selection criteria, different from that by usual study abroad, provide students with more inclusive opportunities. Creative assessment tools are used during and post the internship to assess students' learning from the research undertaken as well as soft skills. Our evaluations showed that students developed their employability skills including critical thinking, independent working and communication with people from a different cultural background, in addition to learning new research skills.

Session 4.3b: Transferable skills for future global leaders

Dr Rosemary Clyne, Queen Mary University of London

Proposition 3

Oral presentation, Win

The Queen Mary Future Global Leaders Forum is a new initiative enabling students to build the mind set and cultural agility needed in the next generation of leaders. Students work together on intercultural and cross-disciplinary teams on work experience projects in collaboration with local charities, or in partnership with university staff on campus. The work experience project is supplemented with a programme of transferable skills and leadership skills sessions. This session will discuss the development of the Forum and highlight feedback from the STEM-subject participants on how the experience has impacted on their studies and future plans.

Session 4.4a: The future graduate: The importance of group work

Dr Nigel Francis, Swansea University

Proposition 4

Oral presentation, Buzz

The modern graduate needs to acquire a range of key transferable skills, including collaboration, communication and problem solving. Group work is an incredibly powerful tool for assessing large numbers of students, whilst teaching these skills, provided it is set up correctly and a positive learning environment is created. That environment needs to foster collaboration to ensure that the end product is a true reflection of the contribution of each individual student. The ability to generate an individualised mark that recognises this contribution is essential for the success of group work. This talk focuses on an ongoing refinement of a group work assessment to generate an authentic assignment that students feel provides a fair reflection of their efforts.

Session 4.4b: Automated feedback for the masses: A case study

Dr David Cutting, Queen's University Belfast

Proposition 4

Oral presentation, Buzz

Feedback is an essential part of the learning process. At a time when educators are under pressure to give more timely and meaningful feedback, cohort sizes are also growing. This presentation discusses a case study where a large (400) class were provided with automated tools to gain immediate formative feedback using summative criteria on their work. An honest and blunt reflection on the two years of this process is included identifying both positive and negative aspects.

Session 4.5a: Pathways to improving accessibility of Biosciences teaching

Dr Carl Harrington, University of East Anglia

Proposition 5

Oral presentation, Dare

This workshop relates to a project that UEA undertook in summer 2019 that worked with student interns who have a range of disabilities. During the project the students helped us identify challenges and barriers to their engagement with different types of Bioscience teaching, with a principal aim being to identify how they can compete better in the graduate jobs market. In addition to identifying the challenges, the project developed some suggested solutions.

Session 4.5b: Becoming a Bioscientist': Fostering team working and personal development in a first year Biosciences module

Dr Becky Thomas, Royal Holloway University of London

Proposition 5

Oral presentation, Dare

We present the highlights and lessons learnt from our first year biosciences course 'Becoming a Bioscientist'. Working with our careers service, we have designed a course where students develop key skills while working on a team-based interdisciplinary project.

Session 4.6a: Embedding the Sustainable Development Goals within first year Biosciences skills teaching

Dr Sara Marsham and Dr Alison Graham, Newcastle University

Proposition 2

Oral presentation, Shine

Students undertaking Biological Sciences-related degree programmes should develop an awareness of how their discipline contributes to the UN Sustainable Development Goals, in order to recognise the importance of scientific evidence in decision making. First year Bioscience students undertake an Academic and Professional Skills module, which provides space in the curriculum to consider the importance of implementing the global goals. This presentation will outline our approach to embedding SDGs within the curriculum in terms of the delivery of workshop and tutorial sessions, and how this links to assessment for which students complete an individual written report and an oral group presentation.

Session 4.6b: Employability and sustainability in STEM: Educating the leaders of the future

Dr Iain Duncan Stalker, The University of Manchester and Mr Rinkal Desai, University of Warwick

Proposition 2

Oral presentation, Shine

STEM gives rise to some of the most vibrant and fast-paced industries in the world; but these industries can often exact a heavy price, impacting people and the planet in the procurement of profits. STEM graduates must become practitioners committed to working in teams with other professionals and stakeholders if they are to address such contemporary challenges and create a more sustainable world. We present an educational framework that provides a holistic perspective on the intersections of industries involved in creating products and services, and the contexts from which these draw; this identifies key partners and stakeholder groups.

Session 4.7a: Student perceptions and development of employability skills in a multidisciplinary, Level 4 Science module

Dr Christopher Hutton and Dr Fiona Aiken, The Open University

Proposition 4

Oral presentation, Evolve

The importance of students developing employability skills is well recognised in higher education (Wakeham, 2016). We researched students' perceptions of their development of employability skills by examining a

sample of their self-assessment scores (using radar diagrams) against learning outcomes as a proxy for these skills. 636 current students were invited to complete a questionnaire on their perceptions of employability skills development (n=74). These results will be presented, and the possible impacts this could have on future curriculum design will be discussed. Initial analysis indicates that students value most the employability skills that they see are closely linked to Science.

