The 2nd Annual STEM Teaching Conference 2021

Conference Booklet

3rd March 2021
Via MS Teams

Conference Webpage: http://stem.open.ac.uk/stem-teaching-2021

ACKNOWLEDGEMENTS

We gratefully acknowledge the support of the following people who helped with various aspects of this conference:

Nicholas Braithwaite, Executive Dean, STEM Faculty

Diane Butler, Associate Dean Academic Excellence

Carlton Wood, Associate Dean, Students

Trevor Collins, Director eSTEeM, STEM Faculty

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Keith Hamilton, Chief Technician AV, Information Technology

Judith Pickering, Head of Curriculum, Strategy & Governance

Matthew Duncanson-Hunter, Senior Manager (Enterprise & External Affairs)

Jaimie Sawyer, Deanery Assistant

Michelle Leonard, PA in Executive Dean's Office

STEM Teaching Conference Presenters

Open University colleagues who have contributed to the conference by facilitating or supporting the short oral sessions.

Thank you!

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PROGRAMME

Wednesday, 3rd March 2021

9.15 – 9.30	**Registration**		
9.30 - 9.40	**Welcome and introduction** (Plenary Meeting Room) (**Diane Butler,** Associate Dean Academic Excellence and **Carlton Wood** Associate Dean, Student Experience, STEM)		
9.40 – 10.10	**Keynote** (Plenary Meeting Room) **Dr Winston Morgan** BSc, PhD, FHEA, Reader in Toxicology and Clinical Biochemistry, Director of Impact and Innovation, School of Health Sport and Bioscience, University of East London, *Changing from the attainment gap to the awarding gap is an attempt to shift interventions away from fixing the students and their deficits; a strategy which has failed over the last 25 years, to fixing the tutor and their biases. Despite the change, many still struggle with how this can be achieved. To this end the presentation will show that making changes to the design and delivery of assessments and assessment practices will not change outcomes, primarily because they assume a student deficit. A more effective strategy would be to highlight the role and impact of tutor bias linked to racialised stereotypes. This is particularly important to the allocation of privileges to students which will enhance performance, the marking of assessments and who is accused of academic misconduct. Finally, the presentation will provide examples of how we can minimise or mitigate the impact of racialised bias on BAME student outcomes, particularly the awarding gap.*		
10 .10 – 11.10	**Parallel Session 1 – Short oral presentations** Short oral presentations are part of a chaired session which includes a number of short presentations (15 - 20 minutes). **Questions that are not answered in the session can be followed up after the conference.**		
	(Meeting Room 1)	(Meeting Room 2)	(Meeting Room 3)
10.10 – 10.30	**Introducing RoboLab: an integrated robot simulator and Jupyter notebook environment for teaching and learning basic robot programming** (Tony Hirst)	**Early Start Opportunity in S294: what has it achieved?** (Katja Rietdorf, Jane Loughlin)	**Teaching diversity competence to digital technology apprentices** (Clem Herman)
10.30 – 10.50	**Demonstration of the SK298/Open Science Lab interactive 3D brain model** (Nicola McIntyre, Katherine Leys, Geoff Austin, Brian Richardson)	**A pilot study of 2D augmented haptic drawing system for novice practitioners who were classified as blind and visually impaired.** (Lisa Bowers, Janet Van Der Linden, Simon Holland, Emilie Giles, Claudette Davis-Bonnick)	**Student views on TMA feedback** (Carol Calvert, Clare Morris)
10.50 -11.10	**Evaluation of game-based learning in a level 2 computing module.** (David Bowers)	**Proactive help for ill-prepared Level 3 students** (Louise MacBrayne, Fiona Moorman, Janet Haresnape)	**Sustaining a community of online learners - a case study from the Open University's MSc in Mathematics** (Ben Mestel)
11.10 – 11.20	**Break**		

11.20-12.20	**Parallel Session 2 – Short oral presentations**		
	(Meeting Room 1)	**(Meeting Room 2)**	**(Meeting Room 3)**
11.20 – 11.40	**Towards qualification world** (Carol Calvert, Rachel Hilliam)	**Caps, quotas and standby lists: a guide to managing student waiting lists (and reducing your stress levels)** (Frances Chetwynd)	**A competency-based accreditation standard** (David Bowers)
11.40 – 12.00	**Adapting to the new normal: using teams to collaborate and co-work with students and associate lecturers** (Georgy Holden, Nicole Lotz, Derek Jones)	**MU123: 10 years and still nailing it!** (Sally Crighton, Gerry Golding, Andrew Potter, Katie Chicot)	**The impact of using OUAnalyse on attainment gap in 3 STEM modules in 2019J** (Martin Hlosta, Vaclav Bayer, Miriam Fernadez, Christothea Herodotou)
12.00 – 12.20	**A collaborative framework for associate lecturers, to enhance student and tutor satisfaction.** (Marina Carter, Richard Mobbs)	**Sustainable student support: which half of the glass should we fill?** (Hayley Ryder, Toby O'Neil)	**A successful assessment strategy for times of Covid** (Janet Haresnape, Vicky Taylor, Hannah Gauci)
12.20 -1.00	**LUNCH and SWAY Presentations available** http://stem.open.ac.uk/stem-teaching-2021 1. **Student perceptions of online tutorials and forums in S294 and/or SK299** (Lorraine Waters & Sarah Daniell) 2. **From Outbreak and Lockdown: Moving T885 Residential Weekends to Online Delivery** (Gareth Neighbour) 3. **OUAnalyse as a mean for investigation of degree-awarding gap across ethnicities** (Vaclav Bayer) 4. **The impact of pre-module interventions on assessment performance in-module and module results** (Becca Whitehead, TR Wilks, H Fraser, R Hildago, C Small) 5. **Engaging new STEM associate lecturers with induction activities** (Janette Wallace & Hannah Gauci) ***For any questions you may have on the Sway Presentations, please contact the authors directly.***		
1.00 – 1.45	**IGNITE Sessions (Plenary Meeting Room)** *5-minute presentations plus 'Q and A' at the end of all presentations)* 1. **MST366: Playing around with game theory and recreational mathematics!** (Robert Brignall and Andrew Potter) 2. **The Mathematics MSc: the next 35 years!** (Ben Mestel) 3. **Interdisciplinarity: a wicked problem.** (John Baxter and John Butcher) 4. **Using past performance as a driver for the future.** (Paul Collier) 5. **Remote examinations for Mathematics and Statistics.** (Tim Lowe) 6. **A Future for Learning Outcomes?** (Tom Olney)		

1.45 – 2.45pm	**Parallel Session 3 – Short oral presentations**	
	(Meeting Room 1)	**(Meeting Room 2)**
1.45 – 2.05pm	**Evaluation of historical outcomes and a 2019J proactive campaign of support for Credit Transfer (CT) students studying at L3 in the School of Life, Health and Chemical sciences** (Eleanor Crabb, Jane Loughlin, Fiona Moorman, Angelika Fischenich, Jo Smythe)	**Producing a module outside the VLE** (Michel Wermelinger & Oli Howson)
2.05 – 2.25pm	**How do students and staff use the Mathematics and Statistics Study Site?** (Rachel Hilliam, Gaynor Arrowsmith, Derek Goldrei, Alexander Siddons, Cath Brown)	**Student support for Data Interpretation skills in S294** (Katja Rietdorf)
2.25 – 2.45pm	**Supporting students seamlessly through better communications between the Science Student Support Team and Associate Lecturers.** (Fiona J Aiken, Fiona Moorman, Gemma Warriner)	**The Mathematics Online Project: a reflection after 10 years** (Ben Mestel)
2.45 – 3.00pm	**Break**	
3.00 – 3.50pm	**Panel Discussion and Plenary (Plenary Meeting Room)** We are delighted to welcome our panel, drawn from a range of different universities and STEM disciplines to our annual STEM Teaching conference. Our discussion will focus on how other STEM practitioners and institutions have experienced the last year and how they feel their teaching practices may be permanently altered as a result of the pandemic and the switch to digital delivery of curriculum. The focus will be on the potential long-lasting implications for STEM Higher Education both in traditional and distance learning institutions. We will be joined by: • **Chair: Diane Butler,** Associate Dean Academic Excellence • **Dr Neil Williams,** Director of Undergraduate Studies, Faculty of Science, Engineering and Computing, Kingston University • **Professor Sally Smith** DBA, FBCS, PFHEA, Head of Graduate Apprenticeships and Skills Development, Edinburgh Napier University • **Dr Elinor Jones,** Associate Professor (Teaching), Department of Statistical Science, University College London	
3.50 – 4.00pm	**Closing remarks and announcement of winners of the Student Prizes (Plenary Meeting Room)** by Professor Nick Braithwaite, Executive Dean, STEM	

WELCOME AND INTRODUCTION

Welcome to the 2nd Annual STEM Teaching Conference. After a very successful first conference last year we are delighted to repeat this event. Ongoing circumstances mean that we are meeting online (the new normal!) but we are pleased that this mode of delivery enables wider participation from our geographically distributed colleagues and our students.
Thanks to all our presenters for their willingness to engage online.

