

The 9th eSTEEeM Annual Conference 2020

Informing Student Success: From Scholarship to Practice

Conference Booklet

29-30 April 2020

Via MS Teams

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ACKNOWLEDGEMENTS

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Nicholas Braithwaite, Executive Dean, STEM Faculty

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Open University colleagues and students who have contributed to the conference

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PROGRAMME – DAY 1

Wednesday 29th April 2020

Time	Session		Venue
9.30 – 10.00	Registration and Coffee		Hub Suite
10.00 – 10.05	Welcome and Introduction Diane Butler and Trevor Collins, eSTeEM Directors		Hub Lecture Theatre
10.05 – 10.10	Opening Address Nicholas Braithwaite, Executive Dean, Faculty of STEM		Hub Lecture Theatre
10.10 – 11.30	Opening Workshop: Addressing Inequitable Outcomes for Black Students at The OU Workshop Wendy Fowle, John Butcher and Darren Gray - Access, Participation and Success		Hub Lecture Theatre
11.30 – 11.45	Morning Coffee Break		Medlar and Juniper
11.45 – 12.45	Parallel Session A: Short Oral Presentations – Innovations in Assessment & Technologies for STEM Learning		Presentation Room A
Session A Chair: Mark Endean	Catherine Halliwell and Jenny Duckworth	Can an asynchronous student conference in Open Studio develop students' critical evaluation skills?	
	Matthew Nelson and David Bowers	Large-scale game-based activity for delivering experience of communication within teams	
	Andrew Potter and Colin Blundell	Blended Tutorials in Mathematics - Simultaneous Face-to-Face and Online Learning Events	
11.45 – 12.45	Parallel Session B: Short Oral Presentations – Supporting Students		Presentation Room B
Session B Chair: Sally Jordan	Janette Wallace, Isabella Henman and Kath Nicol	The role of large informal online workshops to engage and enthuse students studying SDK228 an interdisciplinary level 2 module	
	Cathryn Peoples	The Change in Student Engagement with Personalised Support: An Evaluation at the Mid-way Point of an eSTeEM-funded Project	
	Mark Jones, Sarah Chyriwsky, Judith Croston, Ulrich Kolb, Susanne Schwenzer and Sheona Urquhart	Online Team Investigations in Science (OTIS) – The student view of online team-working in astrophysics and space science	
11.45 – 12.45	Parallel Session C: Workshop/Demonstration – Supporting Students		Workshop Room C
Session C	Rachel Slater, Patrick Murphy, Elaine McPherson and	Accessibility and inclusion in tuition: examples of individualised support	

	Anne Campbell		
11.45 – 12.45	Parallel Session D: Short Oral Presentations – Technologies for STEM Learning		Presentation Room D
Session D Chair: Jimena Gorfinkiel	Adeola Adeliyi, Michel Wermelinger, Jon Rosewell and Karen Kear	A systematic review of pair programming for learners of programming at a distance	
	Sharon Dawes, Chris Thomson, Stephen Rice and Stephen Bowles	How Jupyter Notebooks enhance learning and teaching on TM351	
	Patrick Wong, Helen Donelan and Tony Hirst	Understanding and mitigating students' difficulties in undertaking complex practical activities on their computers	
12.45– 13.45	Lunch Delegates are welcome to browse posters over lunch in readiness for presentations on Day Two		Hub Lecture Theatre
13.45 – 14.30	Ignite Presentations – Future Innovative Scholarship		Hub Lecture Theatre
	<ul style="list-style-type: none"> • Matthew Nelson – Storytelling in computing education • Carol Calvert and Rachel Hilliam – A qualification world? • Sarah Daniell and Lorraine Waters – Evaluation of students' accessibility and use of online tutorials and forums in Level 2 modules, with specific focus on the experience of D flag students • Nick Chatterton and Eleanor Crabb – Developing the equivalent of student whiteboards for use in Adobe Connect tutorials and in forum posts • Ann Grand – Learning to be an engaged research community 		
14.30 – 14.45	Afternoon Tea Break		Medlar and Juniper
14.45 - 15.45	Parallel Session E: Short Oral Presentations - Employability		Presentation Room E
Session E Chair: David Conway	Andrew Potter, Gerry Golding and Sally Crighton	Promoting Good Mathematical Communication as a key Employability and Transferable Skill in Level 1 Service Mathematics	
	Rupesh Shah, Helen Wilding, Martin Reynolds and Ray Ison	Curriculum innovation – transforming postgraduate learning systems for a world in turbulence	
	Leonor Barroca and Matthew Walkley	Who are our apprentices?	
14.45 – 15.45	Parallel Session F: <i>Workshop withdrawn from programme</i>		

14.45 – 15.45	Parallel Session G: Short Oral Presentations – Online/Onscreen STEM Practice & Supporting Students		Presentation Room G
Session G Chair: Laura Alexander	Susan Pawley	Maximising online tutorial attendance of a high population level 1 module	
	Anne-Marie Gallen, Mark Jones and Anne Campbell	Perceptions, Expectations and Experience of Group Tuition: towards a shared understanding amongst stakeholders (part II: the student perspective)	
	Rachel Hilliam, Gaynor Arrowsmith, Alexander Siddons, Derek Goldrei and Cath Brown	The Mathematics and Statistics Study Site: Facts, figures and further plans	
15.45 – 16.00	Afternoon Tea Break		Medlar and Juniper
16.00 – 16.30	Day One Closing Keynote Presentation		Hub Lecture Theatre
	Phil Gravestock, Dean, College of Learning & Teaching, University of Wolverhampton Addressing Disparities in Student Success: Enhancing BAME Students' Achievement		
16.30 – 16.45	eSTeEM Scholarship Projects of the Year Awards		Hub Lecture Theatre
16.45 – 17.30	Wine Down Delegates are invited to reflect on Day One with colleagues over some light refreshments.		Medlar and Juniper
17.30	Close		

PROGRAMME – DAY 2

Thursday 30th April 2020

Time	Session		Venue
9.00 – 9.30	Registration and Coffee		Hub Suite
9.30 – 10.50	Parallel Session H: Short Oral Presentations – Technologies for STEM Learning, Supporting Students & Innovations in Assessment		Presentation Room H
Session H Chair: Duncan Banks	Catherine Halliwell, Simon Collinson, Rachel McMullan and Jenny Duckworth	Can a new OU Study App enhance the learning experience of students on S350, an online only module?	
	Steve Walker, Tom Olney, Carlton Wood and Anactoria Clark	Learning analytics - let's get real!	
	Jake Hilliard, Patrick Won, Karen Kear, Helen Donelan and Caroline Heaney	Using Real Time Student Feedback (RTSF) as an Emotion Awareness and Regulation Tool in an Assessed, Online, Collaborative Project	
	Jim Iley and Nick Adams	Single Component Assessment Examination and Exam Feedback: the S112 experience	
9.30-10.30	Parallel Session I: Workshop/Demonstration – Supporting Students and Tutors		Workshop Room I
Session I	Shirley Evans, Manish Malik and Winston Graham	An AL led eSTeEM action research project to support students and tutors: challenges and opportunities	
9.30 – 10.30	Parallel Session J: Workshop/Demonstration – Online/Onscreen STEM Practice		Workshop Room J
Session J	Nick Chatterton, Eleanor Crabb and Kate Bradshaw	Generating graphical content for teaching: a simple and cheap way to produce diagrams/symbol rich content for forum postings and for live streaming in Adobe Connect	
10.50 – 11.05	Morning Coffee Break		Medlar and Juniper
11.05 – 12.25	Parallel Session K: Short Oral Presentations – Community Building, Support for ALs and Employability		Presentation Room K
Session K Chair: Stephen Lewis	Janet Haresnape, Rupesh Shah, Nirvana Wynn and Barbara Jones	Building a community of STEM ALs – extension of the STEM-ByALs-ForALs programme to include more social learning opportunities	
	Venetia Brown, Alan Cayless and Jo Jarvis	Exploring the use of Labcasts to Support Associate Lecturers	
	David Conway	What are the careers education, information, advice and guidance needs of Open University Level 1 Computing and Communication	

		students?	
	Fiona Aiken and Chris Hutton	Student perceptions and development of employability skills in level 1 science	
11.05 – 12.25	Parallel Session L: Short Oral Presentations – Supporting Students and Equality, Diversity and Inclusion		Presentation Room L
Session L Chair: Alec Goodyear	Catherine Halliwell and Cath Brown	TMA Extensions: How are they used and what is their impact on student success?	
	Gerry Golding and Andrew Potter	Developing “use value mindsets” to enhance undergraduates’ perceptions of learning mathematics in a first-year service mathematics environment	
	Chris Hughes, Chetz Colwell, John Clarke, Kaye Williams and Alison Bromley	Evaluating the accessibility of an alternative format of module materials in Maths & Stats	
	Anne-Marie Gallen, Clare Reger and Mark Bowden	Factors influencing female participation in Physical Science Postgraduate Research Programmes	
11.05 – 12.05	Parallel Session M: Workshop/Demonstration – Technologies for STEM Learning		Workshop Room M
Session M	Trevor Collins, Rebecca Ferguson and Eileen Scanlon	Putting Innovation into Practice – Enhancing the STEM curriculum through scholarship	
12.30 – 13.15	Poster Presentations Delegates are invited to vote for the best poster. The winning poster will be announced during the closing keynote session at the end of Day Two.		Hub Lecture Theatre
13.15 – 14.00	Lunch Delegates are welcome to continue browsing posters over lunch.		Hub Lecture Theatre
14.00 – 15.00	Parallel Session N: Short Oral Presentations – International Partnerships & Supporting Students		Presentation Room N
Session N Chair: Shailey Minocha	Tom Olney, Mark Endean and Duncan Banks	‘More Learning Designers are Needed’: Identifying the instructional design competencies required for the successful implementation of the UK Open University learning design approach in three Chinese Open Universities.	
	Kerry Murphy, Jane Cullen, Eric Addae-Kyeremeh, Kris Stutchbury, Maria Velasco, Sarah Davies, Janice Ansine, Clem Herman, Olivier Biard and Joshua Mallet (58)	OpenSTEM Africa: Strengthening science education in Ghana	
	Stephen Burnley and Sinead O'Connor-Gotra	Giving practical support to MSc students in the Global South	