Session 4.7b: Transforming student aspirations: Embedding 5-year plans in the curriculum

Dr Lindsey Munro, Ms Janet Marshall, Dr Lisa Couthwaite and Dr Fiona Saunders, Manchester Metropolitan University

Proposition 4

Oral presentation, Evolve

Engaging students with planning for their future careers can be challenging, in particular in STEM subjects where high contact hours and coursework requirements can absorb their focus. Students may also be unaware of the changing nature of graduate roles and the need to be able to adapt and continue to learn. We will discuss the impact of embedding 5-year plans and employability milestones into the curriculum on students' assessment of their skills, identification of goals and planning for their futures. We will review the effectiveness of different approaches to raise student aspirations.

Day 2, 30 January 2020

Session 5, 10:50-11:50

Session 5.1: Escaping stale teaching practice

Ms Chloe Agg, Warwick University

Proposition 1

Workshop, Build

Gamification in education is on the rise, and within higher education has been particularly successful in Computer Science (CS). With many of the elements of CS being found amidst other STEM degrees it is important to bring fresh ways of engaging students through gamification into other STEM areas. This workshop explores the use of Escape Room methodology in Engineering Education. It enables delegates to participate in the solution and creation of puzzles, to experience how this relates to engineering habits of mind, and to discuss the benefits and implementation of this pedagogic intervention in various settings.

Session 5.2: Embedding sustainability in the Computer Science curriculum

Dr Martin Chorley, Cardiff University

Proposition 2

Interactive, Work

Can sustainability be fully embedded in Computer Science curricula? On the whole, these curricula tend to focus on the more technical aspects of the field. While some important topics such as employability have managed to find space in the curriculum, it is not clear that the full range of the sustainability agenda has effectively been included to date. This interactive session will look to explore the embedding of sustainability across the Computer Science curricula, gathering existing knowledge, experience and best practice, and aims to spark ideas in participants as to how to best embed this important issue in their own institutions.

Session 5.3a: Reflection in higher education

Miss Belle Batkin, The New Model in Technology and Engineering

Proposition 4

Oral presentation, Win

Many of us have heard and experienced the value of reflective practice for personal and academic growth but may be unsure how to apply it in STEM education contexts. This session demonstrates how reflection has been used as a deliberate strategy in developing the New Model in Technology and Engineering and will showcase best practices for embedding reflection in technical teamwork scenarios, maths learning, creative problem-solving, and business strategies—all key components of engineering practice. We have found that reflection fosters self-awareness and contributes to a positive approach when collaborating, considering ethical issues, maintaining motivation, communicating and coping with stress.

Session 5.3b: Putting Halpern into practice: A 4-step model for teaching critical thinking and reflection

Miss Anna Maria Jones and Dr Sophie Rutschmann, Imperial College London

Proposition 4

Oral presentation, Win

Halpern's 4-part model for teaching critical thinking (CT) gives theoretical instruction to educators regarding the development of student CT: (1) old-timer's insight, (2) instructions and skills practice, (3) transfer opportunities, and (4) learning monitoring. Informed by previous research and relevant literature, a STEM MSc programme at Imperial College London adapted Halpern's model to design and implement an 'invisible' long-thin module across the entire course of Master's study, known as "Critical Thinking & Identity". We believe that prompting continual reflection on CT goals, skills and dispositions, alongside professional identity, will better prepare STEM MSc graduates for workplace or PhD study.

Session 5.4: Thinking about what is gained: Encouraging self-reflection, skills and attribute acquisition in students

Dr Hilda Mulrooney and Dr Alison Kelly, Kingston University

Proposition 4

Workshop, Buzz

This interactive workshop will use a variety of tools to explore current and potential approaches to support self-reflection on goals, skills and attribute acquisition in students. Skills and attributes which are considered to be key will be identified from different perspectives. Recent innovative practice within co-curricular work and Personal Tutor meetings will be used as examples of good practice, and the specific skills which were gained by students engaged in such opportunities will be actively explored. Together possible feasible alternative ways of supporting the development of self-reflection skills in students will be identified.

Session 5.5: The 'APPLE' form as a vehicle for the identification, development and articulation of student skills and attributes

Dr Emma Taylor, University of Exeter

Proposition 5

Workshop, Dare

Undergraduate students often find it difficult to extract transferable skills and attributes from their academic and extra-curricular activities or, conversely, to articulate these effectively for the graduate job market. We have developed the APPLE (Academic, Personal and Professional Learning Evaluation) form to address this issue, with students completing an ongoing reflection upon the most commonly-required employability skills and providing their current best evidence for each. This informs discussion with their tutor, who can use the form to signpost the student to development opportunities or mentor the student to evidence their skills more effectively, offering a more equitable tutor experience.