The aim of the Teaching Conference is to highlight the innovative and ground-breaking teaching that we deliver across our faculty and to share best practice around STEM teaching, learning and student support. Topics covered in the conference range from new assessment practices, using new collaborative tools for teaching and innovative approaches related to teaching specific disciplines.

The conference programme is an exciting mix of keynote, panel discussion, short oral presentations, Ignite sessions and Sway presentations showcasing work from colleagues in the STEM Faculty. We are delighted to welcome Dr Winston Morgan (University of East London) as our keynote and Dr Neil Williams, Dr Elinor Jones, and Professor Sally Smith to participate in our panel discussion.

At the end of the conference the STEM faculty's Executive Dean, Professor Nick Braithwaite will announce the winners of the inaugural STEM Student Awards. Awards will be given for students who best served the STEM Student community who studied STEM module presentations from 19J onwards and are not on current modules.

- **Serving the STEM student community** – recognition for students who have supported, enabled, encouraged their fellow students, or served the STEM student community in any way.

During the parallel sessions, the ignite sessions, poster sessions and breaks for refreshment there will be plenty of opportunities for joining the STEM scholarship debate and we look forward to your contributions.

We welcome you to our 2nd STEM Teaching Conference and hope you have an informative, stimulating, and enjoyable day.

Diane Butler (AD Academic Excellence) and Carlton Wood (AD Student Experience)

OPENING KEYNOTE SPEAKER BIOGRAPHY

Dr Winston Morgan BSc, PhD, FHEA, Reader in Toxicology and Clinical Biochemistry, Director of Impact and Innovation, School of Health Sport and Bioscience, University of East London

Speaker Biography:

Dr Winston Morgan is a Reader in Toxicology and Clinical Biochemistry and also Director of Impact and Innovation in the school of Health Sport and Bioscience at University of East London. He has been an academic for over 25 years and has researched extensively in many areas of bioscience. He is also involved in research and scholarly activity into factors particularly race which determines societal outcomes in medicine, education and wider society. Dr Morgan has written or contributed to numerous articles including in the Guardian, The Times, The Conversation and the BBC on the intersection of race, ethnicity genetics and other societal outcomes.

Keynote summary:

Changing from the attainment gap to the awarding gap is an attempt to shift interventions away from fixing the students and their deficits; a strategy which has failed over the last 25 years, to fixing the tutor and their biases. Despite the change, many still struggle with how this can be achieved. To this end the presentation will show that making changes to the design and delivery of assessments and assessment practices will not change outcomes, primarily because they assume a student deficit. A more effective strategy would be to highlight the role and impact of tutor bias linked to racialised stereotypes. This is particularly important to the allocation of privileges to students which will enhance performance, the marking of assessments and who is accused of academic misconduct. Finally, the presentation will provide examples of how we can minimise or mitigate the impact of racialised bias on BAME student outcomes, particularly the awarding gap.

PANEL DISCUSSION – PANEL MEMBERS' BIOGRAPHY

We are delighted to welcome our panel, drawn from a range of different universities and STEM disciplines to our annual STEM Teaching conference. Our discussion will focus on how other STEM practitioners and institutions have experienced the last year and how they feel their teaching practices may be permanently altered as a result of the pandemic and the switch to digital delivery of curriculum.

The focus will be on the potential long-lasting implications for STEM Higher Education both in traditional and distance learning institutions.

We will be joined by:

Chair: Diane Butler, Associate Dean Academic Excellence

Diane Butler is Associate Dean (Academic Excellence) in the OU STEM Faculty. Her portfolio includes: scholarship and innovative practice strategy; academic staff development strategy; and widening access and success, equality & diversity.
She is a Life Scientist from the School of Life, Health and Chemical Sciences. Over a period of over 25 years with the OU, Diane's teaching has largely focussed on interdisciplinary science at levels 1 and 2. She chaired the University's flagship level 1 science module, amongst others, and was Deputy Programme Director in the Science Faculty. As Director of eSTEeM (the STEM faculty's Scholarship and Innovation Centre) for 4 years, she supported the further development of the scholarship of teaching and learning in the faculty. Her specific scholarship interests include student collaborative work, the challenges facing online learners and the efficacy of online synchronous tuition.

Dr Elinor Jones, Associate Professor (Teaching), Department of Statistical Science, University College London

Dr Elinor Jones is an Associate Professor (Teaching) in the Department of Statistical Science at University College London. She co-founded the Royal Statistical Society's Teaching

Statistics Special Interest Group, which she chairs. Her interests include how to engage students in the learning of statistics, particularly through active learning strategies.

Professor Sally Smith DBA, FBCS, PFHEA, Head of Graduate Apprenticeships and Skills Development, Edinburgh Napier University

Professor Sally Smith is the Head of Graduate Apprenticeships and Skills Development at Edinburgh Napier University. Prior to 2020, Sally was the Dean of Computing at Edinburgh Napier University (2008 – 2020). Working with ScotlandIS, the trade body for the technology sector in Scotland, she is also the Project Director of e-Placement Scotland, a Scottish Funding Council project designed to create 3000 new paid placements for computing students across Scotland. Sally is currently leading the universities' Data Driven Innovation Skills activity in the Edinburgh and South East Scotland Region City Deal, working to embed data skills across curricula. Sally's research interests include placement and graduate apprenticeship outcomes and she leads the Centre for Computing Education Research at Edinburgh Napier. Sally studied Maths at Aberdeen University, Computer Science at City University, and a DBA at Edinburgh Napier University.

Dr Neil Williams, FRSC, PFHEA, Director of Undergraduate Studies, Faculty of Science, Engineering and Computing, Kingston University

Dr Neil Williams is the Director of Undergraduate Studies for the Faculty of Science Engineering and Computing at Kingston University. This role is focused on enhancing learning and teaching across the faculty. He has a long-standing interest in active learning teaching methods, pedagogic research, developing inclusive curricula and closing awarding gaps. Previously he was associate professor in inorganic and environmental chemistry and still has an active research interest in surface chemistry. He is currently a member of the Royal Society of Chemistry Education Division Council.

CONFERENCE INFORMATION

Registration
Conference registration will take place between Tuesday, 2nd February and Thursday 25th February via Eventbrite

To join the conference on the day, visit the STEM Teaching Conference webpage using the links available via the Conference Programme STEM Teaching Conference 2021

Please familiarise yourself with the Programme, paying particular attention to the short oral sessions that will be running in parallel. Using the different meeting links, you may dip in and out of meeting rooms to the presentations you wish to view. Facilitators in each of the meeting rooms will be responsible for ensuring the sessions are run on time.

There will be an opportunity for Q&A throughout the Parallel sessions and Panel discussion at the end. Please feel free to submit your question/s via the MS Teams chat box during the session and if there isn't time to answer you during the session, it will be done afterwards.

Online Helpdesk
An online helpdesk will be available throughout the conference to help you with any queries that you may have. You can reach us by emailing michelle.leonard@open.ac.uk or Jaimie.Sawyer@open.ac.uk with any queries. Alternatively, you could use Skype Instant Messenger.

Conference sessions and recordings
Please note that all sessions will be recorded. The recordings will be made available after the conference is finished and a link will be shared when this is ready.

Audience members are participants in this process. If you have any concerns, please speak to a member of the STEM Teaching conference team.

Session etiquette and electronic equipment
We respectfully ask that all delegates use any personal electronic equipment in their homes with respect for session presenters and fellow delegates. We suggest using mobile phones and electronic equipment in silent mode. Obviously, your household and its inhabitants - partners, children, parents, grandparents, flatmates/housemates, pets etc - can't be set to silent mode, so please do your best to keep your microphones muted during all presentations.

Functionality in MS Teams
To ensure you have the best possible experience during the conference, please have the latest version of MS Teams by clicking on your picture ID on the top right corner of the function bar, and then choosing 'Check for updates'.

Sway Presentations

There will be Sway presentations available on the STEM Teaching Conference webpage between 12.20 – 13.00. You are welcome to browse the presentations over lunch. If you have any questions around any of the Sway Presentations, please contact the authors directly.

Ignite Presentations
For the first time, this year's conference features an Ignite-style presentation session, showcasing new and exciting ideas on the theme 'STEM Teaching Futures'.

Session changes
We will try to keep session changes to a minimum but inevitably there may be some last-minute changes or cancellations. We will let you know on the day by email or via the online meeting room any information about changed or cancelled sessions.

Conference refreshments
There will be regular refreshment breaks throughout the Conference, please do make yourself a coffee or have light refreshments available nearby to keep you going in the morning and afternoon.

Feedback
We welcome your feedback. If you have any issues or concerns, please contact Michelle.Leonard@open.ac.uk or Jaimie.Sawyer@open.ac.uk

BOOK OF ABSTRACTS

Keynote

Dr Winston Morgan BSc, PhD, FHEA, Reader in Toxicology and Clinical Biochemistry, Director of Impact and Innovation, School of Health Sport and Bioscience, University of East London,

Changing from the attainment gap to the awarding gap is an attempt to shift interventions away from fixing the students and their deficits; a strategy which has failed over the last 25 years, to fixing the tutor and their biases. Despite the change, many still struggle with how this can be achieved. To this end the presentation will show that making changes to the design and delivery of assessments and assessment practices will not change outcomes, primarily because they assume a student deficit. A more effective strategy would be to highlight the role and impact of tutor bias linked to racialised stereotypes. This is particularly important to the allocation of privileges to students which will enhance performance, the marking of assessments and who is accused of academic misconduct. Finally, the presentation will provide examples of how we can minimise or mitigate the impact of racialised bias on BAME student outcomes, particularly the awarding gap.