14.00 – 15.00	Parallel Session O: Workshop/Demonstration – Employability		Workshop Room O
Session O	Alexander Mikroyannidis	Decentralised Qualifications on the Blockchain	
14.00 – 15.00	Parallel Session P: Workshop/Demonstration – Supporting Students		Workshop Room P
Session P	Fiona Moorman and Karen New	STEM ISSS - where are we now? Evaluating awareness, usage and effectiveness of individual student support sessions	
15.00 – 15.15	Afternoon Tea Break		Medlar and Juniper
15.15 – 15.45	Day Two Closing Keynote Presentation		Hub Lecture Theatre
	Helen May, Higher Education Consultant Achieving Positive Outcomes for All: What can we do and why does it matter?		
15.45 – 16.00	Best Poster Prize		Hub Lecture Theatre
16.00	Close		

WELCOME AND INTRODUCTION



Welcome to the 9th eSTEEEM Annual Online Conference *Informing Student Success – From Scholarship to Practice* which takes place in our 10th Anniversary Year! In light of the current circumstances, we are experimenting with entirely online delivery and it will be interesting to see how our conference translates into this new format. Thanks to all our presenters for their willingness to transition to the 2020 way of doing things!

As ever the aim of this conference is to highlight recent scholarship supported by eSTEEEM and reflect on innovation and enhancement in STEM teaching and learning. Our continued aim is to maximise the success of our students in achieving their objectives and aspirations.

The conference programme for both days is an exciting mix of keynotes, short oral presentations, workshops and structured discussions showcasing work from colleagues in the STEM Faculty and wider university. We are delighted to welcome Professor Phil Gravestock (University of Wolverhampton) and Dr Helen May (York St John University) as our keynotes on Day 1 and Day 2 respectively.

This year we have introduced some new elements to our programme including on Day 1, a workshop on the critical issue 'Addressing equitable outcomes for black students at the OU' led by colleagues from our OUs Access Participation and Success Team and Ignite sessions where we look ahead to our future scholarship projects. Once again, all conference delegates will be invited to vote for the best poster. We will also be announcing the winners of the eSTEEEM Scholarship Project Awards. Prizes will be awarded for projects in two categories;

- Innovation or innovative/original approach to teaching
- Enhancing the student experience.

The finalists and prize winners will be announced at the end of the day on the 29th April following the closing keynote session.



The success of our students lies at the heart of eSTEEEM's scholarship activity; our portfolio of ongoing and new projects presented at this conference includes studies about the role of students as partners, tutors, technologies for STEM learning, and online/onscreen STEM practice.

During the parallel sessions, the workshops, 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 9th eSTEEEM Online Conference and hope you have an informative, stimulating and enjoyable two days.

Diane Butler and Trevor Collins, eSTEEEM Directors

OPENING KEYNOTE SPEAKER BIOGRAPHY



Phil Gravestock is Dean of the College of Learning & Teaching and Professor of Inclusive Practice at the University of Wolverhampton. Phil has an interest in inclusion and flexible learning, which arose primarily from his experiences of working with disabled students on geological fieldwork. He directed the HEFCE-funded `DisabilityCPD` project, edited the Geography Discipline Network's `Learning Support for Disabled Students Undertaking Fieldwork and Related Activities` series. He co-wrote `Inclusion and Diversity: meeting the needs of all students` with Sue Grace. Phil was recently the institutional lead for two Catalyst projects: DRIVER (lead: Coventry University); and the Value-Added Project (lead: Kingston

University), which explored issues of attainment, retention.

CLOSING KEYNOTE SPEAKER BIOGRAPHY



Dr Helen May is currently a curriculum design consultant for York St John University. She joined the University as Head of Learning and Teaching in 2019, where she led on the Teaching Excellence Framework (TEF) and worked on the University's Access and Participation Plan. She came to the University having worked nationally for the Higher Education Academy (HEA). In her 14 years at the HEA, she held senior roles, leading the Teaching Excellence Awards and over 8 quality enhancement priorities, including student success, retention, inclusion and internationalisation. Helen is deeply passionate about equity and inclusion. She started her career as a primary school teacher, before completing a M.Ed in 1997 and an Ed.D in 2003, focusing on student engagement and inclusive education. Over the years, Helen has authored a number of publications on various topics

including social capital; inclusive learning and teaching; student engagement; equality and diversity; transnational education; and strategic change.

CONFERENCE INFORMATION

Registration

Conference registration will take place between 9.30-10.00 on Wednesday 29th April and between 9.00-9.30 on Thursday 30th April in our Online Hub Reception (the 'Hub Suite').

To join the conference on the day, visit the eSTEE M & Co VLE website using the link sent to you in your joining instructions: <https://learn1.open.ac.uk/course/view.php?id=100174>.

Please have our eSTEE M & Co VLE website open, bookmarked and pinned to your favourites, as this will have all the relevant online room links you will need for your chosen sessions (including the keynotes and all parallel sessions). Also, please have your personalised programme readily available to remind you of the sessions you have registered for.

We encourage you to get involved with the discussions throughout the two days via Twitter @OU_eSTEE M using the hashtags #eSTEE MConf20 #eSTEE Mis10

Online Helpdesk

An online helpdesk will be covered by our eSTEE M conference staff in the 'Hub Suite' throughout the conference to help you with any queries that you may have. You can also reach us by emailing esteem@open.ac.uk with any queries.

Conference sessions and recordings

The welcome address and opening and closing keynote presentations will be live webcast, recorded and made available as replays after the conference via the eSTEE M website.

Some of the Parallel Sessions may be recorded; however, this will be clearly stated for each session and presenters must seek permission from all participants to record before doing so. Audience members are participants in this process. If you have any concerns, please speak to a member of the eSTEE M 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.

Poster Presentations

There will be a poster presentation session on Day Two, 30th April between 12.30 -13.15 in the 'Hub Lecture Theatre' online room. Posters will be divided into 4 presentation groups (Groups A-D) – please see the last section of the conference booklet for the groupings. You are welcome to continue browsing posters over lunch between 13.15-14.00. Conference delegates are invited to vote for the best poster, polls will close at 14.00. The winning poster will be announced at the end of Day Two after the closing keynote session.

Ignite Presentations

For the first time, this year's conference features an Ignite-style presentation session, showcasing new and exciting ideas on the theme 'Future Innovative Scholarship'.

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 in the 'Posts' section of the 'Hub Suite' online room any information about changed or cancelled sessions.

Conference refreshments

There will be regular refreshment breaks throughout the Conference, with plenty of time for tea, coffee or light refreshments in the morning and afternoon, as well as an allotted time for lunch on both days. And, of course, our infamous not to be missed wine down at the end of Day One. We would encourage you to use the Medlar and Juniper rooms during the refreshment breaks as a social online space between sessions over the two days.

Feedback

We welcome your feedback. If you have any issues or concerns, please contact a member of the eSTEEeM conference staff.

BOOK OF ABSTRACTS

Day One Opening Workshop

Addressing Inequitable Outcomes for Black Students at The OU Workshop

Wendy Fowle, John Butcher and Darren Gray
Access, Participation and Success

Evidence from across the sector and institutional data at the Open University suggests differential outcomes for students from different ethnic backgrounds. A student's ethnicity can amplify disparities that exist within higher education. For example, the gap between the likelihood of white students and students from Black, Asian or minority ethnic backgrounds (BAME) getting a first or upper-second-class degree was -13 percentage points across the sector in 2017/18. For The OU with our open entry policy and social justice mission the picture is just as stark, if not more alarming.

- Our BAME student proportion is around 11%, less than half of the sector
- Our BAME students are less likely to:
 - complete their modules than white students -4.45 (OU) and -6.96 (STEM) percentage point gap in 2017/18
 - pass their module -6.44 (OU) and -6.31 (STEM) percentage point gap in 2017/18
 - achieve a good pass -19.94 (OU) and -17.13 (STEM) percentage point gap in 2017/18

The term BAME is broad and of course is not a single homogenous group, all students are unique. However, breaking figures down further shows a module pass gap between Black students and white students of -13.9 percentage points, and a gap in good module pass (1:1 and 2:1) of -31.1 percentage points in 2017/18. The size of the gap has persisted for many years and shows no sign of closing.

The emphasis on the BAME degree awarding gap is mirrored across the different UK nations. The OU's Access and Participation Plan (APP) which is currently awaiting approval by the Office for Students (OfS) requires ambitious targets to be set to reduce these gaps and contribute to their overall elimination. We need to reduce these, not just because the regulator in England is telling us to, but because it is inequitable and a damning indictment of our teaching and student support. So, how are we going to achieve the challenging targets set?

The Access, Participation and Success (APS) team will lead an interactive session to highlight key data, share experience of their project 'Closing the Black Attainment Gap', the APP targets and pathways to success, and implication for The OU on not achieving a reduction in the gaps. The 'inclusive curriculum tool' developed by APS will be showcased.

eSTeEM will be working closely with the STEM Boards of Study Group to commission scholarship proposals in the area of BAME attainment across the STEM curriculum and the session will include the development of scholarship ideas to gain deeper understanding of the issues.

Parallel Session A: Short Oral Presentations – *Innovations in Assessment & Technologies for STEM Learning*

Can an asynchronous student conference in Open Studio develop students' critical evaluation skills?