Session 5.6: Notions of sustainability in interior design studios: The study of the Senior Design Studio at the University of Bahrain

Dr Reem Sultan and Dr Tamadher Al Fahal, University of Bahrain

Proposition 2

Interactive, Shine

Sustainability as an aspect in Design Practice has transformed from being a priority into a necessity. As Design educators, we question whether our students are ready to accommodate and apply this notion by raising a question: "How can we make our design studios more sustainable?" The students expressed their understanding in the form of sketches, which then we synthesised in order to reflect on the INTD curriculum in relation to sustainability issues. This reflective debate has produced propositional insights to embed the notions of sustainability within the current modules, and created the opportunity to propose a reformed Sustainable Interior Design programme.

Session 5.7: Degree Apprenticeships: Learners and aspirations

Professor James Davenport, University of Bath, Professor Alastair Irons, Sunderland University, Professor Sally Smith, Napier University, Dr Darren Dancey, Manchester Metropolitan University and Dr Alina Patelli, Aston University

Proposition 4

Interactive, Evolve

Degree Apprenticeships (Level 6 and Level 7) are relative newcomers to the HE scenes in the UK, with slightly different rules in different jurisdictions. Nevertheless, some universities have been running them for a couple of years, with several more joining, and the time is ripe for some experience sharing and discussion. Clearly the naïve meaning of "employability" doesn't apply to apprentices, who are already employed, but the apprenticeship is explicitly designed to improve long-term employability. The training provider is responsible for the technical skills, but what about personal development? What is the balance here between the employer and the training provider?

Session 6, 12:05-13:05

Session 6.1a: Environmental decontamination after CBRN events: Novel competences for healthcare professionals?

Dr Antonio Peña-Fernández, De Montfort University

Proposition 1

Oral presentation, Build

Unconventional weapons can involve the use of chemical and biological agents. Although the likelihood of suffering a chemical or biological attack is rare, recent attacks have highlighted the importance of preparedness to respond quickly to these events to protect humans. Decontamination after a chemical/biological incident is a particular concern for public health, as seen in the recent terrorist attack with the nerve agent novichok in Salisbury (England). Our international group has created an effective short training course for providing students with basic skills to respond to these events using novel guidance developed by Public Health England.

Session 6.1b: Improving computational skills of personalised Medicine students through positive pedagogy

Dr Priyank Shukla, Ulster University

Proposition 1

Oral presentation, Build

This Advance HE-funded study explores a positive pedagogy inspired Learning & Teaching (L&T) model, which combines student-centred, problem-based and active-learning approaches for teaching a cross-disciplinary subject (in this case Computer Programming) to students of a multi-disciplinary course (in this case Personalised Medicine). Results will include reflection on the aspects of this model that contribute to reducing student anxiety when faced with a challenging cross-disciplinary subject and prepare them better for the global workplace. This study is built on a pedagogy project which was recognised by Ulster University twice, consecutively in 2018 and 2019, through its Distinguished Education Excellence Award.

Session 6.2a: Nutrition, curriculum and the SDGs: A match made in heaven

Dr Hilda Mulrooney, Kingston University

Proposition 2

Oral presentation, Work

This oral presentation will use the example of nutrition to exemplify how the SDGs can be woven into the taught curriculum. A number of specific SDGs will be used (e.g. SDG 2 (zero hunger), SDG 3 (good health & wellbeing) and SDG 10 (reduced inequalities)), in relation to specific activities and modules on two undergraduate accredited Nutrition degree programmes.

Session 6.2b: TBC

Session 6.3a: Balancing the Quartiles: Enabling individual learners in large Computing cohorts

Dr Andrew McDowell, Dr John Bustard, Dr David Cutting and Mrs Angela Allen, Queen's University Belfast

Proposition 4

Oral presentation, Win

Meeting the diverse learning needs of large student cohorts is a challenge across the educational domain. Within the context of Computer Science education, this challenge is significant due to the commonality of large student cohorts, significant skill variability on entry and its nature as a challenging subject area. Accordingly, this presentation describes a number of interventions piloted towards meeting the individual learning needs of some 430 first year undergraduate Computing students. Specifically, by introducing specialist lab spaces and a wider curriculum realignment to student entry profiles for the purpose of promoting retention and academic attainment.

Session 6.3b: Bespoke digital resources to enhance learning of practical skills

Dr Rosemary Clyne, Queen Mary University of London

Proposition 4

Oral presentation, Win

This session will describe two bespoke digital innovations designed to support the learning of practical theory and methodology. The first is a collection of videos demonstrating experimental techniques, with real examples of their application to modern biomedical research. The second is the development of an online flow cytometry virtual lab. Feedback from several large student cohorts on the impact of these resources on

their learning will be presented. The author will also highlight how this interest in digital learning has been incorporated into her scholarly research.