Parallel Session 1: Short Oral Presentations

Introducing RoboLab: an integrated robot simulator and Jupyter notebook environment for teaching and learning basic robot programming

Tony Hirst
Computing & Communications
STEM Faculty

Introducing RoboLab, a novel combination of Jupyter notebooks, magic (yes, really!) and a Javascript based robot simulator developed for TM129 used to create a browser-based laboratory for scripted interactive robot programming experiments.

As part of an update of the practical activities for the TM129 Robotics block, we have developed RoboLab, a novel environment that integrates a simple 2D robot simulator implemented as an interactive Javascript application embedded within a Jupyter notebook environment. Using Jupyter notebooks to provide an instructional narrative as well as a capture learning diary / portfolio reflections, IPython magic lab assistants to configure and operate the robot simulator, and Python code to analyse data logs, RoboLab provides an integrated simulation based lab space and notebook, hosted locally or on remote servers, and viewable through a single browser window.

Early Start Opportunity in S294: what has it achieved?

Katja Rietdorf, Jane Loughlin
Life Health & Chemical Sciences
STEM Faculty

Students see the Cell Biology Module, S294, as difficult and demanding. We have provided a well-received Early Start opportunity to allow students to be better prepared for the Module. This was well received by students. Here we present data on student engagement with the Early Start and on a survey.

The 30 points Cell Biology Module, S294, has completion and pass rates that are lower than Faculty and BoS averages. Revision of the assessment strategy and interventions such as enhanced resit support have led to some improvements in these KPIs but, despite good overall satisfaction rates, students see that module as difficult and demanding. Since 18J, we have offered an Early Start in S294, to try to help students to consolidate their prior study and gain confidence before embarking on the main programme of study. Registered students can access the module website from early July where all the module materials and activities, though not assessment, are available to them. A team of experienced S294 ALs deliver tutorials covering core topics and skills and support students via an early start forum. The AL-led programme also includes journal clubs to help students gain confidence in preparing and delivering presentations. Resources from the Early Start (forums and tutorial recordings) are accessible for all students beyond the Early Start period. An evaluation of the 18J and 19J Early Start has been supported by eSTEeM and is due to complete in Spring 2021. We have found that students taking part are almost unanimously appreciative of the opportunity but there has been no obvious improvement in S294 KPIs. This short presentation will give an overview of how students have engaged with the Early Start opportunity and the effects on student performance. We will also present data from a student survey run in 18J and 19J.

Teaching diversity competence to digital technology apprentices

Clem Herman
School of Computing and Communications
STEM Faculty

TMXY475 is the final module undertaken by Computing and IT degree apprentices, in which they carry out a work-based project that demonstrates and synthesises the knowledge they have gained throughout their apprenticeship. A new resource ‘Embedding Diversity and Inclusion in your Project’ aims to increase the diversity competence of students who will become the developers of future digital technologies.

TMXY475 is the final module undertaken by Computing and IT degree apprentices, in which they carry out a work-based project that demonstrates and synthesises the knowledge they have gained throughout their apprenticeship. A new resource ‘Embedding Diversity and Inclusion in your Project’ aims to increase the diversity competence of students who will become the developers of future digital technologies. Attention to diversity and equality issues needs to take place throughout the whole cycle of development and testing for inadvertent bias needs to be built into the process at regular intervals. In other words, this is not a one-off action or procedure, but a mindset that needs to be adopted at all stages. Thus, students should consider

diversity to be a competence in the same way as more obvious technical skills. Using this resource, students become aware of how their professional design choices might produce gendered or racial bias into products and systems, either by intention or by lack of awareness. This presentation will include some examples of algorithms that have been designed in ways that discriminate against certain groups and show how programmed code can have embedded biases which reproduce existing and historic discrimination. The session will also demonstrate some of the recommended tools and checklists that students can use to develop competence and confidence in embedding diversity in their projects and future practice.

Demonstration of the SK298/Open Science Lab interactive 3D brain model

Nicola McIntyre, Katherine Leys – School of Life, Health and Chemical Sciences
Geoff Austin, Brian Richardson – SWIM
STEM Faculty

This presentation will showcase the new Open Science lab interactive 3D brain model. It will be an opportunity to see how this asset has been used for teaching and to discuss how 3D models could be used to teach other aspects of anatomy across the life and health sciences.

This short presentation will showcase the new Open Science Laboratory interactive 3D brain model. The resource was created by the SWIM (Science Web and Interactive Media) team, in collaboration with LDS and the SK298 module team and uses immersive technology to give students the opportunity to explore the human brain in a way that isn't possible using a 2D image. SK298 (Brain, Mind and Mental Health) introduces students to brain structure and function to allow them to understand the biological underpinnings of mental health and neurodevelopmental conditions. This presents a challenge to students because of the complexity of the human brain and because of difficulties in understanding the relationship between different brain structures. The purpose of the 3D brain model was therefore to allow students to visualise the brain as a 3D structure, using a realistic model. The resource allows students to rotate the brain in multiple planes, zoom in/out and to remove outer layers to focus in on deeper brain structures. Students are introduced to the roles of different brain regions in the normal healthy state and to their role in the development of some common neurodevelopmental and mental health conditions. Students are presented with the 3D brain model throughout their study of the module to help them reinforce and integrate the knowledge as it is acquired.

SK298 is a fully online module and the 3D brain model is embedded in the VLE but is also available as a standalone resource in the Open Science Lab. The Open Science Lab version has a free-roam facility and includes extracts from the module materials linking brain structures with some mental health conditions. This version is open to the public and the intention is that it will be used for public engagement events as well as for students on other modules. The 3D brain model was therefore designed with our own students' needs in mind but also with a view as to how it could be used to work with the public and therefore to promote science at the Open University.

This presentation will be an opportunity to look at the use of the 3D brain asset for teaching and to discuss how 3D models could be used to teach other aspects of anatomy across the life and health sciences.

Attendees are encouraged to access the interactive brain in the Open Science Lab in order to get an opportunity to explore some of the features:
https://learn5.open.ac.uk/course/format/sciencelab/section.php?name=interactive_brain

A pilot study of 2D augmented haptic drawing system for novice practitioners who were classified as blind and visually impaired.

Lisa Bowers, Janet Van Der Linden, Simon Holland, Emilie Giles, Claudette Davis-Bonnick
STEM Faculty

The pilot study speaks about human to computer interventions using touch-based interface and devices. The study is used to evaluate a haptic interface design in terms of accessibility for novice designers who are living with blind and visual impairment.

Currently manual (M) drawing and sketching tools used by people with sight impairments offer little inclusive assistances for user orientation or overview of the drawing. The use of virtual (V) drawing software packages that are primarily focused on sight driven interventions do not offer people without the use of sight any alternative sensory input e.g. auditory or touch-led feedback. Degree programmes or modules which offer applied study and require students to use drawing and sketching to achieve learning outcomes, means that there are barriers to learning and interaction for blind and visual impaired student communities. We present a pilot study of a small user-group of people living with sight loss to examine their engagement and evaluations of a haptic device and interface system. To determine the usability and readability of the haptic system and to better understand the issues of using the system, non-sighted participants were requested to use the device to a scheduled set of drawings (M&V). Participants were asked to work through the drawings in both formats in order and to 'read' the drawings using their dominant hand. Once the drawing tasks were complete an evolutional interview was conducted, and usability of the haptic system was analysed in comparison to manual drawing. Analysis of the test observations and the participant evaluations showed that users without sight and sight impairments were able to draw lines and were able to track and 'read' the lines with enough force control resistance to enable them to understand what their drawn lines represented. However, through the pilot we discovered that there is still more work to do, the participants evaluated that there could be more guidance force and auditory cues to inform the user with higher levels of understanding of the wider complex 'pictorial' linear work presented on-screen.

Student views on TMA feedback

Carol Calvert, Clare Morris
School of Mathematics and Statistics
STEM Faculty

'Make sure you read everything. Do not take the comments personally, they are a means to doing better next time.' A student passing on a tip to their peers about how to maximise the use of TMA feedback. But how much do we really know about students' views on TMA feedback?

This project grew from a concern about the number of students who do not pick up their electronically marked scripts. This is around 10- 15% of students across STEM. The correspondence tuition that tutors provide, via the TMAs, is a key part of our teaching and support to students. It is a major investment of time and effort by tutors and the project aim is to enable tutors to make their comments more accessible to more students. Once the students have read the comments there is the issue about how students can be helped to use even more effectively than is currently the case.

There are five distinct threads to the project:

a) Analysis of existing student patterns of picking up TMAs.
b) Analysis of student perceptions and use of the comments on marked TMAs. This information is gathered from student responses to anonymous questionnaires on most of the statistics module websites.
c) Feedback from tutors who asked their students on a level 1 module why they did not pick up TMA01.
d) Feedback form tutors who offered students slots for verbal feedback on TMA01
e) Developing ways to help tutors to gain and use insights into student views on TMA feedback.

