Advance HE STEM Conference 2021

Rethinking STEM Higher Education

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Pre-recorded session abstracts

Contents

Biomedical and Bioscience teaching in the time of COVID-19

Dr Eiman Abdel Aleem and Dr Steve Hunter, London South Bank University

Rethinking practice-based education

The COVID-19 pandemic has affected many areas of life including higher education. This is particularly challenging for our practice-based Biomedical/Bioscience courses. This session will use specific examples and share approaches towards addressing challenges to meet the practical, transferable and intellectual learning outcomes during COVID-19. Examples include the blended use of Moodle, Panopto and MS Teams. We are also developing a BiomedNet e-cluster to serve as a one-stop-shop for filmed laboratory experiments, tutorials, placement opportunities, peer -, and lecturer-student communications. Our proposal provides an integrative, inclusive and personalised approach towards creating an effective online learning environment to achieve desired outcomes.

Development and impact of a smartphone pilot app for teaching Medical Parasitology

Dr Antonio Peña-Fernández and Joshua Simons, De Montfort University, Professor Carmen Del Aguila, Universidad San Pablo CEU, Spain, Sylvester Koroma, University of Makeni, Sierra Leone, Dr Lucrecia Acosta, Universidad Miguel Hernández de Elche, Spain

Rethinking practice-based education

On April 2020, we launched a pilot app that presents most of the innovative resources of DMU e-Parasitology® (http://parasitology.dmu.ac.uk/), which can be downloaded from Google store for beta tester. The creation of this app is a response to students' feedback collected during our pilot intervention to strengthen medical parasitology at University of Makeni (UNIMAK, Sierra Leone). The novel app has been shown to play a significant role in Medical Parasitology education in a country with very limited access to computers, especially during emotional times for the Sierra Leonean population, who are facing the COVID-19 pandemic just after recovering from the Ebola outbreak.

Digital scaffolds for SPC: A case study of enriched learning for the new normal

Dr Iain Duncan Stalker, Institute of Management, University of Bolton and Rinkal Desai, University of Warwick

Rethinking practice-based education

Digital technologies promise much to facilitate student learning in higher education. Yet, we appear to be lacking a robust framework that can be used to guide efforts and help identify opportunities; one that can be used to classify existing initiatives and is grounded in pedagogical frameworks. Here, we will review our current work in the development of digital learning facilitators for higher education. We will present a framework that can be used to inform digital learning initiatives, which synthesises learning taxonomies and the (so-called) intelligent automation continuum. Using Statistical Process Control, we will explain how we have used this framework to develop digital learning and interventions. A particular emphasis of the talk will be on the individualisation of learning.

Innovative flexible curriculum design for Engineering Degree Apprenticeships to bridge the gap between academia and industry

Dr Goudarz Poursharif, Bill Glew, Dr Panos Doss and Dr Gillian Knight, Aston University

Rethinking practice-based education

In 2019, Aston University's Professional Engineering Centre (APEC) developed a suite of level 6 Engineering Degree Apprenticeship (DA) in line with the existing DA standards and in collaboration with major UK manufacturers. The curricula were designed to be flexible and responsive to employers' needs while ensuring academic and professional development of the apprentices aligned with the required knowledge, skills and behaviour. This work details our design approach in working with employers to develop effective, efficient and flexible curricula. Finally, using the data collected from the staff, employers and students, the effectiveness of these programmes were evaluated and presented.

Online Chemistry investigations using simulations and remotely controlled instruments

Dr Kate Nixon and Dr Eleanor Crabb, The Open University

Rethinking practice-based education

The COVID-19 pandemic has resulted in losses in opportunities for students to gain experience at summer placements in research and industrial laboratories. Such placements are invaluable for developing skills and attributes desired in graduates. Recognising the loss of opportunity, a Chemistry Online Summer School was piloted. The activities at the school are investigative in nature, to build skills relevant to research, and utilise both interactive screen experiments (simulations) and remote experiments. The investigations utilise common analytical techniques such as UV-vis spectroscopy, IR spectroscopy, HPLC and GC-MS which are used in across many disciplines within STEM.