Session 6.4a: Escape Campus: An amalgamation of Escape Room and Treasure Hunt concepts to enhance teamwork

Dr Emmajane Mantle, University of South Wales

Proposition 4

Oral presentation, Buzz

Using escape-type gaming allows for an interactive gaming experience that will inevitably enhance the students' development of working collaboratively to solve problems, and as such giving a valuable insight into the collaborative nature of the Built Environment. This presentation will introduce the development of a game-based learning event, in the form of an Escape Room and Treasure Hunt amalgamation, to create the 'USW Escape Campus', used, not only as an introduction to the University Campus, but as a means to support collaboration.

Session 6.4b: Flexible learning through a CATE winner?

Professor Bob Gilmour, Glasgow Caledonian University

PROPOSITION 4

Oral presentation, Buzz

The CATE award winning PEETS initiative is an example of international and multidisciplinary collaboration delivering teaching excellence through "innovative and transformational learning activities". The initiative, including the 10-day intensive study period will be outlined and delegates encouraged to consider how the various elements could be incorporated into their courses.

Session 6.5a: The value of student-led projects towards facilitating independent learning in Engineering education

Dr Marsha Maraj, Imperial College London

Proposition 5

Oral presentation, Dare

Embedding and managing independent learning within Engineering curricula can be somewhat challenging. This work explores the value of student-led projects towards facilitating independent learning by examining the experiences of undergraduate Engineering students who have been involved in two small-scale projects. The first involves creating a student-led maker space to develop a working prototype of a 3D-printed separation column while the second focuses on the role of students as partners in module design. The results show that these student-led initiatives can provide rewarding independent learning situations that build leadership and resilience, encourage entrepreneurship, promote life-long learning and increase self-efficacy and motivation.

Session 6.5b: The Grand Innovation Challenge: Introducing students to interdisciplinary team-based learning to solve "wicked" problems

Dr Gan Shermer, Dr Monia Mtar, Dr Richard Burke, Mr Brian Rutter, Mr Adria Ametler Picart and Ms Alisha Tuladhar, University of Bath

Proposition 5

Oral presentation, Dare

Most of the challenges that our graduates will face in a future global society are "wicked"; dynamically complex, high stakes problems with no obvious solution. It is vital that universities equip students with real-world transferable skills in order to meet the needs of society, but opportunities to do this within traditional degree programmes can be limited. We have designed a new interdisciplinary team-based challenge to introduce students to design thinking and innovation as an approach to solving a global societal challenge. This presentation discusses the learning from our experience and highlights the strengths and challenges that may be faced.

Session 6.6: Storytelling gamified experience to engage HE students with SDGs in varying decision-making contexts

Dr Soumyadeb Chowdhury, Dr Paul Devadoss and Dr Sian Joel Edgar, Aston Business School

Proposition 2

Workshop, Shine

The objective of this workshop is to demonstrate a storytelling framework using a suitable digital technology (twine), which can be employed in undergraduate and postgraduate teaching to facilitate engagement of HE students with the SDGs and understand their role as well as implications in varying decision-making contexts. This engagement will take the form of a gamified experience in a non-linear storyline, where

individuals/teams will be presented with one or more real-life business cases, and they have to make decisions considering the three core elements of sustainability – people, planet and profit.

Session 6.7a: Helping students learn how to learn in HE

Dr Harriet Jones, University of East Anglia

Proposition 4

Oral presentation, Evolve

Incoming undergraduates often do not appreciate what it means to learn in higher education. They need guidance and support to develop resilience for future years of study. This session will describe how UEA BIO students are asked to develop a Learning Portfolio, which they can take with them into assessments. It helps them work out how to integrate extra study into writing up lectures and practical classes. It removes issues of rote learning, which may well have gotten them into university. They learn the value of extra study and how to create their own revision aids.

Session 6.7b: Benchmarking and developing the resilience of 'Z' generation Healthcare students

Dr Stuart Mackay, University of Liverpool

Proposition 4

Oral presentation, Evolve

This paper presents the resilience promoting curriculum features and survey findings of the resilience characteristics of a 1st year Health Sciences cohort at the University of Liverpool. It will make comparison to comparative data for each characteristic presenting an evidence-based student profile across the four measures of resilience, perceived stress, emotional intelligence and well-being. 311 students took part with a response rate of 84%. Data revealed that they are more emotionally intelligent than the general population, have a relatively high sense of well-being yet they are in a 'moderately stressed' category and are lower in resilience than the comparator group.

