



HEA STEM Conference 2018: Creativity in Teaching, Learning and Student Engagement

Day two: 1 February 2018

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Strand 1: Psychology

Marlborough room

Creative practical programming assignments on a Master of Science degree in Professional Software Development

Dr Cathryn Peoples, Teaching Assistant at Ulster University

Paper presentation

Session 8.1: 11:15-11:45 on 1 February 2018

It could be suggested that there is a greater opportunity to engage computing students with course material than in other subjects due to the general immersion of society in modern technologies. The context of each technology can be exploited and module material can be positioned around it: From the student perspective, it is perhaps more interesting to consider how a robot waiting on a customer in a restaurant requires concurrent programming techniques in the operating system than to consider the simultaneous threads running in a desktop PC. Exploiting the use of modern technologies to support teaching and learning, however, requires a creative pedagogy to harness those aspects of interest. Efforts have been made to achieve this on a Master of Science degree in Professional Software Development at Ulster University. The design of the coursework specifications, along with the student engagement with each task, forms the basis of this presentation. It could be suggested that there is a greater opportunity to engage computing students with course material than in other subjects due to the general immersion of society in modern technologies. The context of each technology can be exploited and module material can be positioned around it: From the student perspective, it is perhaps more interesting to consider how a robot waiting on a customer in a restaurant requires concurrent programming techniques in the operating system than to consider the simultaneous threads running in a desktop PC. Exploiting the use of modern technologies to support teaching and learning, however, requires a creative pedagogy to harness those aspects of interest. Efforts have been made to achieve this on a Master of Science degree in Professional Software Development at Ulster University. The design of the coursework specifications, along with the student engagement with each task, forms the basis of this presentation.

Statistics anxiety and student engagement with research methods learning: What can we do?

Dr Alexander Marchant, Lecturer and Dr Eleni Vangeli, Senior Lecturer (London South Bank University)

Paper presentation

Session 9.1: 11:55-12:25 on 1 February 2018

A recent HEA survey identified three factors that students self-report as contributing to them struggling with quantitative methods: statistics anxiety, lack of confidence, and the time elapsed since they had last studied mathematics (Field, 2014). New analyses of longitudinal data from a cohort of first-year psychology undergraduates will explore the relationships between these variables, how they may affect student engagement and the student experience, and what we can (possibly) do about it.

Running towards success: Using psychological theories to teach non-runners to run a marathon (and develop life skills)!

Dr Frances Garrad-Cole, Senior Lecturer/Educational Developer at Bangor University

Paper presentation

Session 10.1: 13:15-13:45 on 1 February 2018

This session will present and describe a very successful and highly innovative approach to teaching positive and motivational psychology. 22 students who had never run further than 5km enrolled on the course and learnt about theories of grit, determination, self-esteem, anxiety/arousal etc. These theories were then applied in a very real fashion to the seemingly impossible goal of running a marathon. Assessments were carefully planned to allow reflection and development, and to facilitate effective and safe physical training whilst developing the mental toughness required for such a challenge. After only 18 weeks of training the students and staff entered and completed the Liverpool Rock n Roll marathon on 28th May 2017 - and smashed it! The aim of the session is to inspire delegates to think outside the box about how they can incorporate their passion and their creativity into their teaching.

Promoting agentic learning: Embedding the use of feedback in future learning

Mr Mark Jellicoe, Ph.D Candidate and Dr Alexandra Forsythe, Senior Lecturer (University of Liverpool)

Paper presentation

Session 11.1: 13:55-14:25 on 1 February 2018

Undergraduates prize high quality formative feedback but often lack the repertoire of self-regulatory motivations and skills to grasp incremental gains in learning (Winstone et. al, 2017, 2016; Hattie, 2012). We aim to demonstrate a recent research connected learning programme designed to assist students to embed messages from feedback. This approach aimed to engage undergraduates as agents in learning by endorsing and understanding a series of measures and subsequently setting goals centred on embedding feedback. Supporting lectures and virtual tutorials were provided to embed a critical understanding of the perspectives employed. Finally, students critically assessed their understanding of relevant theories and reflected on their own use of these approaches. This approach extends the tools that can be used and evidence base to support students as deterministic agents in making valuable learning gains that extend beyond the academic arena in to employment.

Exploring Möbius: case studies from the University of Birmingham

Dr Jonathan Watkins, Maple T.A. Development Manager (University of Birmingham)

Paper presentation

Session 12.1: 14:45-15:15 on 1 February 2018

Faced with limited time to get students attention, a need to boost their pre-lab preparation, and a desire to get all students competent in the core concepts as quickly as possible, teaching staff responsible for our first year Engineering course sought out a tool which could help students achieve the best learning experience, and the best results. Their choice? Möbius, Maplesoft's online courseware environment, specially built for STEM subjects, and simple to combine with Canvas, our existing VLE. Their comments? "With Möbius, students get material in advance, they come

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prepared, which then frees up time for quick practical work in the limited lab hours.”, “The optional pre-lab work is being completed almost 100%”, “A lot of universities are now trying to develop strategies for building independent learners; with Möbius, we’ve found a way to work that into the course framework,”. Their conclusion? “With Möbius, we’re not limited by the technology. We’re only limited by imagination”. This session explores their experiences.