This presentation will report on each of the threads and in particular the first two threads. Participants will be asked to reflect on their previous experiences and requested to contribute ideas about how to effectively share these findings with tutors.

Evaluation of game-based learning in a level 2 computing module.

David Bowers
School of Computing and Communications
STEM Faculty

This presentation explores student feedback on and evaluation of a game-based activity, developed for a level 2 computing module. The lessons learned and implications are discussed for those planning similar game-based enhancements to distance learning.

A game-based activity was developed for a second-year computing module, as reported in the 2020 eSTEeM conference. Following the style of a business game, adapted for asynchronous distance learning students, students were enrolled into anonymous ‘groups’ of five. The essence of the activity was daily, automatically generated, emails to each student in a group. For four of the five students, the emails were frivolous ‘noise’, of the sort that can drown out important messages in a work environment. The fifth message required a response “the selection of one from four possible actions” to address an aspect of a developing situation. The sequence of

responses within each group of students determined the outcome of the situation, which could range from continued safe provision of IT services to the flooding of the machine room and the loss of all user data and services. The activity had two primary aims: to reinforce students' appreciation of the importance of taking a system-wide view of the IT services being provided to users, rather than focussing on the immediate priorities of the role each student was 'playing', and also to give students insight into the importance of prompt, appropriate responses to significant email messages and, in particular, tuning out the 'noise'. It was intended that both of these aims should be achieved 'experientially' that is, by being part of virtual team where there failure on either count could lead to disaster, students would be nudged towards a deeper understanding of each issue. Since participation in the activity was optional and, in any case, would give students only a single experience of how the situation might develop, a simulation of the same developing situation was also developed, using weighted random choices for the required responses from five 'actors'. After completion of the activity, students could run the simulation as many times as they liked in order to understand better how the responses of each participant might influence the final outcome. The activity and simulation ran for the third time in October 2020, and an RTSF questionnaire was used to gain feedback from students on various aspects of the activity. This presentation will present and discuss the results of the survey. For example, while some 80% of students found the scenario at least plausible, and over 60% agreed that it helped them understand the importance of effective communication, very few students missed the deadline for responding to an email, so only around a third felt that the activity drew attention to the importance of responding promptly. The survey also asked for suggestions for improving the activity "such as allowing anonymous direct email communication between the participants (49%), or an activity with more stages. Such suggestions, and their feasibility and appropriateness in the context of the activity, will be discussed briefly. Finally, this feedback, and the performance of students on related TMAs, may be valuable for others considering the introduction of game-based learning to distance teaching.

Proactive help for ill-prepared Level 3 students

Louise MacBrayne, Fiona Moorman, Janet Haresnape

STEM Faculty

A new proactive support scheme is being piloted for S317 and S315 20J. Students deemed to be ill-prepared were targeted for proactive support. This presentation will update on ongoing results and will reflect on the potential usefulness of such an approach to increase student retention and success at level 3.

Within the School of Life, Health and Chemical Sciences, the level 3 modules in biology (S317) and chemistry (S315) have a substantial proportion of 20J registered students who either do not have the recommended pre-requisite study (S294 and S215 respectively) or have obtained a low pass in these modules. Students new to Open University study, who have been awarded credit transfer for the Open Degree are of particular concern as many lack a comprehensive science background. For the 19J presentation of S315, the pass rate for such students was 31% in comparison to 70% for the whole student cohort. For the 19J presentation of S317, the pass rate was 30% for these students in comparison to 73.7% for the whole cohort. A new proactive

support scheme is being piloted for S317 and S315 20J, in which students deemed to be ill-prepared and hence at risk of not completing, or failing the module, were identified, and targeted for proactive support. Two groups were drawn up based on student profile. Group one for both modules was deemed to be at highest risk and were mostly new and continuing students on the Open Degree with apparent insufficient or unknown science background. Group one students were offered a one-to-one session with their own module tutor to ascertain how they were coping with level 3 study and to identify any particular academic concerns that were common to this group of students. A remedial session delivered by a module tutor, or a member of the module team would then address these common areas of difficulty. The second group of students were those who had the required level 2 prerequisite study, but a grade 4 pass. For S315, it was decided to use their TMA01 score to determine whether these students should be moved into group 1, but in any case, all were invited to the planned remedial sessions. S317 tutors used factors such as engagement, assignment submission and TMA01 score to determine which students in groups 1 and 2 should be invited to the planned remedial sessions; most students in these groups were invited to the remedial sessions but a few deemed to be very strong by their tutor were not targeted for this support and others not initially identified as at risk were invited to these sessions. This presentation will aim to update on the ongoing results of this pilot study and will reflect on the potential usefulness of such a proactive approach for level 3 modules in future presentations to increase overall student retention and success.

Sustaining a community of online learners - a case study from the Open University's MSc in Mathematics

Ben Mestel
School of Mathematics and Statistics
STEM Faculty

The Mathematics MSc has over 600 student registrations. Sustaining this community has been an important goal of the MSc team. In this talk we describe our approach using email, forums, talks and briefings. We highlight the successes (and occasional failures) and give some (hopefully) useful tips for colleagues.

The Mathematics MSc at the Open University has over 600 student-registrations, with students studying usually part-time at a distance. Sustaining this community of learners has been an important goal of the MSc team. In this talk we describe our approach using email, forums, talks and briefings. We highlight the successes (and occasional failures) and give some (hopefully) useful tips to colleagues seeking to build their own communities of online learners. This is an OU-versioned talk that I gave as part of the TALMO* series earlier this year.

*Teaching and Learning Mathematics Online

Parallel Session 2: Short Oral Presentations

Towards a qualification world

Carol Calvert, Rachel Hilliam
School of Mathematics and Statistics
STEM Faculty

Where next on the journey to improve the way a level 2 statistics service module supports STEM and other students? A number of actions which have already been taken are described and you are invited to contribute to our planning of the next steps.

This is the journey of a level 2 statistics module, designed for Maths and Statistics students, to a place that better serves most of its students who now come from other qualification routes. The module had a major rewrite in 2018 and so the aim of this project was to implement changes on the module whilst leaving the re-written material untouched. The module is a service module with around 500 students of whom roughly 40% are Maths or Maths and Statistics students. It has proved very popular as a standalone module, as a part of the Combined STEM and Open degrees; together with serving Computer and Data Scientists, and Economists. The wide range of students led to the module team to consider whether the standard tutorial provision was provided adequate support for the variety of prior statistical experience. A further consideration was which areas of the module were of greatest importance for the range of future modules these students would take in their chosen qualification. The work built on a small piece of work undertaken in July/ Aug 2019 to provide a set of material specifically designed for economists taking the module. Tutorial attendance in 2019 was also analysed to provide comparable attendance information for pre and within Covid pandemic periods.

The project has included the following steps:

- Request information from students on the areas they found particularly difficult in the module. This was collected using module questionnaires in January and May 2020.
- Use the information from the student questionnaires to inform the writing, undertaken by ALs, of sets of qualification focussed tutorials in July/Aug 2020.
- Allocate students to tutors depending on the student qualification route rather than their geographical location for Oct 2020.
- Provide time for tutors for the non-Maths/Maths and Stats groups to run tutor group specific sessions, work ongoing.
- Request information from students concerning how they have found the tutorial arrangements, Dec 2020.
- Analyse actual student attendance at tutorials using another Maths/Stats module as a control group for Covid related changes Jan/Feb 2021.
- Request information from students on which areas of the module they found difficult, May 2021

Caps, quotas, and standby lists: a guide to managing student waiting lists (and reducing your stress levels)

Frances Chetwynd
School of Computing and Communications
STEM Faculty

In this session I will explain the approach adopted in C & C to managing our student waiting lists and detail how we are involving ALs in solving the problem. Participants will be asked to consider if any particular students are being disadvantaged and offer improvements.

With the University seeing unprecedented rises in student numbers on 20J, and with 21B and 21D showing signs of following suit, ensuring we have enough tutors on each module is an increasing problem. On the three largest qualifications within the C & C BoS, the introductory level 1 module (TM111) has seen ever increasing numbers, the effects of which are boosting numbers up through the levels (along with increased retention and progression). In this session I will share the methodology we are using in the C & C School to manage the large number of modules that have quotas, covering the actions needed before FED, between FED and FRD, and for late reg and mal-admin students. I will also discuss how we are involving ALs in the process, including innovative approaches to helping our existing tutors broaden the subject areas they can teach. In discussion at the end, participants will be asked to consider whether the process described disadvantages any particular groups of students, and how the approach could be improved.

A competency-based accreditation standard

David Bowers
School of Computing & Communications
STEM Faculty

This presentation shows how the accreditation standard developed by the Institute of Coding, to address the skills gaps identified by Shadbolt, aligns with regulatory frameworks, benchmark statements and professional body accreditation standards. The key principle of focussing on competency rather than academic capability can be applied in other STEM areas.