Session 7, 14:05-15:05

Session 7.1a: Not all leaders, not all learning outcomes

Dr Martin Chorley, Cardiff University

Proposition 5

Ignite, Rise and Shine

It is suggested that all students should be able to gain experience of leadership and that strong leadership is needed to deliver a world of change. We do not believe this is necessarily true. 'Leadership' is more than management or 'being the boss', and without the ability to develop courage, motivation, generosity and persistence, students will not be able to deliver real change. But, do all students need to develop all these qualities, and is there a tension between the need to demonstrate that all learning outcomes have been met and the reality of working in multi-disciplinary teams in the real world?

Session 7.1b: Investigative skills: An inclusive approach to undergraduate dissertation research projects

Dr Rosemary Clyne, Queen Mary University of London

Proposition 5

Ignite, Rise and Shine

With the expansion of our final year cohort to 270 students, the traditional dissertation model of individually-supervised research projects was no longer feasible. Investigative Skills is the 30-credit, two-semester module delivered as a research project alternative for more than 100 students who do not meet a specified academic hurdle. Six authentic research projects are delivered each year. The module offers an inclusive and authentic research experience for all students, regardless of class rank. The challenges, successes and lessons learned from developing this module for delivery in Nanchang, China will be presented, as well as student feedback.

Session 7.1c: Piloting the concept of work-based learning at the University of Eswatini: A case study of the Faculty of Science and Engineering

Dr Patience Dlamini, University of Eswatini and Dr Christopher Smith, Glasgow Caledonian University

Proposition 4

Ignite, Rise and Shine

The University of Eswatini is at the start of the strategic introduction of 'through-work' work-based learning programmes (Gray, 2001), supported by Glasgow Caledonian University through a Royal Academy of Engineering-funded project. This presentation will outline the differing context in Eswatini and how work-

based learning concepts will be adapted to support self-regulation and lifelong learning aligned to the needs of Engineering graduates working in Eswatini companies.

Session 7.1d: Balancing the Quartiles: Enabling individual learners in large Computing cohorts

Dr Andrew McDowell, Dr John Bustard, Dr David Cutting and Mrs Angela Allen, Queen's University Belfast

Proposition 5

Ignite, Rise and Shine

Meeting the diverse learning needs of large student cohorts is a challenge across the educational domain. Within the context of Computer Science education, this challenge is significant due to the commonality of large student cohorts, significant skill variability on entry and its nature as a challenging subject area. Accordingly, this presentation describes a number of interventions piloted towards meeting the individual learning needs of some 430 first year undergraduate Computing students. Specifically, by introducing specialist lab spaces and a wider curriculum realignment to student entry profiles for the purpose of promoting retention and academic attainment.

Session 7.2a: The alumni project: Year 1 biologists interview recent graduates

Thomas Nuhse, The University of Manchester

Proposition 4

Ignite, Rise and Shine

Many Biology undergraduates chose their degree out of general interest rather than specific career goals. This makes them frequently reluctant to engage in career planning. While Biology graduates embark on very diverse – and sometimes serendipitous – career paths, many can identify actions that opened opportunities in desirable and competitive fields. Their “notes to my younger self” may motivate undergraduates to explore unfamiliar career paths and engage in employability-boosting activities. Here I report on an alumni project that invites Year 1 biologists to interview recent graduates from their programme and share their insight with peers in tutorials.

Session 7.2b: The Global Change Challenge

Dr Angela Priestman and Dr Richard Halfpenny, Staffordshire University

Proposition 5

Ignite, Rise and Shine

How can we make a difference when faced with faked news, vested interests, misinformation and scepticism of science? Our global challenge places students across levels together with a challenge and tasks them to develop ways of communicating, leadership styles and group dynamics to enable agreed actions and the creation of a combined output that presents options for us all.

Session 7.2c: Graduate ABC to success: Student expectations in the School of Applied Sciences (SEApS)

Dr Dawn Story, University of South Wales

Proposition 1

Ignite, Rise and Shine

This ignite session overviews the ongoing journey in the School of Applied Sciences (USW), in approaching embedding a framework of graduate attributes (A's), behaviours (B's) and capabilities (C's) into the curriculum, enabling students to continually reflect and finally measure and celebrate their personal success. The project involves a collaborative approach to the development and delivery of the framework, raising the awareness within the student community of their transferable ABC's to ensure we continue to produce graduates with the necessary skills to address the present and future world challenges and the sustainability of local, national and global communities.

Session 7.2d: Learning Saphriogestics: Teaching students the knowledge and abilities for jobs that don't yet exist

Jens Sutter, University of Strathclyde

Proposition 3

Ignite, Rise and Shine

TBC

Poster Session B, 15:05-15:30, Grow

Session B1: Supporting student transition into higher education and widening participation

Dr Khalid Khan, University of Central Lancashire

Proposition 3

Students studying in higher education in the United Kingdom generally have come from a wide variety of different backgrounds. As a consequence their levels of key skills such as Maths can differ considerably. A problem that needs addressing is how best to support students with weak key skills such that they are able to progress with their course of study and thus enabling them to make a more effective transition into higher education. A new innovative 1-1 mathematics support system has been designed to provide essential key mathematics support needed in a range of different Engineering disciplines across the university.