Strand 2: General/Interdisciplinary

Grainger suite

Modelling learning, unlearning and relearning in large classes

Dr Claire Blackman, Lecturer at University of Cape Town

Interactive workshop

Session 8.2: 11:15-12:25 on 1 February 2018

The futurist Alvin Toffler wrote: "The illiterate of the 21st century will not be those who cannot read and write, but those who cannot learn, unlearn, and relearn."

In this workshop we will investigate small, easily implementable teaching techniques for creating a dynamic learning space in a large class setting. The focus is on developing a large class environment that not only enables students to learn the required content effectively, but also helps them develop the mental and psychological strength and agility that they will require to effectively learn things that have not yet been thought of. We'll discuss time saving technology and online tools that enable us to leverage the large class scenario to get and give immediate feedback. We'll also look at some unexpected techniques – such as daily mindful breathing practice - that can be implemented without technology and can have a significant impact on our teaching, and our students' learning.

Creative techniques to support your laboratory practicals: Student engagement via interactive simulations, smart worksheets and more

Miss Emily Coyte, Digital Content Creator, Mr Bill Heslop, Managing Director, and Mr Stan Mitchell, Consultant at Learning Science

Interactive workshop

Session 10.2: 13:15-14:25 on 1 February 2018

Science and engineering teaching labs are highly valuable but major undertakings. Frequent challenges include:

- Low levels of student preparation and engagement
- Demonstrator time spent explaining basic principles and trivial questions
- Heavy marking burden on staff
- Insufficient or delayed feedback

Addressing these issues requires creativity and innovation. In this session you will explore some e-learning solutions from Learning Science which could support your laboratory practicals and enhance your students' experience.

Interactive simulations engage students with pre-lab preparations. Focussing on lab techniques, background theory or data analysis, the simulations help students come into the lab better prepared and ready to learn, using lab time more effectively.

Smart Worksheets created for your experiments can be used as postlab assignments or dynamic tutorials. From complex calculation to multiple choice questions, Smart Worksheets provide instant, personalised feedback.

These resources can be tailored to your teaching. Once ready, they integrate seamlessly with your VLE and gradebook.

Health Impact Assessment: A cross-disciplinary tool for engaging students in dialogue about how their discipline relates to sustainable development, health and wellbeing

Mr Alastair Tomlinson, Senior Lecturer in Environmental & Public Health and Mrs Gayle Davis, Programme Director & Lecturer in Environmental & Public Health (Cardiff Metropolitan University)

Interactive workshop

Session 12.2: 14:45-15:55 on 1 February 2018

Health, wellbeing, social justice & sustainable development are strategically important issues for Universities and society in general. We need to find innovative ways and techniques to engage our students in dialogue about these issues and how they relate to their disciplines and areas of study. Health Impact Assessment (HIA) is a recognised, flexible approach for considering the wider effects of local and national policies, projects or initiatives and how they, in turn, may affect people's health and wellbeing.

This workshop explores how HIA provides a technique to facilitate dialogue with students about how their disciplines and areas of study relate to health, wellbeing & sustainable development. Come and discuss how HIA might be used in your discipline and programmes to support student learning, and find out how you can access a free online e-learning resource to support you.

Strand 3: General/Interdisciplinary

Blaydon room

Developing storytelling skills for public and community engagement in Veterinary Medicine

Mrs Sharon Boyd, Lecturer at The Royal (Dick) School of Veterinary Studies, University of Edinburgh
Paper presentation

Session 8.3: 11:15-11:45 on 1 February 2018

Storytelling practices have been used effectively to transmit research in other disciplines such as languages and literature, economics, psychology and sociology. Developing storytelling skills in the STEM disciplines may enable students to better communicate their research to a more diverse audience. The aim of this session is to outline a process of developing students' storytelling skills to aid public engagement and foster community participation in research. By the end of the session, attendees will be able to evaluate storytelling as a creative practice, undertake a short written storytelling activity, and identify opportunities where this process could be applied in their own teaching and disciplinary context.

Using coaching to enhance Nursing students' work based learning

Mrs Diane Daune, Senior Lecturer - Work Based Learning at University of Central Lancashire

How to?

Session 9.3: 11:55-12:25 on 1 February 2018

This presentation provides an overview of the use of coaching to enhance UCLan student nurses work based learning within the implementation of Collaborative Learning in Practice model (CLiP²). The presentation includes examples from a range of Health Service Clinical Learning Environments, including acute care, high dependency and mental health services.