Catherine Halliwell and Jenny Duckworth
STEM Faculty

The level 3 module Evaluating Contemporary Science, S350, helps students learn, develop and apply important key skills such as evaluation of current science research and communication of these findings to different audiences, along with professional skills such as time-management, giving constructive feedback to peers and reflecting on learning practices. TMA3 requires students to partake in an asynchronous online student conference using Open Studio (OS), creating a poster and audio presentation using accumulated knowledge to evaluate a contemporary topic in science. The work in the poster is further developed in the EMA, so participation in this OS activity can have a significant impact on a student's final grade in S350.

Whilst many students enjoy the conference and achieve relatively good marks on style and presentation of their work, it is not clear to what extent they develop (and recognize) deeper rather than superficial critical evaluation skills that focus on the science presented. This is a key issue in terms of helping students learn and practice skills which are needed for them to succeed in their final project modules. It is important for module teams and ALs to understand how students approach learning through peer-to-peer feedback in an online environment so that student experience and success can be enhanced and best practice in the assessment of such activities can be shared within the module and to other modules.

Our research questions are:

- Can a student conference using OS lead to a positive impact on module success through supporting a deeper engagement with critical evaluation of contemporary science?
- What 'quick fixes' can we put in place to help promote student engagement in deeper learning and reflection?

To our knowledge S350 is the first module that has used OS as a platform for an asynchronous conference. Previous scholarship Lotz et al., (2017), Thomas et al. (2016) and Kear et al. (2016) has investigated the progress of learner interactions using OS across a qualification, aspects of enjoyment and concerns about giving and receiving feedback from peers, respectively. By identifying how students currently engage with the conference and linking this to their module outcome and satisfaction, we are starting to identify issues that might act as barriers to engagement and the development of deeper learning. Our project therefore expands on previous studies to gain a broader overview with the aim of achieving firmer guidelines on how we should be developing OS and other synchronous conferencing activities within our online teaching for student engagement and success, to promote a deeper engagement with evaluation of scientific ideas.

In this short talk we will share our findings to date and discuss their potential implications together with next steps for the project.

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Thomas, E., Barroca, L., Donelan, H., Kear, K., Jefferis, H. and Rosewell, J. (2016). 'Online conversations around digital artefacts: the studio approach to learning in STEM subjects'. In: *Proceedings of the 10th International Conference on Networked Learning 2016* (Cranmer, S.; de Laat, M.; Ryberg, T. and Sime, J. A. eds.), pp. 172–180.

Large-scale game-based activity for delivering experience of communication between teams

Matthew Nelson and David Bowers
STEM Faculty

Game-based activities that simulate an ongoing work-based scenario in which students can directly engage can provide interesting and effective learning environments. Team working is an important employability skill for computing graduates, required for BCS accreditation. But team working is notoriously challenging in distance learning contexts, and students can be quite hostile to it. Gamification both lightens the theoretical burden of discussing team roles and behaviours and demonstrates their importance for practical team-working exercises. Producing a realistic game-based experience for many hundreds of users, without over-burdening students, tutors or Module Teams, has been achieved through an "automated" email-based participatory activity in which students respond "in role" to an evolving situation. A simulation of the activity that can be executed multiple times is also provided so that students can observe how the responses of different team-role holders influenced one of several possible outcomes.

Learning from the activity is assessed by a reflective question in an assignment, probing students' understanding of the importance of prompt and effective communication within a team. This activity and students' responses in the assignment, and how well they demonstrate engagement and understanding of team roles and team-working skills will be explored in this talk.

Blended Tutorials in Mathematics - Simultaneous Face-to-Face and Online Learning Events

Andrew Potter and Colin Blundell
STEM Faculty

In most undergraduate modules at the Open University (OU), synchronous tuition typically takes the form of either face-to-face tutorials or online tutorials. Opportunities for a single learning event which offers a choice of face-to-face or online participation have been rare, and those that do exist lack an evidence-based approach to evaluation. In this joint scholarship work, we explore the opportunities and barriers of using what we call “blended tutorials” – tutorials which take place simultaneously as both face-to-face and online events.

The use of “blended synchronous learning” has attracted some attention in the literature in recent years. Bower et al. (2015) highlight various issues, including the need for designing active learning approaches, and the “heightened cognitive load” on tutors – both of which are highly relevant in the OU context. However, there are few examples in the literature which deal with blended synchronous learning in the context of STEM learning – and the extra technological challenges that are present when reliant upon symbol-rich calculations written by hand.

We present initial findings from a pilot of two blended tutorials on the Level 3 pure mathematics module M337 Complex Analysis. Our evaluation strategy uses a mixture of qualitative data – including reflective journals, peer observations, and student interviews. We discuss the effectiveness of a blended tuition approach and explore the themes that have emerged from staff and student feedback. Initial results indicate rich points for further discussion: technological, pedagogical, and institutional issues, as well as mathematics- and STEM-specific challenges.

In this session, participants will learn of the barriers and opportunities of using a blended approach to tuition in our pilot. We hope this will inspire participants to engage critically with the issues raised and reflect on the benefits and challenges of using a similar approach in their own teaching practice.

Reference:

Bower, M., Dalgarno, B., Kennedy, G. E., Lee, M. J. W. and Kenney, J. (2015) ‘Design and implementation factors in blended synchronous learning environments: Outcomes from a cross-case analysis’, *Computers & Education*, 86, pp.1–17.

Parallel Session B: Short Oral Presentations – *Supporting Students*

The role of large informal online workshops to engage and enthuse students studying SDK228 an interdisciplinary level 2 module

Janette Wallace and Isabella Henman
STEM Faculty

LHCS's level 2 interdisciplinary module (science of the mind: investigating mental health) attracts a large (2000 +) and varied student body. Students struggle with different aspects of the module and this can mean student engagement, enjoyment and success on the module can vary. A series of module wide online workshops (running November 2019-March 2020) have been created to run alongside the cluster and tutor group tuition provision for our 2019 student cohort. The workshops are linked to key areas within the module but do not specifically deliver module content. They include topics allied to mental health including positive psychology and dementia care in the 21st century as well as skills-based sessions including biology in your own words and plagiarism. The workshops are outside of the LEM, not recorded and are each being run twice (daytime and in an evening). As well as the tutor led information the workshops have been designed to be highly interactive and include small group discussions (in break out rooms). Student behaviour such as numbers of responses to polling and emoticon usage is being measured. And the impact of the workshops on student enjoyment of and engagement with the module are being evaluated using JISC immediately after each workshop. Initial findings suggest the informal style of the workshops were enjoyed by most students, students enjoyed engaging with the presenters and each other, and they learnt more background information enhancing students understanding of and experience of the module. Some students did not enjoy small group discussions, and those students felt they have not gained as much as those who felt able to contribute. A more in-depth questionnaire of student perceptions of the programme will take place towards the end of the 19J presentation when all students on the module will be surveyed. In addition, students will be invited to take part in focus group discussions.

The Change in Student Engagement with Personalised Support: An Evaluation at the Mid-way Point of an eSTeEM-funded Project

Cathryn Peoples
STEM Faculty

The literature often reports that students want more from academic staff: more of their time, more of their respect, more of their interest, and more of their feedback. A report from HEFCE in 2015 reports that, "A sense of 'belonging' emerged as a key determinant of student outcomes" [1]. Furthermore, "... the strong social need that is a clear element in the face to face experience of education ..." [1]. An investigation was therefore launched to provide students with personalised support at The Open University, to understand the extent to which these findings remain applicable today. This project has been running since July 2019, with students becoming engaged in October 2019. Personalised support will be offered until the module ends in June 2020.

The initial findings identify that the students who have engaged the most with the personalised support are part of the higher-performing cohort. Students who may have more to gain have therefore largely not taken advantage of the opportunity, giving initial indications that they may be disengaged with their education experience in more than one way. Personalised support has been offered through ad hoc one-to-one instant chat sessions in Slack [2], scheduled instant chat or Skype sessions, diary entries which are shared with me (their tutor), and a group chat in Slack once a week. The most popular type of support includes the group chat session and ad hoc instant chats, both of which take place in Slack. Slack has been harnessed to act as the hub for the personalised support in use.

The ways which students have engaged with the personalised support has changed in the period that the project has been running, correlating with findings in [3]. For example, one student who initially participated regularly and in a fully engaged manner with the weekly group chat has not contributed to the conversation for the last eight weeks. Where change has resulted in a lack of participation, this is in spite of the fact that students have been made aware of the higher assignment average achieved by those receiving personalised support. In relation to this, however, is the fact that one student recently joined the Slack environment after receiving his first assignment result, demonstrating evolution with personalised support in another direction.

The objective of this session is to discuss the change in engagement with the support over time, to examine reasons which have driven behavioural change, to discuss efforts made to encourage students to continue to participate and new students to join, and to review the ways which are proving to be most effective in supporting students.

References:

[1] A. Mountford-Zimdars, D. Sabri, J. Moore, J. Sanders, S. Jones, and L. Higham, "Causes of Differences in Student Outcomes," Higher Education Funding Council for England, July 2015.

[2] Slack Homepage; Available at: <https://slack.com/intl/en-gb/>.

[3] C. A. Boulton, E. Hughes, C. Kent, J. R. Smith, and H. T. P. Williams, "Student Engagement and Wellbeing over Time at a Higher Education Institution," PLoS ONE 14(11), Apr. 2019.