Session B2: The alumni project: Year 1 biologists interview recent graduates

Dr Thomas Nuhse, The University of Manchester

Proposition 4

Many Biology undergraduates chose their degree out of general interest rather than specific career goals. This makes them frequently reluctant to engage in career planning. While Biology graduates embark on very diverse – and sometimes serendipitous – career paths, many can identify actions that opened opportunities in desirable and competitive fields. Their “notes to my younger self” may motivate undergraduates to explore unfamiliar career paths and engage in employability-boosting activities. Here I report on an alumni project that invites Year 1 biologists to interview recent graduates from their programme and share their insight with peers in tutorials.

Session B3: STEM topics provide students with information, synthesis skills and values to influence their behaviour in a progressive manner applicable to their life-long learning

Dr Haruko Okamoto, University of Sussex

Proposition 1

STEM subjects such as those in the Life Sciences lend themselves well to our understanding of Sustainable Development Goals (SDGs). They provide learners with the background knowledge and evaluation skills that allow them to learn values that impact on their behaviour and that are ultimately required for creating a more sustainable world. In this session, I will discuss how our spiral design of learning provides progressive and life-long learning opportunities.

Session B4: Active learning techniques promote knowledge gain in Developmental Biology

Dr Sharon Parkinson, Queen's University Belfast

Proposition 4

Embryology includes complex subject matter which students struggle to conceptualise. This difficulty is primarily due to simultaneous spatio-temporal changes and molecular events; actions which are not easily depicted through traditional lectures. This study examined the effectiveness of active learning techniques and their ability to improve learning gain in an embryology classroom setting. Active learning techniques employed included: game-based learning, problem-based learning, storyboard learning and hands-on/kinetic learning. Learning gain was significantly improved through use of all techniques, with particular success through game-based and storyboard learning. Student participants commented on the importance of alternative learning approaches to reinforce their knowledge.

Session B5: A comparison of students' views and attainment on an entrepreneurship unit for scientists and engineers

Dr Robert Phillips, The University of Manchester

Proposition 1

We investigated student attainment and analysed both qualitative and quantitative feedback from an entrepreneurship module that was offered to several different subject areas within the university. We found student results and satisfaction to be at least as good as Faculty and departmental norms. Qualitative comments suggest they enjoy applying their subject knowledge to entrepreneurial issues and appreciate it not being offered as a generic course.

Session B6: Authentic resilience learning through critical reflection

Dr Latha Ramakrishnan, Imperial College London

Proposition 4

Studentshapers is an ICL-funded scheme where students get to work as partners alongside staff to engage deeply in education-projects. Reflection and resilience are some of the critical transferable skills that are increasingly important in the workplace and are demanded by employers. Resilience is a complex multifactorial phenomenon and very little research has been done in this area with respect to postgraduate STEMM students. In this ongoing project we are working with Postgraduate Medicine-MRes students to understand their perceptions of resilience and probe if resilience can be developed through critical reflection

over the course of their study. Finally, Studentshapers will also propose strategies for embedding resilience development into postgraduate curricula.

Session B7: The 'APPLE' form as a vehicle for the identification, development and articulation of student skills and attributes

Dr Emma Taylor, University of Exeter

Proposition 4

Undergraduate students often find it difficult to extract transferable skills and attributes from their academic and extra-curricular activities or, conversely, to articulate these effectively for the graduate job market. We have developed the APPLE (Academic, Personal and Professional Learning Evaluation) form to address this issue, with students completing an ongoing reflection upon the most commonly-required employability skills and providing their current best evidence for each. This informs discussion with their tutor, who can use the form to signpost the student to development opportunities or mentor the student to evidence their skills more effectively, offering a more equitable tutor experience.

Session B8: Becoming the biologist of the future

Dr Sarah Williams, Mr Paul Ormond and Dr Richard Halfpenny, Staffordshire University

Proposition 4

Nowadays student discipline-specific knowledge and skills is not enough – graduating as a professional in their field is required. This is achieved through engagement in varied activities including reflecting on their own professional identity development. Students must set personal goals, achieve them and reflect, thus learning from their experiences. Throughout our curriculum we embed modules that connect across subjects at the same level as well as cross-level learning. Our aim is to encourage all students to develop additional skills and attributes beyond what has traditionally been expected and to recognise and develop their own sense of professional identity as a biologist.