This presentation will:

- Demonstrate the use coaching as an educational tool to enhance students' work based learning experiences.
- Demonstrate the organisational support of coaches and mentors facilitating student nurses' work based learning.
- Demonstrate how to embed coaching in the real life clinical learning environments.
- Discuss how coaching increases students levels of self-confidence and lower levels of anxiety.

How do we inspire the next generation?

Dr Ann-Marie Carey, Associate Professor at Birmingham City University

Paper presentation

Session 10.3: 13:15-13:45 on 1 February 2018

How do we inspire the next generation?

Make Your Future is a three year Crafts Council led educational project, collaborating with four higher education institutions to enhance student engagement through creative practice. Make Your Future, now in its second year combines crafts specialities and digital technologies in an interdisciplinary approach. The project is based across the UK (School of Jewellery Birmingham, Leeds University and Leeds College of Art and Central St Martins London) with each region working

with two teachers from eight local secondary schools each year. It has a two phase approach, initially to address the needs of teachers through skills training and practical CPD, and secondly by applying that specialist knowledge within their own school classrooms environment through a number of professional craft-maker led workshops.

This paper will concentrate on one of those institutions, the School of Jewellery Birmingham City University.

The Robot Orchestra collaborative: An outreach project with a difference!

Ms Alison McMurray, Senior Project Manager (University of Manchester) and Dr Erinma Ochu, Lecturer in Science Communication & Future Media (University of Salford)

Paper presentation

Session 11.3: 13:55-14:25 on 1 February 2018

The Robot Orchestra makes innovative and creative use of teaching and learning to encourage young people to do engineering. Hear the amazing journey of the Robot Orchestra collective proving engineering is inclusive, creative and fun. Learn about all the different people and organisations who were involved in developing the project over 18 months. Learn about the challenges we had along the journey.

This is not a technical talk. Everyone is welcome.

How to build a living curriculum for STEAM: Technology meets cultural heritage

Dr Anne Preston, Senior Lecturer Technology Enhanced Learning and Dr Danilo Giglito, Research Associate (Kingston University), Dr Shaimaa Lazem, Assistant Professor (City for Scientific Research and Technological Applications (SRTA-City)), Dr Sam Elkingt

How to?

Session 12.3: 14:45-15:15 on 1 February 2018

The value of HE to individuals, communities and societies in the UK and internationally is increasing as our universities continually strive to prepare our students to face the opportunities and challenges of the future. A key challenge is designing, developing and subsequently embedding high quality programmes to support innovative curricular to embody these demands, particularly in STEM. This presentation reports on work which draws on the HEA's Flexible Curriculum Framework to develop a Living Curriculum for STEAM (A=Arts). A Living Curriculum repositions "learning as a continuous conversation within a dynamic curriculum that is integrated with, and takes advice from, the world our students live in" (Marshall & Scott, 2012). We share insights from its application with Engineering students learning Cultural Heritage and Computing Science in Egypt. We offer takeaway ideas from our Hilali Toolkit to support delegates in the development of their own and their students' living curricula.

Making comics: Creativity, student self-reflection and the power of the personal

Dr Michael Jeffries, Associate Professor at Northumbria University

How to?

Session 13.3: 15:25-15:55 on 1 February 2018

This workshop will get you making mini comic-books, methods that can be used in any discipline and career. Comics and zines are often dismissed as lo-fi and ephemeral, characteristics which are usually seen as weaknesses but their playful, unthreatening, nature make them a very accessible medium. Comic books can be used to explore any subject. Even better they can become highly personal, reflective pieces allowing students to create, interrogate and represent their studies and lives. STEM subjects can be brought to life as students turn their subject knowledge into comic book adventures, from space travel to pond-life. The workshop will include examples of unique, deeply personal zines created by final year geography and environment students and non-representational mapping, another method whose power is hidden behind the deceptive simplicity of a handful of felt-tip pens and a sheet of paper.

Strand 4: Engineering, Materials and Built Environment

Darwin room

Virtual reality as a teaching aid for Anatomy

Dr Laura Mason, Senior Lecturer and Dr Marc Holmes, Research Officer (Swansea University)

Paper presentation

Session 8.4: 11:15-11:45 on 1 February 2018

Anatomy is an area within both Sport and Exercise Sciences and Medical Engineering where students have previously struggled to retain the large amounts of content required. This study was designed to investigate whether virtual reality as an innovative approach to teaching in this discipline could improve both student experience and attainment in this subject area. A virtual reality platform was created in which medical engineering students (n≈50) were asked to individually compete to assemble a human skeleton in both the fastest time and with the fewest errors. This gamification in an immersive environment was hypothesised to increase students understanding and retention of anatomical information. The project development and quantitative and qualitative results from the study will be presented and discussed.