Online Team Investigations in Science (OTIS) – The student view of online team-working in astrophysics and space science

Mark Jones, Sarah Chyriwsky, Judith Croston, Ulrich Kolb, Susanne Schwenzer and Sheona Urquhart
STEM Faculty

OTIS (Online Team Investigations in Science) is an in-depth study of the factors affecting the student experience and pedagogical design of three different examples of online team projects for advanced undergraduate and taught postgraduate students in astronomy and space sciences at the OU. These three team projects are based on open-ended scientific investigations which respectively use an external research archive (the Sloan Digital Sky Survey), the OU's PIRATE

robotic telescope, and the OU's Mars Yard and rover. The key aims of OTIS are to better understand how the success of online team-working depends on pedagogic design, the use of online communication tools, student engagement, group dynamics, peer-learning and assessment strategies. The project is based on comprehensive analysis of forum interactions and in-depth interviews with a sample of students.

In this talk we will focus on the results of interviews with students that explored various aspects of their experiences of online collaborative working. In particular, we report on student views about the design and assessment of the projects, their experiences of peer learning, and the value that they place on engaging in online team working activities.

Parallel Session C: Workshop/Demonstration – Supporting Students

Accessibility and inclusion in tuition: examples of individualised support

*Rachel Slater¹, Patrick Murphy¹, Elaine McPherson¹ and Anne Campbell^{1,2}
STEM Faculty¹, Academic Services²*

Accessibility and inclusion in tuition (AccIT) is an eSTeEM scholarship project designed to support STEM ALs by gathering and sharing examples of specific and personalised support tutors have put in place to address individual students' needs.

AccIT has 4 main aims:

- To develop understanding of accessibility issues in STEM tuition
- To raise awareness of these issues amongst STEM staff including tutors, tutor and student support staff, accessibility staff and module teams
- To gather evidence and examples of how STEM tutors adapt their tuition practice to respond to students' needs
- To develop a toolkit / case studies to share good practice and provide STEM tutors with tools to support and improve accessibility in their tuition practice

By 'tuition' we mean all the practices within an ALs control to support their students. This includes support within face-to-face and online tutorials, but also goes beyond that to cover one-to-one communication, tutor group forums, TMA feedback and feedforward, support ahead of tutorials etc.

Individualised support to improve accessibility and inclusion could be necessary or desirable for a variety of reasons, including to address the needs of students with a disability, long-term health condition, specific learning difficulty (such as dyslexia) or mental health difficulty.

The proposed workshop will include a short presentation about the project with headline findings from interviews being carried out with STEM ALs (n=10-15) during March – April 2020. We will collaborate with workshop participants to develop the findings, gather other examples of personalised support and consider what else could be done to make tuition more accessible.

Everyone is welcome at the workshop and we would particularly like to hear from students who have faced accessibility issues and tutors who have provided individualised support.

AccIT will contribute to a growing body of OU research and scholarship on accessibility and tuition. It builds on the University wide Measuring Accessibility Practices and Perceptions (MAPP) survey by providing more in-depth examples of tuition in STEM to complement the broad snapshot captured in MAPP. It follows on from the HEFCE funded IncSTEM project to embed and sustain inclusive practices in STEM by providing examples of individualised support for activities and assets particularly relevant to STEM, such as group work, practical work, online modules with diagram and symbol rich content, bespoke software etc.

Parallel Session D: Short Oral Presentations – *Technologies for STEM Learning*

A systematic review of pair programming for learners of programming at a distance

Adeola Adeliyi, Michel Wermelinger, Jon Rosewell and Karen Kear
STEM Faculty

Pair programming is one of the key aspects of Extreme Programming (XP), which encourages informal and immediate communication over joint coding work. The technique involves two developers; one developer in a driver role writes the code, controlling the keyboard and mouse and the other developer, the navigator, reviews the code as the driver writes it. With a substantial body of evidence in support of improved learning outcomes when pair programming techniques are used in teaching, the objective of this paper is to present the current evidence relative to the effectiveness of Remote Pair Programming (RPP) in teaching. As an alternative to performing a standard literature review, we conducted a systematic review to reveal the answers to our study questions with a focus on identifying factors affecting the effectiveness of students who remotely pair programmed. The review follows phases described in the procedures for performing systematic review outlined in Kitchenham et al. (2007). We have included 34 primary studies on RPP in the review, and this paper presents the initial results, which show that students' skill level was the factor that affected remote pair programming the most. Gaps within the research field were identified; (i) lack of studies focusing on effects of pair programming in the context of distributed software development such as coordination and communication; (ii) lack of studies focusing on pair compatibility factors aimed at making RPP an effective pedagogical tool. These findings will be the basis for piloting and evaluating RPP in current Open University teaching of computing-related subjects: TM111 & TM112 – Introduction to computing and information technology 1 & 2, TM129 – Technologies in practice, M250 – Object-oriented programming in Java, M269 – Algorithms, data structures and computability.

How Jupyter Notebooks enhance learning and teaching on TM351

Sharon Dawes, Chris Thomson, Stephen Rice and Stephen Bowles
STEM Faculty

Students on TM351 data analysis are presented with study materials using a combination of the OU's VLE and Jupyter Notebooks. The Notebooks are a web browser-based tool that allow a mixture of discussion and programming code. This is not unlike a wiki in terms of presentation, but a lot more powerful, as it allows data to be queried and displayed in place – a bit like having Excel in a wiki. They were originally designed to support data scientists by facilitating and documenting the process of data analysis and are particularly relevant for citizen scientists. They are also proposed for two new OU maths modules: M348 and MST374, and are used in the science modules SM123, SXPS288 and S818. Recently M269 has proposed to embed all module content within the Jupyter notebooks and we wanted to evaluate if this approach would be supported by students.

Whilst there is some literature around how Jupyter notebooks could be used in education settings there is none reporting the effect, success or otherwise, of the proposed methods. To

address this gap in the literature we are evaluating the success of TM351 in its current practice, and in how students think it could be improved. To do this we have issued a survey to students from three cohorts of TM351 to better understand how effective the split is between the VLE and notebooks as a learning resource, and if courses would benefit from a reorganisation of the materials.

In the presentation we will demonstrate how the notebooks work and present the early results of our analysis.

Understanding and mitigating students' difficulties in undertaking complex practical activities on their computers

*Patrick Wong, Helen Donelan and Tony Hirst
STEM Faculty*

Hands-on practical activities can improve students understanding of technological concepts and provide an opportunity to improve their technical skills. In OU Computing & IT modules, practical activities often require students to download, install and configure specialised software to their own computers. This can be a daunting task for less technical students. When a problem occurs, getting immediate technical support is difficult as they are distance learners. Attention has been turned to virtualisation technology, which has the potential to mitigate installation problems by providing students with access to pre-configured virtual machines, which are virtual computers containing all the required software. There are two types of virtualisation technology: cloud-based or local. With cloud-based virtualisation, students do not need to download and install software as activities are undertaken online but it requires a reliable internet connection and involves a relatively high installation and maintenance cost to the provider. In contrast, local virtualisation requires students to install virtualisation software on their own computers, but it does not rely on an internet connection to run once installed.

This study investigated students' experiences of using virtualisation for their computing practical activities and identified the common difficulties they experienced. Using the 40 hour long practical activities in TM255: Communication and Information Technologies as an example, the study employed the OU's VLE Real-Time Student Feedback (RTSF) facility and telephone interviews to investigate TM255 students' experiences in using local virtualisation and their opinions about cloud-based virtualisation. The participants were from the 18J cohort, which had about 440 students registered at Week 24 which was when the survey took place. The number of responses from RTSF is 88, which equates to 20% response rate. Nine telephone interviews took place in the Summer of 2019, when the randomly chosen interviewees had completed the module.

Although the common perception is that students would prefer cloud-based virtualisation as no software installation is required and it is easier to use, 58 (64%) RTSF respondents preferred using local virtualisation techniques. The main reasons were that the process of installing the virtualisation software and virtual machines improved their understanding of virtualisation technology and developed a useful practical skill. It also allows students to stop, save their progress, and resume a practical activity when they wanted to. However, 2 of these respondents

mentioned they wanted the cloud-based virtualisation as a backup. The main reason for those who preferred cloud-based virtualisation was that it allowed them to use any computing device to do the activities. All 9 telephone interviewees agreed the cloud-based option was useful and if the OU was to provide a virtual lab, it is important the appearance and design should be consistent according all modules.

As for study support, the module team provided a technical support forum with a list of frequently asked questions posted at the top of the forum and step-by-step guides for the practical activities. In addition, tutors provided tutorials focussed on the practical activities. All nine interviewees agreed these were very useful resources. However, a Mac user found the step-by-step guide was too PC specific and wanted a separate guide for Mac users.

Overall, 86 (98%) RTSF respondents could follow the instructions to complete all activities. However, 2 (2%) RTSF respondents said they encountered a technical problem, but they were able to resolve the problems after seeking help from the technical forum. When asked to rate to what extent did the practical activities improve their understanding of the technical concept, the score is 8.1 out of 10. Additionally, 98% of students agreed virtualisation is an appropriate tool for facilitating the practical activities.

The finding of this study suggests that while students wish to do computing and IT practical activities without having to install and configurate specialised software and do the activities using any computing devices, they also value the practical skills development opportunity provided by local virtualisation. Whilst enjoying the flexibility of local virtualisation provides, they also want to have the cloud-based virtualisation as a backup.

Ignite Presentations – *Future Innovative Scholarship*

Storytelling in computing education

Matthew Nelson
STEM Faculty

What do Rupert and Gloria, and Ben and Georgina have in common? The answer is that both pairs have starring roles in Computing module material where the learning is embedded in a fictional story. Student reception to this alternative way of learning is polarised; many find it engaging and motivational, while others plead "just give me the facts". What are the objectives of such materials and are they important enough to justify such a "marmite" reaction from students? Can we learn something useful about the way students learn computing concepts by exploring the characteristics of those who find the storytelling approach effective and those who don't?

A qualification world?

Carol Calvert and Rachel Hilliam
STEM Faculty

We live in a qualification world – or do we?