The Wakeham and Shadbolt reviews explored the perceived skills gap between new graduates' capabilities and employer expectations. One of the principal shortcomings was found, in both cases, to be a lack of real-world experience. The Institute of Coding (IoC) is a £20M collaboration between 33 universities and over 100 employers, funded by Office for Students from 2018-2020. One of the workstreams was to develop a new accreditation standard which would address the skills gap, so that students following a degree course accredited against this standard would be better prepared for the workplace. The standard developed by the IoC distinguishes between academic competence, typically represented as knowledge, and professional competence, based on demonstrable real-world experience. The outcomes standard is demonstration of both knowledge of appropriate topics and real-world competence, mapped against the SFIA skills framework for the computing sector. In this presentation, the alignment of the standard with regulatory frameworks, such as FHEQ, and QAA Subject Benchmark Statements, will be demonstrated, as will its alignment with accreditation standards set by the relevant professional

body. Although the IoC standard has been developed for the broad area of computing, similar approaches could be adopted for other STEM subject areas, particularly if there is an appropriate professional skills framework or a set of defined professional standards. The key message is that it is possible to develop an accreditation standard based on competencies rather than just academic capability.

Adapting to the new normal: using teams to collaborate and co-work with students and associate lecturers

Georgy Holden, Nicole Lotz, Derek Jones
STEM Faculty

This presentation reports on two projects run during lockdown/restrictions, which used MS Teams to work with students and ALs. The presentation discusses the benefits of working with students in a collaborative way and the effectiveness of Teams for facilitating this.

This presentation reports on two projects run during lockdown/restrictions, which used MS Teams to work with students and ALs. The first project, the creation of an online exhibition of student work, the second an extra-curricular 'summer school', set up to develop student skills in the use of design software. To facilitate both projects MS Teams was used in conjunction with OpenDesignStudio. MS Teams was used for these projects because of the affordances that it offers for discussion and dialogue alongside file sharing and text chat. It was also used as it is more similar to the video conferencing platforms that have become ubiquitous in lockdown. ODS was used to display and share work in progress and to build a record of student work. The exhibition project included students who were geographically very remote and enabled them to take part and play an active role where they would not have been able too if the exhibition had been on campus as it has been previously. The summer school tested out an idea for future curriculum development and enabled academic staff to gain insights into the abilities and challenges of students learning new pieces of software. Both projects demonstrated the richness of experience and knowledge that students bring to the university and offered those who took part an opportunity for C.V. development. It also showed the advantages of conferencing software that easily enables multiple participants to use video. The report will discuss the learning that has come from these projects and will discuss how this approach might be used more widely.

MU123: 10 years and still nailing it!

Sally Crighton, Gerry Golding, Andrew Potter, Katie Chicot
School of Mathematics and Statistics
STEM Faculty

What is the secret of MU123's long-lived success? The MU123 module team presents some of the initiatives it has used to keep its module content fresh, and the resulting retention and satisfaction high over the past 10 years.

Since its first presentation in 2010B, MU123 Discovering mathematics has provided a gentle-yet-exciting whirlwind introduction to mathematics for over 30 000 Open University (OU) students. The module contributes to approximately 100 qualifications across the university and student

satisfaction rates and retention rates for MU123 have been consistently excellent across twenty presentations. Students are drawn from such a diverse range of qualifications such as Computing & Communications, Business & Economics, Open qualifications, and of course, Mathematics & Statistics.

So, what is the secret to MU123's success, especially with such a diverse student body? In this short oral presentation, we will present some of the initiatives the MU123 module presentation team has used to keep its teaching fresh and vibrant after 10 years. We believe the key to our success is how we listen to and act on feedback from students, tutors, and colleagues from across the Faculty and beyond. We will show how we are using tutor contact hours to deliver inspiring module-wide events on a wide range of subjects, and how we continually update our assessments to highlight the relevance of mathematics in other subjects. This has led to eSTEeM scholarship projects and collaboration with the module teams of other key Level 1 STEM modules, such as SDK100.

We will also discuss the improvements being made to the module during the 20J-to-21J rebranding exercise. We have replaced the now-unsupported Flash-enabled software with innovative teaching methods which use screencasts which increase student engagement. We will also show how we are improving accessibility and updating content in a 'light-touch' manner. Finally, we will show how we have improved Equality, Diversity, and Inclusion by refreshing our module's cartoons, historical content, and assignment questions. We hope that participants will be inspired by MU123's story and be able to take what we have learned to teaching on their own modules. There will be an opportunity to ask questions and engage with the MU123 module team.

The impact of using OUAnalyse on attainment gap in 3 STEM modules in 2019J

Martin Hlosta, Vaclav Bayer, Miriam Fernadez, Christothea Herodotou
KMi
STEM Faculty

We will present the results of a pilot of OUAnalyse with 22 teachers in 3 STEM modules in 2019J where tutors were asked to systematically check the system. We will present the details of the study, the results with close attention to the attainment gap for BAME students.

Previous OUAnalyse research showed that tutor engagement with OUAnalyse and the students previous results were the two most significant factors that were associated with the students' pass and completion (Herodotou et al. 2019). The following study (Herodotou et al. 2020) showed that tutors who used OUAnalyse between 10% and 41% of the weeks a course runs had better student retention rates (56%) compared to 48% retention of the low engagement group (<=8% weekly usage). Tutors improved their outcomes in terms of student retention the year they were accessing OUAnalyse than the previous years when they had no access to it. We ran a pilot of using OUAnalyse in three STEM modules (U101, S209 and S294) during the 2019J presentation with 22 participating tutors. Tutors were asked to log in before TMA 1-3, three times before the deadline, i.e. 1, 2 and 3 weeks before the deadline. Tutors were asked to provide feedback and consider contacting students identified as at-risk of 1) not submitting the TMA or 2) predicted to Fail or achieve a low grade. The results of students whose tutors used OUAnalyse (treatment group, n=582) were compared with the students whose tutors have not used OUAnalyse

(comparison group, n=964). We will present details of the study, the results of both groups in terms of completion and pass rates. Close attention will be drawn to the differences in BAME and Black students compared to White students. The results showed that BAME students in the treatment group had 9% higher pass rates than students in the comparison group (59% vs 50%), while their completion rates were very similar. We will also show similar results that have been measured for Black students and students from low socio-economic areas. We will discuss the potential implications of our findings, and the possible role of OUAnalyse in closing the attainment gap in module pass rates for all students and BAME in particular, and also achieving good grades.

Herodotou, C., Hlosta, M., Boroowa, A., Rienties, B., Zdrahal, Z., & Mangafa, C. (2019). Empowering online teachers through predictive learning analytics. British Journal of Educational Technology, 50(6), 3064 "3079. Herodotou, C., Rienties, B., Hlosta, M., Boroowa, A., Mangafa, C., & Zdrahal, Z. (2020). The scalable implementation of predictive learning analytics at a distance learning university: Insights from a longitudinal case study. The Internet and Higher Education, 45, 100725.

A collaborative framework for associate lecturers, to enhance student and tutor satisfaction.

Marina Carter, Richard Mobbs
Faculty of Computing and Communications
STEM Faculty

The adoption of a collaborative framework enables students to benefit from consistent, coordinated, and enhanced support and the sharing of the tuition workload among associate lecturers (ALs). The framework involves the staff tutor working closely with ALs using tutor forums to support the collaboration.

The adoption of a collaborative framework enables students to benefit from consistent, coordinated, and enhanced support and the sharing of the tuition workload among associate lecturers (ALs). The framework involves the staff tutor working closely with ALs using tutor forums to support the collaboration. The tutor forum facilitates peer support amongst tutors, sharing of experience of all the key elements of module tuition, including consistency and accuracy of correspondence tuition right through to broader teaching philosophy and pedagogy issues.

The initial stage is on nurturing peer bonding and knowledge exchange among the tutors through a framed series of threads. The second stage involves sharing the tuition tasks amongst the team of tutors according to each tutor's subject expertise and interest. The coordination and negotiation of this activity is carried out in the forum. This includes the development and updating of tutorial materials used by the cluster, with a lead and helper for each tutorial. To develop consistency in marking and feedback an assessment thread is used for sharing good practice.
The third stage of the framework is enhancing student's tuition provision by the inclusion of topic focussed tutorials hosted by subject experts. Additionally, a weekly teaching email is sent to all students (via their tutor), with one tutor responsible for composing the email each week. The

fourth stage is using the forum to share students' activities. This involves the use of threads for logging tutorial attendance and assessment submissions, in order to keep track of student engagement, progression and retention analytics. Operation and iteration of the framework over three years, across all computing undergraduate levels, has had a positive experience on both tutors and students. In the Oral presentation we will share our findings on these initiatives and best practices which can be taken forward by other module teams.

Sustainable student support: which half of the glass should we fill?

Hayley Ryder, Toby O'Neil
School of Mathematics and Statistics
STEM Faculty

We describe how a structured study route, together with tailored interventions, enabled time poor students to enjoy and complete a 60-credit level 3 module in an academically, financially and emotionally sustainable manner.