Session B10: Industry-linked projects and research-informed-and-enriched curriculum for sustainable student employability metrics

Dr Sunday Ekpo, Manchester Metropolitan University

Proposition 4

A student project constitutes the largest single piece of work the individual students will carry out during their degree course. Most students see their university projects only as a unit to be fulfilled for their degree attainment and think less of their post-university professional and academic career ambitions. This paper presents industry-linked projects and research-informed-and-enriched curriculum for sustainable improved student educational metrics. The findings reveal that integrated research-informed model of reflection and formative assessment and feedback is a productive teaching-supervision craft practice tool that promises to enhance the student development and outcomes; academic career progress; professionalism; entrepreneurship; employment; and employability.

Session B11: Transferable skills for future global leaders

Dr Rosemary Clyne, Queen Mary University of London

Proposition 5

The Queen Mary Future Global Leaders Forum is a new initiative enabling students to build the mind set and cultural agility needed in the next generation of leaders. Students work together on intercultural and cross-disciplinary teams on work experience projects in collaboration with local charities, or in partnership with university staff on campus. The work experience project is supplemented with a programme of transferable skills and leadership skills sessions. This session will discuss the development of the Forum and highlight feedback from the STEM-subject participants on how the experience has impacted on their studies and future plans.

Session 8, 15:30-16:30

Session 8.1a: Transnational teaching of semiconductor devices using advanced TCAD software

Dr Rami Ghannam, University of Glasgow

Proposition 1

Oral presentation, Build

Semiconductor devices are the basic building blocks of energy harvesters such as solar cells and thermoelectric generators, as well as key electronic components found in power conditioners and energy management circuits. Skills and knowledge in semiconductor devices is therefore essential for the development of a more sustainable world. Nevertheless, the ways we teach semiconductor devices are still

rooted in 20th Century textbooks and methods. We therefore present updated learning methods and materials that are more appropriate for the environments in which STEM graduates will work.

Session 8.1b: Providing skills through an online Mathematics and Statistics learning community

Dr Rachel Hilliam, The Open University

Proposition 1

Oral presentation, Build

The School of Mathematics and Statistics at The Open University is constantly exploring ways of engaging students outside the 'classroom' environment. One initiative was to provide an online subject site to provide students with a place to access wider skills and knowledge. Online discussions in this site have flourished creating a vibrant learning community. This also provides students with the opportunity to engage in issues such as curriculum development and delivery of student support leading to improvements in the structure of mathematics and statistics qualifications, influencing the content of new modules, more effective assessment strategies, and better ways of supporting students.

Session 8.2a: Overt or covert: Getting sustainability into the curriculum

Dr Katherine Haxton, Keele University

Proposition 2

Oral presentation, Work

Embedding sustainability into curricula can take two paths: overt, where a module is created with intended learning outcomes; or covert where sustainability underpins as many topics as possible. In most STEM degree programmes there is sufficient scope for both. At Keele University we have an 'environmental and sustainable chemistry' module as well as a strong drive to include sustainability wherever possible. This session will look at some of the ways we have achieved this, and allow scope for participants to reflect on their own teaching.

Session 8.2b: Exploring the impact of climate change using virtual field trips

Mr Joseph Berry, University of Birmingham

Proposition 2

Oral presentation, Work

Visit a Norwegian glacier and a sci-fi forest from the comfort of the seminar room to see the impact of climate change in real-life environments. Virtual fieldtrips have in the past been costly to produce and criticised for a lack of interactivity, sometimes making them little more than an expensive form of virtual tourism. This presentation will explore the pedagogical impact of next generation 360 tools, and assess the potential of these tours to deliver engaging learning as well as an immersive sense of place.

Session 8.3a: Skills progression in practical science within the Life Sciences: Do students recognise the skills they have developed as employability skills?

Dr Janet Haresnape, The Open University

Proposition 4

Oral presentation, Win

A student survey explored (i) what practical and problem-solving skills students had developed while undertaking a Level 2 field investigation, (ii) how this helped them to successfully complete a more challenging Level 3 follow-up investigation and (iii) whether they could articulate these skills as being relevant to employability. Finally the session explores what the OU can do to make the relevance of these investigations clearer to students.

Session 8.3b: BEST: Badging Employability in Science & Technology

Mr David Butler, Nottingham Trent University

Proposition 4

Oral presentation, Win

The School of Science and Technology have 'badged' Work Like Learning (WLL) activities at course level as part of the Badged Employability in Science and Technology (BEST) scheme. The aims of the BEST scheme are to: 1) highlight to students where WLL activities are located within their courses, with a view to enabling them to translate their learning and activities into job applications and interviews; and 2) encourage course teams to extend and further improve the quality of their WLL content. This presentation will outline the development of the scheme and its impact to date.