Many modules in mathematics and statistics act as service modules for a wide range of non-M&S qualifications, how can we best serve the needs of multiple qualifications through one module? In this talk we will outline a possible approach, which considers how the study aims of the module, and the support given to individual students on differing qualifications, might be tailored to their qualification goal. The aim is to provide a student journey through the module which will be more appropriately aligned with their individual qualification and therefore improve both student satisfaction and retention.

In order to achieve this aim, it is first necessary to identify which concepts students find particularly challenging and if this differs according to the qualification they are studying. This talk will outline a number of ways in which we are gathering and evaluating this information and provide some initial insights into this work.

Our starting point is to gather evidence from students, Associate Lecturers and the module team about the "pinch points" in the module. We have already started gathering information from students using short in module anonymous questionnaires, but which identifies qualification being followed, in the study calendar. Later we will use the same, targeted, in-depth approach we used in a previous esteem project, "Success against the odds" to help identify what helped weaker students succeed.

The information about "pinch points" will be then mapped against the module content by qualification. We anticipate that "pinch points" will vary by qualification and we aim to develop

alternative materials for some sections by qualification. We have already trialled this approach with producing supplementary materials for Economists on M248.

Two massive challenges lie in the integration of alternative, not supplementary materials, into both the assessment structure and the study support structure. The study support structure we can potentially address by allocating students by qualification, instead of by geography, to tutors and providing some tutorials specifically directed at students on some qualification. Providing alternative continuous assessment materials is at least potentially feasible as all of the continual assessment materials are formative. Hence the huge challenge, having identified “pinch points” by qualification is to enable adaptation of exam materials to reflect marginally different learning experience of students by qualification.

Evaluation of students’ accessibility and use of online tutorials and forums in Level 2 modules, with specific focus on the experience of D flag students

Sarah Daniell and Lorraine Waters
STEM Faculty

Attendance at online tutorials and use of forums by LHCS students continues to be low (tutorial attendance at best is approximately 10% of student numbers). In addition, participation in student forums, particularly tutor group forums, tend to be sporadic and linked to essential module-based activities, rather than facilitating a routine means of communication and sharing of ideas. The concern is that students may not access these online resources because of a lack of confidence with using the technology, access to them, and fear of the online classroom environment. Students with D markers related to mental health (for example anxiety) may be particularly sensitive to these issues. Once students opt out of trying to attend synchronous tuition events, this may be a pervading pattern of behaviour throughout their studies. Similarly, students may well be utilising social media such as Facebook, WhatsApp and Twitter for study support instead of module-based forums. Overall these trends may lead to a lack of engagement with the module and key module resources, as well as practical or collaborative work, affecting retention and students’ overall learning experience. It is widely accepted that students who engage more fully and feel a greater sense of community have enhanced learning capabilities and a more fulfilling experience.

This study aims to investigate these issues by retrospectively evaluating access to and use of online tutorials/forums and asking students studying both S294 and SK299 about their perceptions of these synchronous and asynchronous facilities and the barriers to them being used more extensively. The intention is to increase our understanding of why students choose not to attend so we can address any accessibility issues, feeding that information forward to module teams. For example, whether students simply struggle with the technology, particularly if they experience technical issues, or navigating to the correct online room.

We will also interview students with D markers related to mental health to understand how we can proactively give reassurance and build confidence in using these resources. Thereby enabling a better understanding of what we need to do to convince students of the benefits of attending synchronous learning events and engaging with their forums.

Through informed student consultation it is hoped to develop a strategy to adapt our current tuition model to improve equal student access to tutorials and to forum resources. For example, we might foster familiarity with the resources via a TMA activity in which students need to enter an Adobe Connect room and take a screenshot of a welcome page, perhaps posting a relevant module-related question. Potentially accessibility of forums is an issue that could be addressed with Apps linking directly to those sites, in a similar way to messaging software.

Developing the equivalent of student whiteboards for use in Adobe Connect tutorials and in forum posts

Nick Chatterton and Eleanor Crabb
STEM Faculty

A major challenge in teaching is to understand what students are struggling with. Student whiteboards or their equivalent are widely used in school and face-to-face universities to help overcome this problem: students are given a problem, and then write their answer on the whiteboard and hold their answer up to the instructor. This approach gives the instructor a good idea of whether their class has “got it”, allowing the instructor to adapt their sessions based on this immediate student feedback.

The options for gaining student feedback in Adobe Connect sessions are varied including the use of voting polls and the use of the chat box or the microphone. However, if tutors wish “to see” what their group can do, the options are limited to individuals gainfully trying to write, normally using a mouse, on the screen. The output is often unsatisfactory for the student and the tutor as the diagrams are hard to read and take a long time to produce which limits this approach to instruction. In addition, only one student can realistically work at a time while the other members of the group wait and watch. This issue is of particular importance when the subject matter involves drawing diagrams and problem solving where the approach is equally important to the final answer. A related issue exists in student forum posts – students are required to describe their problem in words rather produce a quick sketch that outlines their question. The aim of this new project is to find economic and effective technological approaches to solve these problems. We would like to involve both ALs from any subject area across STEM who are interested in receiving this kind of immediate feedback and also from students.

Learning to be an engaged research community

Ann Grand
STEM Faculty

A glance at the recently published engagement strategies of UKRI, NERC and other funders shows that researchers are increasingly being asked to actively involve stakeholders throughout the research cycle; in other words, to conduct engaged research. The vision for AstrobiologyOU is to establish a transdisciplinary research community that will collaboratively address the scientific and ethical challenges of asking the question ‘are we alone in the Universe?’ and to approach this huge question in an ethos of engaged research that will bring together the experiences and

expertises of multiple stakeholders, including scholars in science, technology, education, engagement and international development and governance, policy-makers, community and special interest groups, teachers and students, international collaborators and the space industry.

AstrobiologyOU is not alone – not even in the Open University – in setting this ambition for engaged research. However, if we are asking researchers, particularly postgraduate students, to take on new roles and responsibilities and aspire to create embedded engaged research, we have to think about the kind of support that we need to offer each other. How do we learn to become an exemplary engaged research community? In an ideal world, what would engaged scholarship look like and how would we want to shape it?

Building on previous work in our university on the training needs of early-career researchers, a good place to start should be with the community of postgraduate researchers; can we describe a set of conditions that focus on building a culture of engaged scholarship? How do we ensure that no one, no group and no sector of society is excluded from possible collaboration and engagement? How do we respect different expertise and diverse values and build on a culture of reciprocity to influence policy and practice beyond the university?

Parallel Session E: Short Oral Presentations – *Employability*

Promoting Good Mathematical Communication as a key Employability and Transferable Skill in Level 1 Service Mathematics

Andrew Potter, Gerry Golding and Sally Crighton
STEM Faculty

Our study into the effectiveness of online tutorials at engaging students in active learning focused on comparing three different types of interactive activity available in Adobe Connect: polling, on-screen activities (such as drawing or moving objects) and answering questions by chat box or microphone. Only activities involving answering mathematical questions were included. MU123 is a key introductory Level 1 mathematics module, which provides a vital grounding in mathematical concepts and techniques for a wide variety of qualification pathways. Like many other mathematics modules, an integral component of the assessment in TMAs is “Good Mathematical Communication” (GMC). Students are awarded marks for the clarity of their communication and presentation, and the adherence to mathematical orthographic and symbolic conventions.

Based on informal feedback from students, tutors and colleagues in other Schools, a strong emphasis on the promotion of GMC is highly regarded, if not vital, and is seen as one of the most important skills that students of MU123 develop. The ability to present a logical argument is widely acknowledged as a key transferable and employability skill.

A potential concern for MU123 is that as the majority (over 80%) of students are not on a mathematics specific pathway, they may not feel that GMC necessarily applies to them. As a result, and to acknowledge the impact of these skills beyond the mathematical sciences, we have chosen to present GMC under the broader umbrella of “Communication and Presentation” while maintaining a strict “when in Rome...” policy.

In this session, we present an initiative which involves the design and development of a learning tool to support students in their development of “Communication and Presentation” skills within a mathematical environment. This tool will also support tutors in their teaching and assessment of GMC as a Communication and Presentation skill. The design of the learning tool is an interactive grid which decomposes various aspects of GMC into categories providing exemplars of “excellent”, “needs developing”, and “poorly developed” practice in each of those areas.

The grid has been developed and undergone some initial evaluation over three short cycles in collaboration with tutors and students using forums and focus groups and initial findings will be presented in this talk.

Further evaluation of the effectiveness of this learning resource will take place during the 20J and 21B presentations through student and tutor focus groups. If successful, we plan to eventually make this learning resource available to all access and level one students who study mathematics and we hope that participants at this session will gain a better understanding of the issues surrounding the communication and presentation of mathematical and scientific calculation, and will be encouraged to consider the implementation of similar approaches in their own modules and/or discipline areas.

Curriculum innovation – transforming postgraduate learning systems for a world in turbulence

Rupesh Shah, Helen Wilding, Martin Reynolds and Ray Ison
STEM Faculty

Academics from the Applied Systems Thinking in Practice (ASTiP) group at the OU have been involved in a systemic inquiry over seven years aimed at informing the development of postgraduate education within the OU.

A curriculum can be thought of as a ‘learning system’ – an organised collection of elements interacting together to generate learning as an outcome. We start with an assumption that in a world characterised by turbulence there is a need to move away from learning systems (curricula) that are passively driven by existing markets towards designing learning systems that proactively drive and shape the contexts within which students experience their developing (professional) practice.

This paper reports on findings from the most recent eSTEEeM-funded phase of this inquiry to understand attempts to reconfigure curriculum development in the context of significant institutional changes and challenges presented for distance learning organisations.