Most students do not get grade 1 passes on their modules. This means that they may not be secure in the assumed prerequisite knowledge or skills when they study a successor module. Students may make a strategic decision not to aim for the highest possible grades; indeed, even within a given module, students may not study everything, which can cause problems if there are inter-module dependencies. M303, further pure mathematics, is a 60-credit level 3 pure mathematics module that naturally follows on from the level 2 pure mathematics module M208, Pure mathematics. When M303 launched in 14J, students were advised that they needed a 1 or 2 pass on M208 in order to succeed on M303. However, for M303 to be sustainable, and in keeping with open access, we wanted (and needed) to make M303 accessible to any student who had passed level 2 mathematics modules. A student with a grade 3 or 4 pass on M208 will know some of the prerequisites for M303 but we won't know which bits and they're likely to be different across all such students. These students are often time-poor, taking an opportunistic and unstructured approach to study, meaning that they do not get a coherent view of the discipline. In the worst cases, such students can develop antipathy towards pure mathematics because they have no coherent view of the topics. We wanted to change this. To address this for M303, we created a coherent 'core route' through the module. We also ensured that the assessment had enough questions that could be attempted by students following only this route so that they could pass (but not necessarily gain the higher grades). We describe the introduction of this core route and the associated set of interventions. The core route was designed so that students could jump on and off as their available time permitted: focusing only on core material early on would not prevent students from studying the full content of later units if their circumstances changed. The interventions helped core route students to keep on track by enabling their limited time to be focused solely on learning the essential material and tackling the associated assessment.

The core route is academically, financially, and emotionally sustainable:

1. Academically because it enables module teams to maximise the chances that students who only have time to study part of a module study can identify the topics that will be most helpful for their future academic development.
2. Financially because more students who start a module can finish it.

3. Emotionally because the students can learn and enjoy a coherent fraction of the module. Of the 38 students who started M303 in 18J and had either grade 3 or 4 passes or had failed M208, 36 were present at the 25% fee point, and all bar two have now passed M303 (and one of these is registered on 20J). For a 30-credit comparator module, only 19 of the 30 students in the same category have now passed.

A successful assessment strategy for times of Covid

Janet Haresnape, Vicky Taylor, Hannah Gauci
School of Life, Health and Chemical Sciences
STEM Faculty

19J S295 students sat an 'open book' remote exam and were limited to their own gardens for their practical investigation because of lockdown restrictions. Nevertheless, the distribution of marks was impressively like that for previous cohorts, demonstrating that the examinable component tests understanding of module materials rather than recall.

On S295 the examinable component comprises an exam and a TMA based on a practical investigation report. Until 19J the exam was a 3-hour face-to-face exam, but for 19J students it was instead an 'open book' exam, designed to take 3 hours but with students given 24 hours to complete it because of the Covid situation. No changes were made to the exam paper, and only minimal changes were made to the mark scheme to give less weight to any aspects which could easily be looked up online. All exam scripts were checked for plagiarism no issues were identified. The resulting distribution of marks was impressively like that for previous cohorts. We interpret this as a clear demonstration that the exam tests understanding of the module materials, plus statistical and digital literature skills, rather than recall. The exam consists of Part A: short questions which are generally based around interpretation of a simple graph or scenario, Part B: a data interpretation question which involves use of one of four statistical tests which students are taught during the module, and Part C: a set of questions based on a pre-seen scientific paper. All require students to have a good understanding of the material studied, and none can be answered by copying text directly from the module materials. The other part of the examinable component is the practical investigation report - based on observation of pollinating insects - which students undertake outside in their own chosen location. Because of the Covid-19 pandemic lockdown restrictions, areas available for 19J students to undertake this study were very limited. Most observed insects in their own gardens. Some used video resources provided by the module team normally reserved for students with mobility or other difficulties which prevent them from going outside to collect data. The investigation report builds on feedback provided by the student's tutor on previous experimental reports, and also on a project planning document submitted to their tutor before embarking on their practical observations. Despite being advised to keep to a simple experimental design, students often embark on investigations which are too ambitious and impractical, and which give results which are difficult to interpret. Because 19J students were limited to doing the investigation in their own garden where the number of flowering plants and hence pollinating insects was very limited, more students chose simple experimental designs. This led to many investigations involving very clear and straightforward comparisons, with the result that the quality of the reports was just as good as in

previous years. Following OU policy, we are currently writing an online remote exam paper for 20J students, with a revised specimen paper (SEP) to reflect the remote exam design. These exam papers have been written incorporating more opportunities for more able students to excel. We are optimistic that 20J students will be able to complete the module assessments as well, if not better than, last year's cohort, despite the likelihood of continuing restrictions on travel and field work.

Sway Presentations

Student perceptions of online tutorials and forums in S294 and/or SK299

Lorraine Waters & Sarah Daniell
School of Life, Health and Chemical Sciences
STEM Faculty

Attendance at online tutorials and use of forums by students continues to be low, this may be more so for students with mental health issues. We have used a JISC questionnaire to assess students' perceptions of online tutorials and forums. Initial results suggest anxiety is a barrier to engagement.

Attendance at online tutorials and use of forums by students continues to be low. We have used a JISC questionnaire to assess students' perceptions of online tutorials and forums. The survey has focused on understanding attitudes and concerns about use of these resources. Students with mental health conditions may be particularly affected. Initial results suggest students feel satisfied with online tutorials and availability of recordings, with a small proportion suggesting anxiety restricts involvement. Engagement with forums is more varied with anxiety having a greater effect on participation. We will be exploring these ideas in greater depth through student interviews.

From Outbreak and Lockdown: Moving T885 Residential Weekends to Online Delivery

Gareth Neighbour
School of Engineering and Innovation
STEM Faculty

The delivery of 'T885: Team Engineering' was 'hit' by the COVID pandemic in early 2019. This SWAY presentation will recount, from the perspective of the Module Team Chair, the story of our journey from two residential schools to a fully online version of T885 over a few months.

The delivery of T885 - Team Engineering was 'hit' by the COVID pandemic in early 2019, and amazingly earlier than most, by the upheaval at Kent's Hill in February. This SWAY presentation will recount, from the perspective of the Module Team Chair, the story of our journey from two residential schools to a fully online version of T885. It will recognise the contributions of the 'module team' and collectively how we overcame the challenges, highlight the successes, retained an exceptional student experience and provide lessons for the future as well as possible implications for a post-COVID landscape.

OUAnalyse as a mean for investigation of degree-awarding gap across ethnicities

Vaclav Bayer
KMi
STEM Faculty

This work presents our current efforts towards targeting the degree awarding gap for BAME students at the Open University. By building on OUAnalyse, we study divergences of learning patterns across ethnicities, with the aim of creating more targeted and effective prediction models for the early identification of students at risk.

Reports from UniversitiesUK and AdvanceHE show a 13% degree-awarding gap for Black, Asian and Minority Ethnic (BAME) students, highlighting systemic inequalities within Higher Education. We present our current efforts towards targeting the degree-awarding gap at the Open University by means of OUAnalyse, a system powered by machine learning methods for early identification of students at risk of failing. OUAnalyse has been used by 336 modules within the university in the year of 2020. By disaggregating data across ethnicities, we show divergences on learning patterns. These divergences are informing the development of targeted prediction models to more effectively support students.

The impact of pre-module interventions on assessment performance in-module and module results

Becca Whitehead, TR Wilks, H Fraser, R Hildago, C Small
School of Physical Sciences
STEM Faculty

Do students benefit from early access to course materials? We assess the effectiveness of the pre-module Headstart and Bootcamp programmes in S282 Astronomy using data from Action for Analytics.

We present our preliminary findings about the effectiveness of the Headstart and Bootcamp programmes in S282 Astronomy. These two programmes enabled students to work through directed materials in advance of the course start date with AL support. While we were convinced from anecdotal evidence and the immediate student response, that the Bootcamp and Headstart programmes were enjoyed and beneficial to the students who took part, we have used data provided by Action for Analytics to provide further evidence. We compare four years of data to see the effect of the programmes on retention, TMA performance and exam performance.

Engaging new STEM associate lecturers with induction activities

Janette Wallace & Hannah Gauci
School of Life, Health and Chemical Sciences
STEM Faculty

Do new STEM ALs engage with induction activities? If not why not and what can we do to support them and improve engagement?

New Associate Lecturers (ALs) come to the OU with varied previous experience of online tuition. ALs have a short period after appointment to gain competence and confidence in core tutoring skills and OU practices and processes. Alongside generic OU-wide training and support from their line manager and mentor, new STEM ALs are invited to attend a faculty-based programme of workshops and are directed to a supporting website containing information about training and a discussion forum. We present an evaluation of engagement by ALs with these induction activities, discuss barriers and pose solutions for improving engagement and support.

Ignite Presentations

MST366: Playing around with game theory and recreational mathematics!

Robert Brignall and Andrew Potter
School of Mathematics and Statistics
STEM Faculty

How can playing games support learning and attract students to formal study? The module production team for MST366 Graphs, games and designs would like to share their blue skies thinking!