Remote delivery of Electronic Engineering practicals

Dr Adam Funnell, University of Sheffield

Rethinking practice-based education

How can practical learning outcomes be maintained during a pandemic? With strict social distancing and slashed lab capacities, educators have been forced to innovate and provide take-home kits, remote access to in-lab equipment and even experiments in students' kitchens! Hear how educators in the Multidisciplinary Engineering Education team at the University of Sheffield, a team dedicated to Practical Engineering education, maintained practical learning outcomes for thousands of students across an entire faculty. By taking a multidisciplinary overview of progressively structured learning outcomes, alongside some innovation and creativity, students still experienced effective practical learning.

Students as partners in module design: The development and delivery of a computer-aided drawing course for Chemical Engineering undergraduate students

Dr Marsha Maraj, Pierre Walker and Nikolaos Kalogeropoulos, Imperial College London

Rethinking practice-based education

Teaching computer-aided design (CAD) software within the Chemical Engineering Department at Imperial College is somewhat limited by a condensed timetable and traditionally, students will produce 2D hand-drawn diagrams as part of their module requirements. With the move to remote teaching, students and staff collaborated on a series of online CAD training videos and exercises which were trialled for nine students before being rolled out to the entire third-year cohort. Initial feedback showed that the students found the CAD training to be helpful and relevant to not only the current module, but also to other design-based modules within their programme. This highlights the importance of staff-student collaborations and embedding the student voice to create more authentic learning experiences.

Teaching practical cyber security remotely: Challenges and discoveries

Dr Yulia Cherdantseva, Cardiff University

Rethinking practice-based education

Given the shortage of cyber security professionals worldwide, it is important for all Computer Science and Software Engineering programmes in HE to provide high quality Cyber Security Education (CSE) as their integral part. The unexpected move to remote teaching in 2020 has presented many challenges to practical CSE. This presentation will explain how the National Software Academy at Cardiff University dealt with teaching practical cyber security remotely in the context of project-based learning and in collaboration with industry. The presentation will cover the challenges faced and the interesting discoveries made, which can benefit all cyber security educators.

The importance of teaching risk management for a resilient and sustainable STEM education

Dr Salma Alarefi, University of Leeds

Rethinking practice-based education

The disturbance experienced across the education sector due to the breakout of COVID-19 has emphasised the importance of resilient teaching and learning. The higher education sector, STEM in specific, is no exception. Today, the new norm of teaching means that anticipated risks are to be mitigated by the migration to the digital world. Teaching risk management, however, is yet to be considered. While remote learning remains a safer alternative, it may not be the ultimate inclusive substitute. Resilient but sustainable measures are to be considered. This era therefore presents a pivotal time to educate STEM learners on risk management. An example of practicing risk management for Engineering students through project supervision is thus presented.

The role of web broadcasts to develop online learning communities in STEM

Venetia Brown, The Open University

Rethinking practice-based education

The challenges of not being co-located on site can affect the student learning experience. To address this, The Open University uses interactive web broadcasts to engage students in practical demonstrations, experiments and field investigations. The approach embeds a live video-stream alongside text-chat and question-and-answer widgets to enable bi-directional communication between students and lecturers. The research discussed in this session is evaluating how the broadcasts are being used to support learning and enhance a sense of community. Findings will be presented on the attitudes, motivations and types of interactions between students and lecturers and discuss how such live events can deliver an alternative to on-campus events.

Adapting assessment for meaningful learning and positive outcomes

Dr Raja Toqeer, Macclesfield College and Dr Sahithi Siva, Pearson Education

Rethinking assessment

An unprecedented lockdown for COVID-19 has led many of us to adapt our lives rapidly. For me, one of the key challenges was to rethink the remote assessment, which is valid, verifiable and equitable to ensure that I

adapt the teaching to prepare students for this new type of assessment. The first step I had to take was to identify and agree effective channels of communication. I ensured that the teaching, learning and assessment activities were clear, short and smart, providing opportunities for academic and employability skills development and ensuring that the students were not disadvantaged for future progression.

Examining student engagement with online resources in changing scenarios: Lessons learned for post-COVID assessment

Dr Catherine Dobson, University of Hull and Gail Capper, Pearson Education

Rethinking assessment

With over five years' experience running a first year Engineering module with online assessment, Dr Catherine Dobson, in collaboration with Gail Capper from Pearson, will share the impact on student engagement caused by a number of changes. In this academic year the online assignment deadlines and course credit value were changed, then COVID-19 forced everything to go fully online for the final three weeks of term. This session will review lessons learned and provide practical advice for delivering online formative and summative assessment, providing a future-proofed approach for HE educators whatever the coming months and years may hold.