Developing student competence with process simulation software using video-enhanced and discovery/inquiry-based learning

Dr Daniel Belton, University Teaching Fellow at University of Huddersfield

Paper presentation

Session 9.4: 11:55-12:25 on 1 February 2018

Process simulation has become a ubiquitous and indispensable tool in chemical engineering and an important, but often underutilised, part of the chemical engineering curriculum. The work presented here describes a methodology for teaching process simulation that utilises video-enhanced and discovery/inquiry-based learning. The approach was evaluated for first year students, drawing together quantitative results from an online survey and qualitative data from a series of semi-structured interviews with students. A thematic analysis of the interviews revealed several key themes that underpinned the learning process and resulted in a model for process simulation pedagogy being proposed. The analysis also allowed progressive mapping of different learning modalities with the development different levels of cognition. The progression of the students through different levels of the Dreyfus and Dreyfus five-stage model of skill acquisition could also be demonstrated. These interconnected findings have led to new insights and informed teaching elsewhere in the course.

“Battery EV ScaleX” - Scalextric slot-cars for student led exploration of battery electric vehicle phenomena

Dr Antony Allen, Senior Teaching Fellow in Hybrid and Electric Vehicles, Mr Andrew Moore, Lead Engineer, Dr Asim Mumtaz, Senior Teaching Fellow and Dr Valentina Donzella, Senior Teaching Fellow (University of Warwick)

Interactive workshop

Session 10.4: 13:15-14:25 on 1 February 2018

The session will demonstrate how Scalextric slot-cars, powered by batteries, can inspire student engagement in experiential learning of battery electric vehicle engineering phenomena. Delegates will design and undertake short experiments to evaluate battery and whole-vehicle performance under a range of scaled real-world use case scenarios. The accompanying presentation will highlight alignment of the activities to industry skills needs.

Implementation of research-led learning and teaching of Material Science across Bachelor and Master Degrees

Dr Elena Konyshева, Associate Professor at Xi'an Jiaotong-Liverpool University

How to?

Session 12.4: 14:45-15:15 on 1 February 2018

During the last two decades Material Science has become a rapidly growing discipline, providing huge support to the development of our society and industry.

The aim of the paper is to develop a vision of Material Science discipline across the diverse student cohorts.

The discussion will be focused on the following aspects:

- Implement the Material Science vision at different years of study within the Bachelor Degree in accordance with students' learning abilities and reinforce it at the Master level;
- Research-led teaching as the driving force for the students' engagement in deeper learning;
- Emphasize the cross-disciplinary nature of the discipline and demonstrate links with the related subjects;
- Establish the framework for the development of practical skills and improve students' employability.

Building transnational and cross-discipline bridges in Materials Science and Engineering Education as a methodological approach: Far away journeys of self-discovery

Dr Gabriel Cavalli, Senior Lecturer in Materials Science and Engineering and Dr Andy Bushby, Reader in Materials (Queen Mary University of London)

Paper presentation

Session 13.4: 15:25-15:55 on 1 February 2018

We will discuss our experience of working in a transnational/cross-discipline setting in Science and Engineering at the Queen Mary University of London Engineering School (Northwestern Polytechnical University of Xi'an in China). Working in a transnational/cross-discipline setting has provided us with deep awareness of our teaching and learning practices as we negotiate these with practitioners from both a diverse institutional background and disciplinary community. This has

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provided a fertile environment to challenge and therefore improve our practices, both transnationally and locally. An emerging consideration from this experience is the opportunity to exploit this transnational/cross-discipline setting as a methodological approach in teaching and learning approaches and curriculum design, rather than simply successfully navigating it. The aim of this session is to introduce and explore this proposal, generating debate in the context of a critical but enthusiastic audience to enable it to take further shape and consolidate.

Strand 5: Computing and General/Interdisciplinary

McClintock room

Students' perception of using student response system

Dr Sardar Jaf, Teaching Fellow at University of Durham

Paper presentation

Session 8.5: 11:15-11:45 on 1 February 2018

The use of technologies for encouraging student participation and engagement in lectures is often advocated by many academic practitioners. The Student Response System (SRS), colloquially known as 'Clickers', has been used in many academic institutions. There are some evidence that it contributes positively to students' learning, engagement and interaction in lectures. The aim of this study is to highlight Computer Science students' opinion on using SRS, and its contribution to their learning and engagement in lectures. We report our finding on students' opinion of using this teaching and learning technology. Moreover, we found different effect of this technology on students' engagement in lectures, peer learning, and knowledge acquisition. Based on students' feedback, we draw our conclusion on using this technology by suggesting some ways for improving its use according to students' views and feedback.