MST366 Graphs, games and designs is the planned replacement module for MT365 Graphs, networks and design, a much beloved Level 3 mathematics module which has served thousands of students from across STEM for over 25 years. MT365 has long attracted students from a wide range of disciplines and has successfully introduced pure mathematical ideas from graph theory and discrete mathematics in an accessible and appealing way. The new MST366 is due to have its first presentation in 23J. MST366 will, for the first time, include three brand-new units on game theory. The MST366 module production team are currently thinking of the best ways to enthuse students on this exciting and highly applicable new topic. We believe that one of the best ways to learn game theory is by playing games! This follows a long tradition in MT365 of using 'recreational mathematics and puzzles as a means of stimulating student interest in ideas from combinatorics. Many students don't realise that by solving a sudoku they are 'doing maths'! This ignite session will show our blue-skies thinking on how we would best facilitate game-playing for learning. We are inspired by the success of the Perplex app, developed in 2016 by Senior Lecturer Katie Chicot in collaboration with colleagues from the School of Mathematics & Statistics and OpenLearn. We wonder if there is space for a graphics-rich interactive experience like Perplex which facilitates the module content of MST366. What would be the opportunities and barriers of such an approach? Could we make these games publicly available, like Perplex, as a way of attracting students to OU study? We hope our talk will inspire you to consider the 'coolest' features of your modules in production, and to consider how you can use that to attract students to study it in future!

The Mathematics MSc: the next 35 years!

Ben Mestel
School of Mathematics and Statistics
STEM Faculty

In this future-facing talk, I will discuss pathways for the evolution of the Mathematics MSc programme, focussing principally on curriculum development. I will outline my own vision for the ideal Mathematics MSc and how that might fit in with other taught postgraduate programmes, current and projected, offered by the Faculty.

The MSc in Mathematics has been offered since the mid-1980s and is one of the OU's longest running taught postgraduate programmes with over 600 module registrations in 20J. Together

with its subsidiary qualifications the PGCert and PGDip, it is a mainstay of the suite of qualifications offered by the School of Mathematics and Statistics. In this future-facing talk, I will discuss pathways for the evolution of the programme, building on the success of the past few years, and focussing principally on curriculum development, although I will also touch on the structure of the qualification. I will also review how well the programme matches the 2020 QAA statement on the characteristics of master's programmes and what changes might be needed to make the fit closer. Finally, I will outline my own vision for the ideal Mathematics MSc and how that might fit in with other taught postgraduate programmes, current and projected, offered by the STEM Faculty.

Interdisciplinarity: a wicked problem

John Baxter, School of Life, Health and Chemical Sciences, STEM Faculty
John Butcher, WELS

Interdisciplinarity has been central to our mission since the university's inception, so in theory we should be well placed to develop curriculum which prepares our students to deal with a future of complex, interdisciplinary, 'wicked problems'. But in recent years interdisciplinary curriculum has been in decline at the OU: should we, can we, reverse this?

Interdisciplinary, cross-disciplinary and multidisciplinary study have arguably always been at the centre of the Open University's mission. The Open University Planning Committee in 1969, suggested our aim should be to provide: 'a broader type of education than that provide by a usual degree, and an interdisciplinary one'. In part this was in recognition that: 'a student is the best judge of what [s]he wishes to learn and that [s]he should be given the maximum freedom of choice consistent with a coherent overall pattern. ...this is doubly true when one is dealing with adults who, after years of experience of life, ought to be in a better position to judge what precise studies they wish to undertake...'. (Perry, 1976). No doubt the demographics of our students have changed drastically since the 1970s, and the rise of named degrees at the Open University has been a necessary development. But there is a risk that our curriculum could become stale and irrelevant if we do not act promptly.

The presentation will discuss: The decline in the number of interdisciplinary modules in our undergraduate curriculum and possible reasons for this. Recent curriculum developments which begin to address the issue, like 'Open Box' modules. The nature of 'wicked problems' and why we need to address them through developing an interdisciplinary curriculum. External responses to the challenge of interdisciplinarity, like the recent launch of the London Interdisciplinary School. In discussing future innovations in STEM, a key area to consider is how to facilitate colleagues from different schools and faculties coming together to produce innovative Interdisciplinary, cross-disciplinary and multidisciplinary teaching.

Using past performance as a driver for the future

Paul Collier
Senior Manager, STEM Students
STEM Faculty

This presentation will look at different impacts on the future of STEM from three perspectives. Firstly, we know that Flexible Study can have a large impact on Student Success. This can be driven from the curriculum or from the changing preference of our student's study patterns. In either case the faculty should be able to accommodate this emerging trend. In STEM, at the moment, we have the lowest proportion of full-time students, compared to the rest of the University. The presentation will explore several key findings from research carried out. Secondly, the HE market is a dynamic environment. We will look at what opportunities there are for growth from the perspective of Black and Asian students. This is particularly pertinent given the time and commitment to the APP plan. The report will look at the scope of this market opportunity and suggest some curriculum opportunities we could explore on the basis of the analysis. The final area is to understand preferences in study with our current curriculum for 5 key demographic groups. These groups have been selected on the basis of their size, growth and strategic importance to the University. We will first set the context for the group by understanding their selection for study and then move onto looking into the preferences for study within our current curriculum. By doing this we can hope to understand how we might be shaping those preferences and whether we can offer something different to cater for their needs in the future.

Remote examinations for Mathematics and Statistics

Tim Lowe
School of Mathematics and Statistics
STEM Faculty

In June 2020, due to the COVID-19 pandemic, examinations in mathematics and statistics were held as 24 hour remote, open-book exams, using the question papers prepared in expectation of 3 hour invigilated exams. As anticipated, this resulted in an increase in raw examination marks, which were standardised using the usual processes to avoid inflating grades. Unfortunately, the lack of prior student-facing university information on this process led to some student disquiet.

In June 2021, with more time to better prepare for examinations, we plan to use time-limited examinations delivered via the iCMA system but permitting the upload of PDFs of written solutions (which could include scans of handwritten work). Question papers are being prepared with the open book/remote nature of the exams in mind. Such a delivery method was piloted on a small number of examinations in September 2020.

In this talk I will describe the background to the above together with outstanding issues and difficulties. I will also consider possible future directions for remote examinations within Mathematics and Statistics and the University in general, together with issues such as verification of the student identity and remote invigilation/proctoring.

A Future for Learning Outcomes?

Tom Olney
Senior Manager, Learning & Teaching STEM Deanery

The intention of this short ignite presentation is to provide a little background as to how confusion around learning outcomes has evolved and present some useful models and tools to cut through the fog.

Opinions on learning outcomes differ. For some, they limit creativity and prevent diverse teaching. In this view they are abstract, meaningless statements that serve only to create more paperwork and confusion for students and teachers alike. For others, they provide the backbone of an accountable, student-centred approach that is at the core of designing open and active learning. Designing learning outcomes that are useful and practical can be a tricky and time-consuming affair, however, with practice, and once the terminological confusion and misunderstandings are stripped away, it is an activity worth doing well. The intention of this short ignite presentation is to provide a little background as to how the confusion around learning outcomes has evolved and present some useful models and tools to cut through the fog.

Parallel Session 3: Short oral presentations

Evaluation of historical outcomes and a 2019J proactive campaign of support for Credit Transfer (CT) students studying at L3 in the School of Life, Health and Chemical sciences

Eleanor Crabb, Jane Loughlin, Fiona Moorman, Angelika Fischenich, Jo Smythe
STEM Faculty

Retention and success of credit transfer students is lower than for continuing students. This presentation will share evaluation of historical CT student data, survey findings and outcomes from a proactive SST campaign to registered 2019J CT students to consider how support for CT students could be improved.

Credit transfer students join a qualification with differing amounts of credit for study undertaken elsewhere. Although numbers fluctuate year-on-year, this group can represent a significant proportion of students on a module (between 7-15% of the total cohort). Preparedness for study, especially at L3, is a particular issue for students registered on the Open Degree where students are awarded the maximum level of CT, irrespective of area of prior study. Analysis of the success of new LHCS students entering directly at L3 has shown lower pass-rates for these students compared to continuing students. For example, the pass rates for 19J CT students studying S317 and S315 were 30% and 31% respectively in comparison to 73.7% and 70% for the whole student cohort on these modules. Evaluation of historical data (17J onwards) for CT students registered on L3 LHCS modules was conducted to obtain an overview of retention and awarding gaps for this group of students. A proactive SST campaign involved call attempts to new students registering on 2019J UG Science modules at both L2 and L3, to discuss preparedness for study and to explore aspects such as module choice and completion of induction resources. A survey was also made available to CT students within our school to further explore their preparedness for and experiences of OU study, including their thoughts on support from buddies / mentoring schemes. We will share findings from the analysis of historical data concerning CT students as well as presenting an update of survey findings from recent CT students. In-depth evaluation of outcomes associated with students who were part of the SST campaign will also be presented to inform approaches to proactive support for CT students. We hope that this session will provide opportunity for reflection about improving support for CT students by module teams, ALs, colleagues in the SST and student buddies/mentors. The session will be structured as a short presentation with an opportunity for questions at the end.

Producing a module outside the VLE

Michel Wermelinger & Oli Howson
Faculty of Computing and Communications
STEM Faculty

We're producing a Computing module to be fully delivered (study materials and TMAs) via Jupyter notebooks, not the VLE. We're authoring in a simple text format (not Word), automating

the process as much as possible, and hosting the production materials on a version control platform to work together.