The current research was informed by two prior eSTEEeM projects:

- The first project examined experiences of stakeholders associated with post-graduate study of Systems Thinking in Practice (STiP) at the OU. The focus was upon understanding perspectives of current students, alumni and employers on attempts to apply ideas from the programme in the workplace.
- Amongst other findings from the first project, we understood the significance of suitable conditions that would enable students and alumni to practice systems thinking effectively. Thus, the second project explored possibilities of OU contributing towards externally recognised standards of professional competence for STiP.

These two projects helped us make a significant distinction between developing competence and developing capability. Competence might be understood as the somewhat abstracted state of an individual’s knowledge, skills and behaviour; capability describes the situated ability of an individual to act knowledgeably as circumscribed by an environment, which is dynamically changing in response to the practices being enacted.

In this third eSTEEeM project we set out to understand the relationship between design of learning systems and delivery of effective workplace capabilities. There have been two main areas of investigation:

1. Critically exploring processes and practices of ‘innovation’ in curriculum design/implementation
2. Tracking innovation through case study of PG curriculum development (refreshing core STiP modules for 2020 and a Level 7 Systems Thinking Practitioner Apprenticeship)

Drawing on ideas from the systems tradition about change and transformation, we have been able to distinguish three orders of innovation as a human activity (innovating) that can affect the capacity of curriculum to deliver workplace capability:

- ‘first-order’ innovation in curriculum relates to action to change how a system for learning functions.
- ‘second-order’ innovation describes attempts to change what a system for learning does.
- ‘third-order’ innovation relates to activity that aims to change the way in which the learning system is governed.

We will report on some of the affordances, barriers and constraints associated with each of these different orders of innovating in the design of learning system. Participants in the session will be engaged by exploring their own experiences of these different orders of innovating and implications for educational practice.

Who are our apprentices?

*Leonor Barroca and Matthew Walkley
STEM Faculty*

Apprenticeships are entering a new phase of business as usual within the University; apprentices are, however, still a small group of students for whom a big effort of curriculum development and support is being invested.

As access and participation are pressing issues for higher education it is important to understand the profile of our apprentices as a basis for sound decisions on the future approach to apprenticeships and to the recruitment of apprentices.

We collected data (age, gender, ethnicity, disability, social economic status, prior educational levels) from within the OU on the profile of apprentices (in Computing) across England, Scotland and Wales and compare that data with similar data for our non-apprentice students highlighting any areas of concern.

At the moment, we are still trying to access similar data for apprentices in other institutions across the UK but have not been successful so far.

We suggest areas that may need to be addressed within an agenda for access and participation.

Parallel Session F: Workshop/Demonstration – Supporting Students

Workshop withdrawn from programme.

Parallel Session G: Short Oral Presentations – Online/Onscreen STEM practice & Supporting Students

Maximising online tutorial attendance of a high population level 1 module

*Susan Pawley
STEM Faculty*

The cost of providing regular online tutorials, particularly at Level 1, is high and so it is important that these resources are easily accessible and used effectively to maximise student support. Following the introduction of GTP, the MST124 module team proposed a strategy which focused on tutorials given in geographical clusters for both face-to-face and online tuition, with learning events which were unit and assessment focussed. Decisions on the timing and blend of face-to-face and online tuition were left up to individual cluster managers, which resulted in a duplication of tutorial content and timing across different clusters and a disparity in the number of face-to-face and online tutorials occurring between clusters. This has led to online tutorials that were poorly attended and an increase in complaints from students who wished to attend online sessions in other clusters but were prevented from doing so.

Data collected through student questionnaires (Thomas 2019) and AL discussions have shown that to effectively provide the tutorial provision required by students, tutorials need to be more closely focused on their academic and pastoral needs, easily accessible and with their purpose clearly labelled. In particular, there is a demand for:

- tutorials during the daytime, in the evenings and weekends;
- tutorials at slower and, to a lesser extent, faster paces;
- tutorials that help students catch up when they have fallen behind and that help when they are ahead;
- tutorials that match joint study calendars, for example for students studying M140 and MST124 simultaneously or those studying MST124 and MST125 together;
- tutorials on academic study skills such as typesetting or tackling assessments;
- tutorials on tricky topics;
- tutorials that are recorded.

In 18J, some tutorials were scheduled in the module-wide room on MST124 and these sessions and particularly their recordings were well-received.

As a result, we have extended the module-wide programme for 19J, which has enabled us to offer different tutorial streams based on time of tutorial, study speed and study programme, along with some specialist tutorials.

This presentation will focus on the rationale for the different tutorial streams and the data collected on initial tutorial attendance during the first 5 months of the programme.

Reference:

Thomas C (2019): Maths & Stats Student Survey on the effective use of tuition time, Scholarship Exchange (online). Available at <https://openuniv.sharepoint.com/sites/units/lds/scholarship-exchange/documents/TuitionTimeSurveyFindings.pdf#search=online%20tuition> (accessed 14 February 2020)

Perceptions, Expectations and Experience of Group Tuition: towards a shared understanding amongst stakeholders (part II: the student perspective)

*Anne-Marie Gallen¹, Mark Jones¹ and Anne Campbell²
Faculty¹/ALSPD, Academic Services²*

As the University's Group Tuition Policy (GTP) was being developed, we initiated a project that asked whether our students expect the same things from tuition that we, as an institution, offer. The final implementation of the group tuition policy in October 2016 has not produced evidence of a positive change in student engagement with tuition in groups and this suggests that there remains a divide between our provision and student expectations.

Although tuition, and in particular tuition of groups, has always been core to The Open University's support model, identifying a common understanding of what group tuition is trying to achieve remains very timely for the University, and should feed into on-going debate about our teaching model; especially as we move towards a new AL contract.

The first phase of enquiry looked at the perceptions, expectations and experiences from the viewpoint of Associate Lecturers and led to a series of recommendations for taking these ideas forward. These included the need for tutorials to have a well-defined purpose that is clearly articulated to students, including emphasising the importance and benefits of attending. It was clear from this and from earlier research that we, as a University, need to know more about student perceptions of tuition if we want to better understand their motivations for learning and to improve the overlap of expectations and perceptions of tuition amongst all our stakeholders. Consequently, we initiated a project to better understand the student perspective of tuition. Based on an online survey of students on level-1 modules across STEM, this was followed-up with in-depth interviews with a selected subset of these students. In this presentation we will concentrate on what the survey results reveal about student expectations of tuition in groups and how these expectations differ between online and face-to-face tuition and between the expectations and perspectives of our Associate Lectures and our students. These differences raise questions for us as an institution about the expectations attached to tuition as well as the effective use of online learning environments to provide the academic support that students value.

The Mathematics and Statistics Study Site: Facts, figures and further plans

*Rachel Hilliam¹, Gaynor Arrowsmith¹, Alexander Siddons², Derek Goldrei¹ and Cath Brown³
STEM Faculty¹, Academic Services², OU Students Association³*

The Mathematics and Statistics (M&S) Study Site, launched in 2017, provides interactive resources enabling students to self-serve module choice advice, revise & refresh content, and to make a head start in a variety of ways. These resources have been developed over several years, and the Study Site enabled all these elements to be gathered together in a one-stop-shop to provide information, advice and guidance for any student on a M&S module. In addition, there is a dedicated M&S careers and employability section, jointly produced by the School and the OU careers service with external support from the Institute of Mathematics and its Applications (IMA) and the Royal Statistical Society (RSS). The School works closely with study and educational advisers in the Student Support Team (SST) to ensure the resources address common queries, and all advisers point students to appropriate parts of the site on a routine basis.

This talk will give a brief summary of some of the resources on the Study Site and show how the resources are supported by the popular module advice forum, to which students, ALs, central academics, staff tutors and SST staff all contribute, creating an online community in mathematics and statistics. In the forum, contributors discuss future study plans, how different modules may help with future careers and what is like to study particular modules. Essentially anything related to module choice and study planning. In addition, students provide first-hand feedback on all aspects of the students experience in terms of both current and future curriculum and student support in all its forms. This feedback on the curriculum and support provided in M&S, has led to improvements in qualification and module structures and delivery.

Analytics have been used to evaluate how and when students use the site, which show some interesting trends that will be explored in the talk. The School employs a variety of different methods to direct students to the site, such as embedded links in MILLS messages, links from every M&S module website, cards distributed at f2f events, email messages to tutors and students, creation of an M&S newsletter and putting an outline of the site's contents on the back of each module mailing checklist. The analytics suggest that each of these methods attracts a few more students to the site. It is also clear that once students have found the site they keep coming back.

Finally, we will outline our next steps for future work, including evaluating how all students find the site, even those on a qualification run by another School, and which resources they find of most use.

Day One Closing Keynote Presentation

Addressing Disparities in Student Success: Enhancing BAME students' achievement

Professor Phil Gravestock

The gap in higher education degree attainment between UK-domiciled white students and Black, Asian and minority ethnic (BAME) students has been prevalent for over 10 years. The extent of the gap becomes more explicit when the BAME categories are considered separately, with Black students showing the greatest gap in attainment compared with white students. This disparity in award outcomes for students from different ethnic groups has been highlighted by the Office for Students as a specific target that the higher education sector has to address.

The diversity of students entering higher education means that it is hard to provide appropriate support to ensure that all students: develop a sense of belonging; make meaningful learning relationships; and acquire the appropriate academic skills to meet the assessment requirements to allow transition into subsequent academic levels.

This presentation will reflect upon research that has been undertaken as part of national projects – such as 'Disparities in Student Attainment (DiSA)', 'What Works?', 'DRIVER, Data Responsive Initiatives as a Vehicle for achieving Equity in Results' and 'Value-added' – to enhance BAME students' attainment, success and progression.