Embedding enterprise and employability in a final year taught unit

Dr Penny Hart, Senior Lecturer and Mrs Ronel Beukman (University of Portsmouth)

Paper presentation

Session 9.5: 11:55-12:25 on 1 February 2018

This paper describes a unit which combines learning about business use of emerging technologies with enterprise and employability skills in the final year of Business Information Systems and Computing degrees at the University of Portsmouth. The unit's value is in embedding employability and enterprise alongside academic topics, improving student engagement with these vital topics. Using student-centred learning and embedding four-week modules directly taught by the Enterprise and Employability functions in the University, we provide the students with the environment to develop their critical and enterprise thinking, to improve their life chances on graduating. Feedback on the unit has been encouraging and lessons learned from the previous run are being applied to the current run.

The Manhattan Project: Creativity and Computing synthesised

Dr Chris Nash, Senior Lecturer / Programme Leader, BSc (Hons) Audio & Music Technology at University of the West of England

Interactive workshop

Session 10.5: 13:15-14:25 on 1 February 2018

This workshop provides a demonstration of the Manhattan digital environment, a platform designed to support and motivate learning programming through musical creativity. The software combines music editing with a scalable level of coding – from simple formulas or code fragments to more advanced algorithms and generative music. Following a 20-minute introduction to the project and program, delegates will have the opportunity to interact with the software, through one of the lessons, which takes a topic in computer science (e.g. iteration, conditional statements, or variables and arrays) and explores it in a musical context. The session will show how the environment

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enables a wide range of complex computing concepts to be taught visually and musically – supporting intrinsic motivation, scalable challenge, and personal creativity, to foster deeper engagement with the subject. The session is ideal for educators in computing and non-computing disciplines looking to develop students' computational thinking styles and aesthetics.

ALL SySTEMS Go: Engaging Young Scientists

Mrs Catherine O'Donnell, Research and Impact Manager, Widening Access and Participation and Mrs Lorraine Lavery-Bowen, School Partnerships Manager at Ulster University

Paper presentation

Session 12.5: 14:45-15:15 on 1 February 2018

During 2017 Ulster University delivered All SySTEMs Go. This was a STEM Outreach Extravaganza offered to year 10 pupils from post primary schools. A range of schools across Northern Ireland were invited. 700 pupils from 17 schools attended at either the Jordanstown or Coleraine Campus. Interactive parallel sessions were delivered throughout the day and groups had the opportunity to take part in 4 sessions led by different STEM disciplines.

The main objective was to increase interest in STEM and raise aspirations to go to University.

Research by Harland and McCready, 2012 had indicated that educational interventions with year 10 pupils are more likely to positively impact on aspiration and engagement.

All SySTEMs Go events were evaluated and this session will share key evaluation findings. It will also disseminate the approach and lessons learned. It should appeal to those with an interest in STEM, widening access and participation and educational outreach.

Investigating new areas of Art/Science practice-based research with the MA Art in Science postgraduate programme at Liverpool School of Art and Design

Mr Mark Roughley, Research and Teaching Assistant and Ms Kathryn Smith, PhD Researcher and Graduate Teaching Assistant (Liverpool John Moores University)

Paper presentation

Session 13.5: 15:25-15:55 on 1 February 2018

Art and Science are often seen as two different entities with very separate ideas of what constitutes research. The MA Art in Science programme at Liverpool School of Art and Design established in 2016 aims to bring together artists and scientists to explore collaborative approaches in Art/Science research and practice.

This paper will summarise the aims, development and implementation of the MA Art in Science programme, and present reflections from the programme team on the first year running this unique MA programme, including how the programme's approach to interdisciplinary Art/Science collaborative practice can be translated across disciplines.

Strand 6: Engineering, Materials and Built Environment

Ridley room

Fostering curiosity and risk in the study of materials and technology for Architecture

Mr Toby Blackman, Assistant Professor of Architecture at University of Nottingham

Paper presentation

Session 8.6: 11:15-11:45 on 1 February 2018

Architectural qualification in the UK comprises three parts: undergraduate, and postgraduate degrees prescribed by the Architect's Registration Board (ARB) and validated by the Royal Institute of British Architects (RIBA), and completion of a practice-based period of study. A clear mandate is set by the RIBA: design must constitute at least 50% of the degree programme; yet what constitutes design remains unclear. A ubiquitous model of architectural education thus prevails with immersive design studio classes, and technical, history and theory studies situated in the periphery, predating both modular degree structures introduced in the 1990s, and increased technical competency sought from practitioners and stakeholders in the built environment. This paper argues the case for continued risk taking in spatial design, whilst presenting an increment of disruption to the model in a holistic field of study presented as a case study seeking to foster curiosity and risk in STEM for architecture.

Using evidence-based active learning approaches in Engineering: How does it impact engagement and performance?

Dr Alan Brown, Lecturer (Ulster University)

Paper presentation

Session 10.6: 13:15-13:45 on 1 February 2018

Active learning techniques have been shown to improve learning across a range of STEM disciplines. This paper presents three methods: pre-class reading with online quizzes, the use of audience response devices in class and in-lecture worksheets that have been used in a Thermal Fluid Sciences class in Mechanical Engineering.