A new edition of M269 (Algorithms, data structures and computability) is being authored in a different way to provide more programming practice to students and reduce the overhead of using multiple tools and files for students and ALs. M269 is authored entirely (both book and TMAs) in Markdown, a very simple and widely used text-based mark-up format. A set of scripts written by us transforms the Markdown files into Jupyter notebooks, which will be the main medium for students to study M269. Jupyter notebooks are interactive browser-based documents, allowing students to read the text, run the example programs and solve the exercises without the overhead of switching media. Using freely available software we convert the Jupyter notebooks to PDF and HTML to provide alternative read-only formats to students. Traditionally, the module team, students and ALs work with multiple documents: the TMA questions, the student's Solution Document, the tutor notes and additional code files. This leads to inconsistency errors and time overhead in authoring, answering, and marking TMAs. Using notebooks reduces the number of documents and hopefully those problems. A single Markdown document is used for each question, containing the questions, answers and marking guide. Selected questions are automatically formed into a TMA, which is further automatically split and converted to one notebook (with questions and code) for students to add their answers and one notebook for ALs with the tutor notes. Once students submit their notebook, a script merges it with the tutor notes, so that ALs have a single document with the student's answers, the model answers, and the marking guide. Once the notebook is marked, another script removes the model answers and marking guide before the notebook is returned to the student. This process is going to be co-designed and evaluated with ALs before presentation. Using a text-based format like Markdown (instead of a binary format like Word) allows fine-grained version control. The module team and the LDS editor are using private GitHub repositories to keep the full history of all materials, edit D3s, review changes, merge them, and report issues.

How do students and staff use the Mathematics and Statistics Study Site?

Rachel Hilliam, Gaynor Arrowsmith, Derek Goldrei, Alexander Siddons, Cath Brown
School of Mathematics and Statistics
STEM Faculty

Evaluation of the mathematics and statistics study site show how advisor staff in the SST use the site on a regular basis. There is a lack of awareness of it amongst many students, ALs and SRF staff and an urgent need to improve navigation to and around the site.

The Mathematics and Statistics Study Site was created in September 2017 and was one of the pilot study sites in the OU. Many of the resources on the site have grown out of smaller scholarship projects. This session will report on a study which was conducted to evaluate the effectiveness of the site for students, ALs and SRSC staff. Whilst the study site has evolved since it opened in 2017 it is still possible to see how students have used the website using analytics. However, analytics can only be obtained for students linked to one of the M&S qualifications. In 2019/20 the number of students linked to an M&S qualification was 7947, whereas the number of students studying a mathematics and statistics module as part of another qualification in 2019/20 was 7683. Alongside usage analytics, the project team also wanted to gain feedback on

how students find the study site and how useful areas of the study site are. The study site was designed to be a one-stop shop for students on any mathematics or statistics module, their tutors and student support staff, to aid with study advice in a broad sense and to help engender a sense of community. To gain feedback from all these stakeholders two questionnaires, one for students and one for AL/SRSF staff, were distributed during June/July and Nov 2020. The main findings showed that education and senior advisors in the M&S SST found the site particularly useful and regularly used the resources in their conversations with students. However, most of the SRF staff who work across all faculties, and are the front-line staff in the SRSC, were unaware of the existence of the site. There needs to be both staff development and induction for SRF staff regarding study sites. There is also a problem with students finding the site in the first place. However, once they discover the study site, they use it on a reasonably regularly basis, particularly for help in choosing their next module and for using the resources between module study (for most, over the summer). There is also a lack of awareness of the site amongst ALs and this also needs to be addressed through staff development and in CDSA conversations. One major criticism is that navigation both to the study site and around the site is difficult, and thought should be given to how students are routed to the site and also the tab headings which do not seem to be fit for purpose.

Student support for Data Interpretation skills in S294

Katja Rietdorf
School of Life, Health and Chemical Sciences
STEM Faculty

The exam in the Cell Biology Module, S294, contains an element of data interpretation, which students struggle with. We here present additional resources we developed to help students to learn and test their data interpretation skills prior to the exam, and their impact on student performance.

The 30 points Cell Biology Module, S294, has completion and pass rates that are lower than Faculty and BoS averages. Revision of the assessment strategy and interventions such as enhanced resit support have led to some improvements in these KPIs but, despite good overall satisfaction rates, students see that module as difficult and demanding. Development of key skills in S294 is supported through tutor group tutorials and feedback on three formative TMAs. These skills are then assessed in a summative TMA (25% OES) or the exam (75% OES). AL observations and monitoring of exams indicated that students struggled with data interpretations skills (assessment of which contributes 18.75% to the overall score for the module) and performed better on questions that assessed knowledge and understanding. To improve support for development of data Interpretation skills, we produced additional resources to supplement tutor group tutorials: a recorded session explaining the basics and running through examples similar to those that students would encounter in the exam, and a Moodle self-assessment quiz testing data interpretation skills. This short presentation will give an overview of student engagement with these resources and data on their impact on student performance. We propose to share this data with future students to encourage engagement.

Supporting students seamlessly through better communications between the Science Student Support Team and Associate Lecturers.

Fiona J Aiken, School of Earth, Ecosystems and Environmental Sciences
Fiona Moorman School of Life, Health and Chemical Sciences
Gemma Warriner School of Physical Sciences
STEM Faculty

In February 2020 three AL representatives were appointed as consultants, one to each of the Science Schools. Their role was to work with colleagues within the SST and their school to improve communications between SST colleagues and ALs. We will share the resources developed and the outcomes from this project.

This work started with the appointment of an Associate Lecturer (AL) representative to each of the three Science schools in February 2020. The ALs were appointed as consultants from February to December 2020. The main aim of their role was to help the Student Support Team (SST) to improve communications and collaborations with the Science ALs. The main issue that was being addressed was the need to better integrate ALs into the SSTs and to highlight how the support they give to students compliments that given by advisors in the SST. Another issue was it had been some time since there had been AL staff development sessions run for ALs that focussed specifically on the role of the Student Support Team and the interventions that are routinely sent to students. The AL reps attended an induction day in the Manchester office in February 2020 to meet staff and to be given an overview of how the SST functions. Following discussions with the Science School SST leads communication was identified as a key area which required improvement. The need to help ALs fully understand the role of the Advisors in the SST and the interventions sent to students from the SST were identified as key areas to work on. Throughout 2020 from March to December the AL reps attended regular meetings with SST staff putting forward the AL perspective and gaining knowledge in the key areas of support offered to students by SST colleagues. The Science SST faculty leads with input from the AL reps produced a document for circulation to all Science ALs titled 'The SST and AL role in Science undergraduate student contacts.' This document was sent to all Science ALs in October 2020 and it was backed up with ALs being invited to one of two sessions in Adobe Connect led by the AL reps and supported by the Science School SST leads titled. 'Exploring the role of Student Support Teams and Introducing MILLS interventions.' These sessions concluded with a poll aimed at gathering points, thoughts and questions about the SST role and the MILLS interventions. The questions and answers were shared on a forum accessed by all Science ALs after the event. The AL reps concluded their project by writing a report on their time as SST AL reps. We will share the main findings from this report in the session, they will be relevant to colleagues across the university. The session will be structured as a short presentation with an opportunity for questions at the end.

The Mathematics Online Project: a reflection after 10 years

Ben Mestel
School of Mathematics and Statistics
STEM Faculty

The Mathematics Online Project ran 2006 - 2009, working with the CETLS, particularly COLMSCT. I shall review the project work, discuss the evolution of mathematics online teaching over the last ten years, and look forward to the post-Covid future for online delivery of mathematics and other symbolically rich disciplines.

The Open University Mathematics Online Project ran from late 2006 to 2009, working with the Centres for Excellence in Learning and Teaching (CETLs), particularly COLMSCT (Centre for Online Learning of Mathematics, Science, Computing and Technology). In this talk, I shall review the work of the project, (what was successful, what was less so), discuss how online teaching of mathematics has evolved at the OU over the last ten years or so, and consider what the future holds post-Covid for online delivery, not only of mathematics, but of other symbolically rich disciplines in STEM.

Panel Discussion & Plenary:

We are delighted to welcome our panel, drawn from a range of different universities and STEM disciplines to our annual STEM Teaching conference. Our discussion will focus on how other STEM practitioners and institutions have experienced the last year and how they feel their teaching practices may be permanently altered as a result of the pandemic and the switch to digital delivery of curriculum.
The focus will be on the potential long-lasting implications for STEM Higher Education both in traditional and distance learning institutions.

We will be joined by:

- **Chair: Diane Butler,** Associate Dean Academic Excellence
- **Dr Neil Williams,** Director of Undergraduate Studies, Faculty of Science, Engineering and Computing, Kingston University
- **Professor Sally Smith** DBA, FBCS, PFHEA, Head of Graduate Apprenticeships and Skills Development, Edinburgh Napier University
- **Dr Elinor Jones,** Associate Professor (Teaching), Department of Statistical Science, University College London

Closing remarks and Student Awards

At the end of the conference the STEM faculty's Executive Dean, Professor Nick Braithwaite will announce the winners of the inaugural STEM Student Awards.

Awards will be given for students in two categories:

- **Inspirational Achievement** – recognition for students who have succeeded with their studies against the odds
- **Serving the STEM student community** – recognition for students who have supported, enabled, encouraged their fellow students, or served the STEM student community in any way.

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