Parallel Session H: Short Oral Presentations – *Technologies for STEM learning, Supporting Students & Innovations in assessment*

Can a new OU Study App enhance the learning experience of students on S350, an online only module?

Catherine Halliwell, Simon Collinson, Rachel McMullan and Jenny Duckworth
STEM Faculty

The module S350, Evaluating Contemporary Science, was one of 20 modules that took part in a pilot of a new OU Study App (OU Study App, 2019) in its 19J presentation. The aims of the developers are to access the ever-increasing time that OU students spend daily on their mobile devices (eMarketer, 2017) for valuable study within the busy lives of OU students such as while on their daily commute or break at work.

This eSTEEem project recruited student volunteers to complete study diaries recording their use of the OU Study App during their daily routines over a three-week period. Data from these diaries, along with qualitative data from student focus groups and module forums has given us preliminary information on our research questions:

- How can OU students best engage with the OU Study App to optimise their study?
- What aspects of the App are critical to supporting the student learning journey and should be developed next/further?

The impacts and uses will provide guidance for module teams, ALs and students on other modules (in LHCS and STEM more broadly) about the most effective use of the OU Study App to enhance the learning experience of students. We will also feedback into the future development by the OU Study App project team.

The overall outcomes will be a clear guide for students (and tutors) on how to gain maximum benefit from the App such as what it can and can't do, how to best integrate it within their study programme, how to keep on track when using different modes of study.

Correct guidance to manage student expectations and use of the OU Study App should lead to an enhanced learning experience for students. In particular, we hope to demonstrate how it can be best used to keep students in contact with the module, not feel isolated or overwhelmed when they have to prioritise other commitments, so that they do not passively withdraw or do the minimum to pass.

In this short talk we will share our findings to date and discuss their potential implications for a full roll-out of the OU Study App to all modules in October 2020.

References:

OU Study App Project Site (2019). Available at <https://learn3.open.ac.uk/course/view.php?id=301070> (Accessed 11/02/20)
eMarketer (2017) in-App vs Mobile Web [Online]. Available at

<https://www.emarketer.com/Chart/Average-Time-Spent-per-day-with-Mobile-Internet-Among-US-smartphone-Tablet-Users-In-App-vs-mobile-Web-2011-2017-hrsmins/177933> (Accessed 28/8/19)

Learning analytics - let's get real!

*Steve Walker¹, Tom Olney¹, Carlton Wood¹ and Anactoria Clark²
STEM Faculty¹, WELS Faculty²*

The drive for innovation generally, and most obviously in relation to technology, has a tendency to focus on the 'next big thing', often before we have a decent sense of whether or not the last thing delivered as claimed. The pace of scholarship does not always match the pace of technological or organisational innovation. In our Esteem projects, we don't generally tend to see ourselves as using evaluation to draw on and add to a growing body of scholarship knowledge. Realist evaluation to claims to offer the basis for enabling the identification of underlying mechanisms which lead to particular outcomes in particular contexts – 'what works, for whom, in what context, and why'. Identifying such mechanisms may help us transfer learning from our individual projects to a shared body of knowledge, which may be applicable in other situations.

This presentation illustrates the way in which the evaluation of some learning analytics implementations in the STEM faculty (see Piloting OU Analyse and the Student Probabilities Model on 12 STEM modules; Walker et al, 2019; Olney et al in preparation) has taken a realist approach.

The pilot modules did not demonstrate clear benefits in student retention, generally the primary objective. Tutors had mixed views, with many reporting inter alia that the dashboard did not add significantly to what they already knew about their students, that the interface was clumsy and that the predictive element of the data was opaque and unreliable.

We identified some candidate mechanisms which may explain at least some of the observed outcomes. Some of these mechanisms may be quite specific to learning analytics but others may have a wider relevance and help to inform other esteem projects and/or areas of learning and teaching.

Using Real Time Student Feedback (RTSF) as an Emotion Awareness and Regulation Tool in an Assessed, Online, Collaborative Project

*Jake Hilliard¹, Patrick Wong², Karen Kear², Helen Donelan² and Caroline Heaney¹
WELS Faculty¹, STEM Faculty²*

Over the last decade, research has increasingly highlighted the inextricable links between emotion and cognition, as well as the profound effects emotions have in academic contexts in both individual and social learning settings (Pekrun and Linnenbrink-Garcia, 2012). Although much of this research has been undertaken in face-to-face learning settings, such notions have also been evidenced in online learning environments (Henritius et al., 2019; Reis et al., 2018).

With the increased understanding of the importance of emotions in educational contexts, researchers have started to develop tools that can be used by students to help raise awareness of their emotions and regulate their feelings when undertaking learning activities (Järvelä et al., 2016). One such tool is The Socio-Emotional Sampling Tool (SEST) developed by Webster and Hadwin (2013). This aims to prompt students to metacognitively monitor and evaluate their current emotional state before, during and after undertaking computer-supported collaborative learning activities. The SEST has been developed to have both research and instructional purposes. On the one hand, it can be used as a research tool to collect data about students' emotional experiences, whilst on the other hand it can be used as an instructional tool to help students become more aware of their emotions and think about ways of regulating them.

In this research, we have implemented an adapted version of the SEST, using the OU VLE's Real Time Student Feedback (RTSF) facility, during a 9-week assessed, online collaborative project in the Communication and Information Technologies (TM255) module. A benefit of the RTSF facility is that it enables students to provide instant feedback and allows the module team to make prompt interventions if problems are detected. In our study, students were presented with the opportunity to fill out short feedback forms on four occasions: once before the project had started, twice during the project, and once after it had finished. Links to the four forms were embedded into the weekly module content. Although each form aimed to assess students' current emotions, the two forms completed during the task also invited students to think about how they could regulate their emotions.

In this presentation, we will report preliminary findings from the study, as well as discussing practical implications of using Real Time Student Feedback as an emotion awareness and regulation tool in assessed, online, collaborative projects in a distance learning setting.

References:

Henritius, E., Löfström, E. and Hannula, M. S. (2019) 'University students' emotions in virtual learning: A review of empirical research in the 21st century', *British Journal of Educational Technology*, vol. 50, no. 1, pp. 80–100.

Järvelä, S., Kirschner, P. A., Hadwin, A., Järvenoja, H., Malmberg, J., Miller, M. and Laru, J. (2016) 'Socially shared regulation of learning in CSCL: Understanding and prompting individual- and group-level shared regulatory activities', *International Journal of Computer-Supported Collaborative Learning*, vol. 11, no. 3, pp. 263–280.

Pekrun, R. and Linnenbrink-Garcia, L. (2012) 'Academic emotions and student engagement', in Christenson, S., Reschly, A. ., and Wylie, C. (eds), *Handbook of research on student engagement*, London, Springer, pp. 259–282.

Reis, R. C. D., Isotani, S., Rodriguez, C. L., Lyra, K. T., Jaques, P. A. and Bittencourt, I. I. (2018) 'Affective states in computer-supported collaborative learning: Studying the past to drive the future', *Computers & Education*, vol. 120, pp. 29–50.

Webster, E. A. and Hadwin, A. F. (2013) 'Regulating emotions during computer-supported

collaborative problem solving', Annual Conference of the Canadian Society for the Study of Education, Victoria, British Columbia.

Single Component Assessment Examination and Exam Feedback: the S112 experience

Jim Iley and Nick Adams
STEM Faculty

S112 operates an SCA-OES assessment strategy involving a low stakes exam experience. The OES is made up from 6 TMAs (3 x 3% and 3 x 10%) plus exam (61%). The 10% TMAs cover three of the eight module learning outcomes not easily addressed in an exam; the exam covers the other five LOs.

Students can pass S112 by achieving 66% on the exam alone. Over two cohorts 1539 students submitted 5 or 6 assignments there is little evidence of gaming behaviour (only 7 out of 1656 sat the exam only). Previous study affected S112 outcome: S111 > U116 > SDK100.

Onward module performance for key L2 18J Science modules: little difference was seen between those who had completed S112 17J and those who had completed other modules prior to studying S206, S294, S295, SK299 in 18J; however, for S209, 17J S112 students had an increased Rank score of ca. +6% compared with those who had not completed S112, whereas for S215, 17J S112 students scored ca. 3.5% lower. For five Stage 2 modules, performance on S112 17J correlates with performance on the Stage 2 module ($R^2 = 0.4-0.5$); for S215 the correlation was significantly poorer ($R^2 = 0.2$).

S112 17J was one of nine modules in the 2018 university exam feedback pilot. We deployed the most automated of all the approaches taken, using an MS Excel spreadsheet to generate feedback that was assembled into a feedback report. S112 performed consistently in the top two modules for of feedback. Indeed, the automated approach correlated with students reporting "there was enough detail". Student criticism centred on the need to have their script to compare answers with feedback. Initial script-marker concern about automating feedback proved unfounded, with the positivity rating of the process significantly correlating with the level of prepared feedback provided.

Parallel Session I: Workshop/Demonstration – *Supporting Students and Tutors*

An AL led eSTeEM action research project to support students and tutors: challenges and opportunities

Shirley Evans, Manish Malik and Winston Graham
STEM Faculty

This Associate Lecturer (AL) led scholarship project is entitled ‘Strategies to support students and tutors with online collaborative projects: an action research project.’ This pilot project is based on the online collaborative work in Block 2 of TM255 Communication and information technologies and has similarities with group work in other STEM modules and the wider OU community.

Research (Hilliard, 2017) and Donelan and Kear (2017) indicates that collaborative group work can cause increased cognitive load, positive and negative emotional reactions and increased anxiety for students.

Reflections by current students on the group work in the relevant TMA question indicate that many students have concerns about the group work that they may not voice elsewhere. Many do say that they did enjoy it in the end but for some who have a diagnosis of anxiety, and others, it can be quite a painful experience. In addition, facilitating the group work can be stressful for tutors in terms of ensuring that students have the opportunity to engage sufficiently, balancing student initiative with tutor support and marking the group work fairly.