By using active learning methods, attendance and engagement has improved significantly, but end of module exam results have seen no significant improvement.

This session will present the findings of this research and discuss some of the important aspects to consider when implementing these activities. By doing so it is hoped that participants will be able to improve the learning experience for students in a variety of STEM disciplines.

Problem based learning with a twist: "Reverse-engineering" method vs. "open-ended problems" in teaching Aerospace design to undergraduate and postgraduate students

Dr Zoran Jelic, Lecturer at Swansea University

Paper presentation

Session 11.6: 13:55-14:25 on 1 February 2018

The aim of this presentation is to explain a 'twist' in the Problem Based Learning (PBL) approach in teaching Engineering Design (Aerospace). A common issue in modern engineering education is the compartmentalized, self-sufficient, modular delivery of subjects, quite the opposite of the multidisciplinary aspect of technical design. Scattered subject information leads to low knowledge retention and issues with development of 'real-life' problem solving skills. Applying the conventional PBL 'open-ended' problem method in a single semester, lower level undergraduate studies design module, causes a lot of struggle among students. A significant portion of time is wasted on curriculum repetition, and students always fall short of the design expectations. To cut short the 'fuzzy' start of the project, instead of 'open-ended' problem (i.e. instead of finding the 'original' solution) 'reverse-engineering' is introduced. This paper presents the practical implications of the method to undergraduate and postgraduate students, some research metrics, and responds to the question of how reverse engineering encourages 'originality' among learners.

Setting up a Community of Practice for a university CubeSat programme

Dr Lucy Berthoud, Senior Teaching Fellow and Ms Katy Pugh, Student (University of Bristol)

Paper presentation

Session 12.6: 14:45-15:15 on 1 February 2018

'CubeSats' were introduced by Robert Twiggs from Stanford and Jordi Puig-Suari from California Polytechnic as an educational project for engineering students. The aim is to give students a practical experience of designing, building and testing a real satellite. Developing a CubeSat is an interdisciplinary multi-year project. Information needs to be passed to new cohorts and between departments. To overcome these challenges, a "Community of Practice" (CoP) was used as a way of connecting the University of Bristol CubeSat community and encouraging better knowledge management. This work describes the implementation of the CoP in its first year by describing the different approaches taken and their effectiveness in engaging the community. At the end of the year, interviews following a semi-structured format were carried out with members of the community to evaluate the value created by the CoP. Themes from these interviews provide recommendations applicable to any challenging interdisciplinary student engineering projects.

Interventions to improve student engagement and learning in practical laboratory activities

Dr Rebecca Selwyn, Senior Teaching Associate and Dr Irene Renaud-Assemat, Senior Teaching Associate (University of Bristol)

Paper presentation

Session 13.6: 15:25-15:55 on 1 February 2018

This work presents a number of interventions made in 1st year engineering laboratory activities, with the main aim of improving student engagement and learning. A problem based learning (PBL) approach was implemented, and detailed written guidelines along with the mark scheme for the written assessment were made available to students. Students were also encouraged to reflect on their written work by adding a few comments at the end of their reports. Students reported high levels of engagement during the PBL activities, and appreciation of the relevance of the activities to their future careers. The guidelines and mark scheme increased student confidence in their writing skills and developed learner autonomy. The reflective comments moved the feedback from a monologic system towards a dialogic system, and students said the feedback would be useful in future assessments.

Learning to wire the brain: From dancing cells to spiking neurons - Using embodiment to teach developmental neurobiology

Dr Darren Williams, Reader, Dr Richard Wingate, Reader and Dr Clemens Kiecker, Senior Lecturer (King's College London)

Paper presentation

Session 8.7: 11:15-11:45 on 1 February 2018

We remodeled a traditionally taught level 6 module in Developmental Neurobiology that had relied heavily on students assimilating content. To overcome a perceived deficit in conceptual awareness in our students, we devised new learning outcomes aligned with synoptic assessment. Lectures were organised into blocks and separated by 'concept workshops'.

Concept workshops employ active-learning techniques, initially using drawing tasks and subsequently "embodiment exercises" where students 'become' biological elements such as active neurons in a network.

We reasoned that embodiment exercises create a dynamic environment where individual students constantly renegotiate understanding through their own constructs. This moves away from 'neurocentric' ideas of cognition, based on symbols and computation. Rather, embodied cognition takes place through minds that are embedded within bodies. Our experience suggests that embodiment opens students to imaginative modes of thinking that facilitate a deeper understanding of the complex topic of neurodevelopment.