Session 8.4a: Determinants of pupils' engagement with STEM disciplines in secondary education

Dr Alessandro Siani, University of Portsmouth

Proposition 3

Oral presentation, Buzz

Women's attrition along the academic and professional pipeline is a key contributor to the current STEM skills shortage. This study surveyed 504 secondary students to investigate factors affecting their engagement with STEM disciplines. Statistically significant associations were found between pupils' gender and their subject preference and between parents' education status and their children's choice of science news sources. This study also unearthed a worrying trend in terms of pupils' choice of scientific role models with only 12% of the participants (4% of males, 21% of females) choosing a woman when asked to name an influential scientist.

Session 8.4b: Multidisciplinary perspectives of sustainable development

Professor Debbie Willison, University of Strathclyde

Proposition 3

Oral presentation, Buzz

This presentation will describe the development of a novel multidisciplinary elective module based on the UN's Sustainable Development Goals which is available to all students at the University of Strathclyde. The module is delivered through an online and blended learning mode and has contributions from staff in each Faculty (Business School, Engineering, Humanities and Social Sciences and Science). Details will be provided of how the class is delivered and how students will develop collaborative and communication skills through working in multidisciplinary teams.

Session 8.5a: Case-based learning in Anatomy and Physiology for pre-medical students: An opportunity for team work, leadership and stealthy reflective practice

Dr Lewis Fall, University of South Wales

Proposition 5

Oral presentation, Dare

In 2016 we formally introduced case/team-based learning into Level 5 of our BSc Medical Sciences and BSc Human Biology degrees to support our undergraduate students to develop their team working and team leadership skills. Components of the courses were rearranged allowing us to refocus Level 5 around six, three-week authentic 'case blocks' nested within three anatomy, physiology and clinical practice modules. Each team of six mixed cohort, mixed ability students took turns leading a case throughout the year culminating in a written personal reflection and evaluation of their role within the team.

Session 8.5b: Student-centred learning and teaching (Queen's University Belfast Student-Staff Partnership Project)

Dr Maryam Malekigorji and Dr Caoimhe Clerkin, Queen's University Belfast

Proposition 5

Oral presentation, Dare

This programme has provided an opportunity for students, as course partners, to co-design a module. This module provides extensive practices, seminars, workshops and case studies to strengthen students' learning and academic skills. Students interacted with their peers and staff continuously over the course to determine whether these current strategies are effective and to further exchange ideas on how to improve the curriculum design, delivery, assessment and quality of the course. Here, Universal Design for Learning (UDL), which encourages students to become co-creators of their own curriculum, has created a generation of critical thinkers, problem solvers and individuals who are capable of thinking cognitively, to the highest standard and to become future world leaders.

Session 8.6a: The Grand Challenge: Engineering the next generation of engineers for a more sustainable world

Dr Maria Valero, Ms Sandra Haywood, Dr Helen Liang and Dr Sally Clift, University of Bath

Proposition 2

Oral presentation, Shine

This presentation discusses a curriculum-based approach to embed values, knowledge, skills from graduates' understanding of the links with their own discipline and reflection on own interests, attributes and skills. As part of a multidisciplinary, cross-departmental unit for several MSc programmes in Mechanical, Electrical and Civil Engineering at the University of Bath, students work on a "Grand Challenge" (like a sustainability-related goal/challenge) of their own choice. Students research, integrate and evaluate principles and methodologies from multiple disciplines (Electronics, Mechanics, Chemistry, etc.) to come up with their own proposal/solution, blending students' professional/employability skills with their own technical expertise.

Session 8.6b: Technology-based numeracy training for everyone: A partnership between the University of Derby and Vretta

Dr Ovidiu Bagdasar, University of Derby and Professor Graham Orpwood, Vretta UK

Proposition 2

Oral presentation, Shine

Many professionals and students in higher education (even those in STEM subjects) struggle to perform tasks involving numerical calculations in a practical context. To support its learners, the University of Derby has partnered with Vretta, an award winning educational technology company based in Canada. Following a pilot project implemented in 2018-19 within the College of Engineering and Technology, we used the innovative "Elevate my Maths" platform to develop 12 numeracy courses. In this talk we briefly present our implementation, the impact on the mathematics achievement for students from a wide range of subjects, and the feedback received from users.

Session 8.7b: Are critical thinking and reflection required to learn Clinical Biochemistry?

Dr Antonio Peña-Fernández, De Montfort University

Proposition 4

Oral presentation, Evolve

A pedagogic intervention to facilitate acquisition/development of critical thinking and reflective skills was implemented in the final year module Clinical Biochemistry (De Montfort University, 2018/19). Students provided answers on diagnosis, treatment and management for three clinical cases distributed throughout the first term. The ability to extract all the fundamental concepts, synthesise information and clarity of expression, was enhanced in Medical Science students, which could be attributed to the feedback provided for each case. 88.3% considered that their critical thinking had improved by participating in this intervention and 66.6% learnt to reflect and resolve general pathologies using clinical biochemistry information.