Investigating contract cheating provider marketing in the Computing discipline

Dr Thomas Lancaster and Morkus Salasevicius, Imperial College London

Rethinking assessment

Contract cheating providers and essay mills are often thought of as offering only a general service, but the advertising and marketing mechanisms they employ go far beyond simply essays. This presentation will report on the results of a study conducted in summer 2020 that examined how services were targeting their advertising to the computing academic discipline. A student going online, looking for help with programming, cyber security or databases is still likely to be greeted with offers of contract cheating. The intention of the session is to encourage delegates to rethink their understanding of assessment techniques and their robustness.

Promoting a deep approach to student practical preparation

Dr Kevin Morgan, Queen's University Belfast

Rethinking assessment

Practical classes are essential to the training of students and are designed to provide opportunities to develop technical skills and apply theoretical principles to real-life contexts. I believe a previous generic approach to pre-lab preparation led to surface approach learning in students. Newly designed, targeted and specific pre-lab assignments encourage students to understand procedure and safety documents. Teaching assistants found advance knowledge of most students had improved with a move from of "what do I do next?" to "why?" and "what ifs?" queries related to the practical and its theory. The new pre-lab assessments also resulted in a marked improvement in understanding of the science itself and the communication of that knowledge in the post-lab reports.

Trial and learn using online assessment platforms

Dr Vijesh Bhute and Ellen Player, Imperial College London

Rethinking assessment

Formative assessment is a critical component for student learning. Providing individualised feedback especially in Mathematics-heavy Engineering courses is a significantly time-consuming and subjective process. Doing this on a weekly basis is practically not possible. Identifying what students are struggling with can also become challenging with remote education. In this presentation we will discuss the implementation of an online assessment platform, WeBWork, to automate the process and make Math problem sets come alive. We will discuss best practices on how we used this to make assessment better for both students and teachers.

Who's scamming who? Exploring the dark side of the contract cheating marketplace on Reddit

Dr Thomas Lancaster and Rahul Gupta, Imperial College London

Rethinking assessment

Reddit is a website powered by user-generated content used to host online communities and discussions. Although it has legitimate uses, there is a growing marketplace on Reddit supplying and offering contract cheating services. Such services are particularly prominent for STEM subjects. This presentation will use a case study and example-type approach to explore the services on offer, the reasons people provide to justify buying and selling original assessed student work and the underlying risks of scams that students and providers brokering breaches of academic integrity need to be made aware of.

"Blended tutorials": Blended synchronous learning in Mathematics

Dr Andrew Potter and Colin Blundell, The Open University

Re-Connecting

As we reconnect with students in both face-to-face and online environments, the prospect of blended synchronous learning has attracted a great deal of interest. The advantages of teaching in a single session with some students face-to-face and some students online are obvious in the context of a global pandemic and social distancing. In this session, we will present the results of a scholarship of teaching and learning project, which seeks to explore the use of blended tutorials in an honours technological, pedagogical, and institutional issues, as well as STEM-specific challenges-level Mathematics module. Results indicate rich points for further discussion.

Co-creating Business Ethics Course: Version 2.0 for yourself and your learning

Dr Mary Ho and Jessica Lynn Martins, HKUST Business School

Re-Connecting

In part of the university's co-create programme, Project '#U2.0: Version 2.0 for yourself & your learning experience' was a journey to reframe and redefine learning initiatives for the new academic year (Fall 2020). With the vision of creating a new self, four Business undergraduates with their professor aimed to re-think what Business Ethics education should be and explore innovative pedagogical approaches to enhancing the delivery of teaching and learning experiences for a Business core course at a Science and Technology university.

The use and value of a student-led Wiki towards facilitating peer collaboration in Chemical Engineering

Dr Marsha Maraj, Thomas Nok Cheng and Pierre Walker, Imperial College London

Re-Connecting

Wikis can facilitate an effective and increased online engagement between individuals who may be geographically distributed. In January 2020, a student-led Chemical Engineering Wiki was developed by two undergraduate students at Imperial College with progressive support from staff. Wiki pages were developed for ten second-year modules which by June 2020 had received over 10,000 views. 90% of the students who used the Wiki found it to be a valuable means of retrieving information, consolidating concepts and preparing for their examinations. These efforts will continue across all year groups in the new academic year and it is hoped that this will provide students additional opportunities for increased collaboration and peer scaffolding given the ongoing requirements for remote teaching and learning.