Strand 7: Sciences

Jenner room

Developing a digital environment for teaching and learning parasitology

Dr Antonio Peña-Fernández, Senior Lecturer in Biomedical & Medical Science and Dr Mark D. Evans, Lecturer (De Montfort University), Dr Angela Magnet, Lecturer and Dr Soledad Fenoy, Senior Lecturer (Universidad San Pablo CEU) and Dr Lucrecia Acosta, Lecturer

Paper presentation

Session 9.7: 11:55-12:25 on 1 February 2018

A group of academics from three EU universities and biomedical scientists are developing a digital learning environment on parasitology that emphasises self-learning and will facilitate the acquisition of basic clinical and parasitology skills. The resource, named DMU e-Parasitology, will be publicly available in 2018 on the De Montfort University website (<http://parasitology.dmu.ac.uk/>). This eLearning package presents three sections (theory, and a virtual laboratory and microscope), which will be presented during the session including the scaffolding and translational approach used to develop this teaching and learning resource. A description of the clinical case studies available in this resource to enhance critical thinking and self-learning will be also provided. The DMU e-Parasitology could be used to facilitate the introduction of parasitology in any human health science degree as recent surveys have highlighted the necessity of teaching the foundation of parasitology to future health and medical professionals.

Taking an active approach to lectures using flipped learning, play and digital technologies

Dr Lorraine Smith, Teaching Fellow at Sussex University

How to?

Session 10.7: 13:15-13:45 on 1 February 2018

My main aim was to increase engagement of students, thereby increasing the amount of deeper learning within lecture sessions. The objectives of this strategy involved incorporating several different active learning approaches into lectures, including:

- 1) A Flipped approach for the main content of each topic using videos available prior to lectures, enabling students to gain an understanding of the main concepts at a pace that suits them.
- 2) Using digital technologies available for polling and quizzing to provide students with immediate feedback during 'lecture' sessions.
- 3) Using digital technologies available for group work (e.g. drawing and modelling apps) to encourage group work and peer learning.
- 4) Using cloud technologies to share students' completed group work and provide students with immediate 'snowballed' feedback.
- 5) Encouraging students to apply knowledge and understanding via creative play strategies such as card games and quizzes.

Synchronous online tuition: Differences between student and teacher expectations and experiences

Dr Lynda Cook, Senior Lecturer, Mrs Diane Butler, Senior Lecturer, Deputy Director eSTeEM, Dr Vikki Haley-Mirnar, Senior Lecturer, Dr Catherine Halliwell, Associate Lecturer and Dr Louise MacBrayne, Associate Lecturer (Open University)

Paper presentation

Session 11.7: 13:55-14:25 on 1 February 2018

Online synchronous tuition in the distance learning context is thought to provide many benefits for the learner. These include opportunities to engage with peers as well as with teachers, while enhancing learning and skills development. Our recent research has suggested that some of these opportunities are rarely valued by students (HEA Manchester, 2017). We have further explored student perceptions of online tuition and systematically examined student learning behaviours in online classrooms. Our findings suggest that whilst students appreciate some of the benefits of this approach, such as the ability to view recordings of online tutorials after or instead of attending live events, many appear to have a set of expectations of successful online tuition which conflict with our view as teachers. In particular conflict are the teacher and student view of the merits of peer to peer learning.

The aims of this session are to describe the differences found between student and teacher expectations and experiences as applied to tuition in online settings and to discuss implications for this mode of delivery.

Experimental Design Laboratory within Introductory Physics

Dr Pedro Parreira, Lecturer at University of Glasgow

How to?

Session 12.7: 14:45-15:15 on 1 February 2018

Being able to contextualise and solve complex problems is a highly valued skill in STEM graduates, which we strive to nurture in our students. In undergraduate degrees, laboratory teaching has been used to consolidate conceptual understanding, develop practical skills and inculcate an evidence based problem solving approach. Here we present an alternative to the traditional introductory level physics laboratory experiments which enhances students' learning by focusing on problem solving rather than simply following detailed instructions. Conceptual understanding is enhanced further by connecting students' prior learning and experience with the predominant use of everyday objects. Working in small groups, students were able to achieve the aims of the experiments through self and peer-instruct. The entire laboratory component of a first year Physics course was successfully reorganised based on this approach. Introductory undergraduate teaching laboratory can truly fulfil the function with which it was originally conceived cost effectively by following this approach.

Enhancing student engagement and experience in Forensic Science and policing by collaborative practice and experiential learning

Dr John Wheeler, Associate Dean for Students for the School of Law, Policy and Forensics and Dr Claire Gwinnett, Associate Professor in Forensic and Crime Science (Staffordshire University)

Paper presentation

Session 13.7: 15:25-15:55 on 1 February 2018

This presentation discusses the work conducted at Staffordshire University in developing strong collaborations with forensic and policing stakeholders to enhance the student experience and aid employability. This work has led to collaboration with more than a dozen police forces and a multitude of forensic providers and governing bodies. This collaborative practice has had an enormous impact on the development of innovative and inclusive opportunities for students to gain real-world work experience and undertake research projects that have a direct impact upon police policy and process. This work has led to greater student satisfaction, improved graduate employability, increased numbers of good degrees and being a winner for the HEA Collaborative Award for Teaching Excellence 2017.

The aim of this presentation is to describe the overall strategy and approach for developing these opportunities for students, including how these may be integrated into the curriculum and discussing the students' experience of these experiential learning activities.

Using the internet of things to deliver teaching materials in student workshops

Dr Nicola Whitehead, Associate Professor and Mrs Colin Telford, Demonstrator (University of Wales Trinity St David)

Paper presentation

Session 8.8: 11:15-11:45 on 1 February 2018

Google's Physical Web technology provides new possibilities for the provision of just-in-time, just-in-place information to students working on practical skills. This paper discusses the use of this in a collaboration between the University of Wales Trinity St. Davids' schools of Applied Computing and Architectural Glass. It will discuss the technology used and how it was set up and monitored, together with an overview of the health and safety and related instructional materials that were presented to students using the technology. Usage statistics and student feedback will be considered.

Strand 8: General/Interdisciplinary

Gibbs room

Object-based learning in the class room, to engage and enthuse

Dr David Smith, Senior Lecturer in Biochemistry (Sheffield Hallam University)

How to?

Session 9.8: 11:55-12:25 on 1 February 2018

The use of objects within the classroom and workshop sessions is an invaluable way of increasing participation and generating conversation. Objects can act as focal point for learning or can be used in a more abstract manner to generate ideas. This session will explore the use of objects as an engagement and learning tool in both large and small group settings. 3D printed artefacts, parts of instruments and printed images will be used to explore structure and function, generating discussion and acting as stimulus to prompt conversation. In this session the practical aspects of the use of objects in large and small group teaching will be addressed alongside the pedagogical basis of the learning theory.

Developing STEM teaching: Understanding the importance of the observation

Dr Christopher Douce, Staff Tutor at Open University

Paper presentation

Session 10.8: 13:15-13:45 on 1 February 2018

Teaching excellence has been a theme that has recently dominated discourse about higher education teaching and learning. A fundamental question to ask is: how do we best develop STEM teaching practice to ensure that sessions are effective and engaging? This paper presents a summary of a research project at the Open University that has explored the practice of tutorial and teaching observations. The paper begins with a short literature review and then summarises results and opinions gathered from a series of focus groups: two focus groups for associate lecturers, and one focus group for their line manager. At the end of the paper, a number of recommendations and suggestions for practice are offered. This session will be of interest for anyone who is involved in teaching development and quality enhancement.

Teacher Education: A journey of experiential professional development

Dr Shereen Shaw, Lecturer in Further Education at Edge Hill University

Paper presentation

Session 11.8: 13:55-14:25 on 1 February 2018

This paper aims to explore the experiences and outcomes of this experiential approach to professional development for teachers who participated in the Employable teacher module on FET programme via primarily looking through learners' assessment, feedback/ reflections and any personal reflective accounts. Key research questions are:

1. To what extent do learners draw upon their own unique past experiences as a foundation to engage with the new? Or as a barrier/hindrance?
2. In teacher professional development, can the suggested approach realistically motivate teachers to try new practices and make desired changes to the curriculum a practical reality?

Progression and promotion as a tool to drive teaching excellence

Dr Nicholas Freestone, Associate Professor and Ms Sophanit Pepple, Graduate Student (Kingston University)

Paper presentation

Session 12.8: 14:45-15:15 on 1 February 2018

The Dearing Report published in 1997 suggested that there needed to be a rebalancing of the academic promotional pathways in UK HEIs to ensure that excellence in teaching is recognised and rewarded. Twenty years on are we any nearer to finding that balance? Data gathered in this work suggests we still have a long way to go. An analysis was undertaken of the promotion criteria across a range of universities in the UK. Institutions were also asked what the current situation was in relation to the proportion of the professoriate achieving recognition through either their teaching practice or research. Overwhelmingly, we found that the majority attained their professorships by dint of their research achievements rather than excellence in learning and teaching. We found that promotional criteria related to learning and teaching were non-transparent and ambiguous which was in marked contrast to the clear promotional criteria associated with research.

Collaborating with Impact: Increasing student attainment through higher order engagement

Dr Matthew Watkins, Senior Lecturer at Nottingham Trent University

Paper presentation

Session 13.8: 15:25-15:55 on 1 February 2018

The paper will outline the experience of engaging 2nd year BSc Product Design students in live briefs over two years with a large family owned construction company. Specifically the paper will consider the outcomes of the projects and why the projects have been more successful in terms of student's engagement and attainment than typical projects including other live industry projects. A number of factors are considered and evidence drawn upon to conclude that the improvements are due to increased motivation due to a number of factors pertaining to the relevance, experiential learning opportunities, the competitive nature, and investment in terms of time, money and encouragement from the live partner involved.

Session : on