We're all in this together: A school-wide approach to facilitate presence and consistency for learners and staff

Dr Dawn Story, University of South Wales

Re-Connecting

The University of South Wales has responded to the COVID-19 situation with the development and of a pan-university set of principles and an underlying framework for implementation called DEAL – Digitally Enabled Active Learning. DEAL calls for building social learning communities, enquiry over instruction, inclusivity and accessibility, high quality interactions and learning that is visible and active. The School of Applied Science have taken ownership of facilitating and ensuring a consistent approach to module and course delivery which meets DEAL by developing a template within the VLE that guides both staff and learners through the DEAL journey.

Virtual team-working in the post-COVID-19 environment

Ming Jiun Ngu and Dr Vijesh Bhute, Imperial College London

Re-Connecting

Teamwork is ubiquitous in organisations and therefore, team-based learning (TBL) has become an essential component of undergraduate education in the past few decades. Collaboration within academic programmes has been shown to be a valuable source of self-efficacy and active learning. However, with the COVID-19 pandemic, most universities have adopted remote teaching and learning. Thus virtual team-working plays an important role in this transition. Our study explores different student attributes as well as evidence-based best practices to improve student communication and teamwork in the remote setting.

Re-connecting scholarship: Moving a STEM community online

Diane Butler, Dr Trevor Collins and Diane Ford, The Open University

Re-Connecting

In this presentation we will explain how moving a community of scholars online in response to the COVID-19 pandemic has helped to widen and deepen scholarship within our STEM faculty. We will share lessons from the process of mobilising the community to engage with online conferencing technology and the wider

implications this is having for our teaching. As a distributed organisation, the move to home working and online events has enabled us to extend participation in scholarship and establish a re-connected SoTL community.

Promoting connectivity during lockdown: Adopting a socio-cultural approach for the training of Graduate Teaching Assistants to support STEMM undergraduate students' academic writing development

Rebecca White, Dr Julie King and Dr Majula Silva, Imperial College London

Re-Connecting

At Imperial College London, the Department of Materials and Centre for Academic English collaborate to train Graduate Teaching Assistants (GTAs) to support the development of undergraduates' academic writing while giving feedback on coursework and technical reports. During lockdown, we wanted these sessions to allow GTAs to build support networks with both fellow GTAs from their subject disciplines and the Centre for Academic English. In this session we share how we took a sociocultural approach to learning design to promote collaboration and connection using the Microsoft Teams collaboration hub.

Stay and Succeed North East: Re-connecting with industry and improving graduate prospects in a socially distanced world

Laura Gower, Newcastle College University Centre

Re-Connecting

Stay and Succeed North East is a three-year project funded by the Office for Students and led by Newcastle College University Centre. The project aims to ensure North East graduates in the fields of Engineering and Digital Technology are able to access higher level employment in their home locality and contribute to regional industry and economy. Central to this innovative project are 18 graduate interns who operate as a strategic vehicle by which new collaborative networks can be formed between the college and regional employers. This session explores how collaborative practices central to the project are enabling the institution to support Digital and Engineering students post-COVID.

Widening access and supporting student transition and success on MSc AI and Data Science conversion courses

Dr Kamilah Jooganah, Dr Ed de Quincey, Dr Sangeeta Sangeeta and Dr Allison Gardner, Keele University

Renewed

The shortage of specialists from diverse backgrounds (e.g. ethnicity, gender, disability) working in AI and Data Science is an area requiring urgent attention. Through drawing on interview data conducted with university students, our study aims to understand the barriers individuals encounter from considering a career and/or from studying MSc AI and Data Science courses. Our objectives are to provide insight into how universities can widen access and support student transition and success on MSc AI and Data Science/Computer Science related courses. This understanding will be of value to others running similar courses, as well as PGT STEM courses in general.

Transition: Changing the face of lecture notes

Ellen Player and Dr Vinesh Bhute, Imperial College London

Renewed

Notes are a vital resource for students to reconfirm material taught in lectures and the way they are provided have potential to make a significant difference in students' understanding and engagement. We have designed a novel approach with e-learning to achieve this. Using active collaboration with students we have upgraded the way Maths notes are delivered to students focusing on accessibility for all.