According to Seale (2013) writing in the context of e-learning and disability in higher education, an accessibility lens focuses on barriers and what a person cannot do rather than the digital inclusion lens which focuses on opportunity and what a person can do. This lens can usefully be applied to all students and will underpin the approach to this project.

The research question is: How can tutors best support students to successfully engage in online collaborative projects?

The aims of the research are to:-

- Better understand which strategies best support students to engage with online collaborative projects.
- Better understand which strategies best support tutors to support students.
- Produce tips, guidelines, training materials and resources to support tutors to help concerns before and during the activity with a view to optimising learning for students.

Targeted strategies and resources would help manage tutor time and focus to better support students and reduce worry and anxiety before and during the activity possibly for both students and tutors.

In this session there will be an overview of the project and progress and finding to date. Participants will be presented with an online group work scenario and asked to consider the

challenges for both students and tutors and how these challenges might be addressed. Participants will have the opportunity to reflect on their own practice and/or experiences and strategies they might employ in future online group work activity.

References:

Donelan, H. and Kear, K. (2017) 'Creating and collaborating: students' and tutors' perceptions of an online group project', *International Review of Research in Open and Distributed Learning*. Volume 19, Number 2

Hilliard, Jake (2017). *Students' Perceptions and Experiences of Anxiety in An Online Collaborative Project*. MRes thesis The Open University.

Seale, J., (2013), *E-learning and Disability in Higher Education: Accessibility Research and Practice*, Routledge

Parallel Session J: Workshop/Demonstration – *Online/Onscreen STEM practice*

Generating graphical content for teaching: a simple and cheap way to produce diagrams/symbol rich content for forum postings and for live streaming in Adobe Connect

*Nick Chatterton, Eleanor Crabb and Kate Bradshaw
STEM Faculty*

Personalized learning centres around developing teaching strategies that allow students to learn in a way which is most effective for them. Further, it has been shown to enhance student engagement and performance. In many ways, the online distance learning modules developed at the Open University allow personalized learning to some degree: they use a range of formats and media, and students can study at their own pace. However, one limitation of the current provision is the inflexibility of technologies for the delivery of online student support. Forum posts are mostly text, whereas Adobe Connect tutorials are predominantly based around words and pictures on PowerPoint slides. This inflexibility presents issues in the teaching of content where students are asked in assessment to draw accurate diagrams by hand and where the teaching material is symbol-rich, for example, in mathematical problems. A current eSTeEM project looks to address these limitations and this workshop presentation will focus on simple technological approaches that we have utilized in the teaching of chemistry and general science modules.

Much of the work to date has involved the level 3 chemistry module S315 wherein a bank of video “snippet” resources has been developed in response to student forum posts. These snippets have been produced using a document camera which is plugged into a computer and with voice recording made using standard headset. The recorded videos are then uploaded to YouTube and “played” in forum posts. Examples include mathematical derivations, advice on how to depict different types of molecule and reaction mechanisms in organic chemistry. Similar snippet videos have also been employed in the general science level 1 module S112. In addition, the technology has been used several times in Adobe Connect teaching sessions run by the S315 module team and in S112 cluster tutorials. This workshop will outline our approach, some examples of the types of resources produced, along with a brief demonstration of the technology. Participants will have the opportunity to try their hand using the cameras in Adobe Connect or record their own short videos.

Parallel Session K: Short Oral Presentations – *Community Building, Support for ALs & Employability*

Building a community of STEM ALs – extension of the STEM-ByALs-ForALs programme to include more social learning opportunities

Janet Haresnape, Rupesh Shah, Nirvana Wynn and Barbara Jones
STEM Faculty

This programme provides a friendly, supportive environment in which OU tutors from STEM can share ideas and concerns about their teaching practice and the best ways to support their students. It also helps nurture a sense of community among tutors. The workshops take place in the same online environment in which tutors give tutorials to their students (Adobe Connect), so provide an ideal situated learning environment (Lave and Wenger, 1991), and one which fosters peer support.

Analysis of feedback from the early phases of the programme showed it had succeeded in providing opportunities for ALs to share good practice in a supportive environment, and that meeting in real time helped to relieve some of the isolation they feel (Haresnape et al, 2020). Moreover, through enabling participating tutors to build links it helped them to feel part of the STEM tutor community and so played a part in encouraging community cohesion.

Recently we extended the programme to include informal drop-in sessions (in 2019) - suggested and led by one of our STEM ALs - and Online Journal Club sessions (in 2020) in which ALs can give mini-presentations to fellow STEM ALs on something of professional interest, such as a summary of a journal article, a snippet of news in their academic field, or an overview of an aspect of their research or scholarship interests. This provides an additional opportunity for ALs to expand their skills portfolio.

This presentation will raise awareness of our expanding programme, and also explore the idea that ALs can learn together (social learning) to develop new understandings and practices (Wenger and Wenger-Traynor, 2015) that might shape the changing landscape in which they work as we move towards the new AL contract and as they become more integrated into the OU STEM Community.

Exploring the use of Labcasts to Support Associate Lecturers

Venetia Brown, Alan Cayless and Jo Jarvis
STEM Faculty

Live, interactive web-broadcasts (i.e. labcasts) provide students with an opportunity to observe and engage in practical science demonstrations through synchronous question-and-answer widgets and text-chat via the OU's Stadium Live platform. Recent findings indicate that labcasts in STEM modules can have a positive impact on student learning and motivation and facilitate more in-depth engagement with the wider OU science community (Bradshaw, Thomson and Velasco, 2019). This study will explore to what extent labcasts can engage the Associate Lecturer (AL)

community to help support module tuition strategy and promote a sense of community across the ALs and module team.

SXPS288 'Remote Experiments in Physics and Space' includes a new planetary science experimental investigation, which will take place in the second half of the module. As this student investigation is novel, a discrete labcast for ALs will serve as an introduction to the project. The labcast will also provide an opportunity for ALs to learn more about the practical elements of labcasting and that of the student experience. There are ten ALs and approximately 200 students on the 19J presentation.

A mixed-methods design will expand quantitative results from questionnaires with qualitative findings from focus groups. A pre-evaluation questionnaire will survey ALs on their prior experiences and expectations of the labcast event and sense of community; followed by a labcast demonstrating the experiment. Stadium data logs (i.e. the widgets and text-chat) will be collected to observe tutors' interactions during the labcast. A post-evaluation questionnaire will collect data on participants' perceptions of the content and delivery, perceived changes in knowledge and sense of community. Last, we will conduct two online focus groups to expand on ALs perspectives of labcasts.

We will present findings from the data collected on the perceived benefits such as increased confidence, subject knowledge and the effect of labcast on tuition strategy and discuss the use of labcast for continuing professional development.

Reference:

Bradshaw, K.R., Thomson, L.A. and Velasco, M. The impact of live streaming module-wide events in student engagement and motivation in pdf, n.d. The 8th eSTEEeM Conference: STEM Scholarship – From Inquiry to Implementation (May 2019). Available online: <http://bit.ly/bradshaw-et-al-2019-live-streaming>

What are the careers education, information, advice and guidance needs of Open University Level 1 Computing and Communication students?

David Conway
Academic Services

Since changes to funding within UK Higher Education (HE) and increased student fees, a growing number of Open University (OU) student's study for career motivations.

As a distance learning provider of approximately 170,000 typically mature students, who complete study around other commitments', knowledge of why contact to Careers and Employability Services (CES) is made is paramount. Understanding student needs effectively allows for the correct 1:1 and 1:2 many (webinars, forums, virtual events) services to be provided at the right time.

1:1 careers, information and guidance (CIAG) appointments are created by students using a

webform or via referral from OU staff. When an appointment is requested a careers service request (SR) is created in the Customer Record Management (CRM) system which includes reasons for seeking CIAG. Each SR is categorised into broad themes (e.g. qualification prospects).

Unlike traditional universities where year 2 and 3 students engage with careers services the most, approximately 50% of careers contact at the OU comes from Level 1 students. This may be because Level 1 OU students typically have more refined study motivations in comparison with traditional university 1st year students. This means they are more likely to engage in careers related learning (CRL) actively at an earlier stage of their student journey. This concurs with research from The Association of Graduate Careers Advisory Services (2018) which indicates that career motivated mature students are more likely to approach careers services for support.

Level 1 Computing and Communication (C&C) students are one of the highest users of CES within the Science, Technology, Engineering and Mathematics (STEM) faculty. Understanding CIAG needs of this student population in greater depth may lead to improved curriculum, careers services, pre module and qualification/module bridging activities which contribute to enhanced student success.

192 Level 1 C&C careers service requests (SRs) between October 2018 and July 2019 were manually evaluated by Careers and Employability Consultants (CEC) and categorised into themes to multiple sub levels below what already exists within the CRM. Themes were categorised into a hierarchical model.

Results of the SR analysis found 14 themes to which 4 could be further categorised into sub areas. The most reoccurring theme was students contacting careers to understand what impact studying a specific qualification would have on their career (57). Within this theme, the most common sub area was “career options if I change from C&IT to an alternative qualification” (15).

This study highlights the wide-ranging reasons Level 1 C&C students contact CES and how CECs must not only be experts in CRL and labour market intelligence, but also in understanding of OU and other HEI qualifications and modules. This allows CECs to guide students effectively and support them in choosing the correct qualification/module for their study goals.

This research provides evidence to why CRL should be a key part in any pre module, induction and module/qualification bridging activities in the 1st year of study as it increases the probability that students select the correct study path first time, increasing the likelihood of student success.

Student perceptions and development of employability skills in level 1 science

Fiona Aiken and Chris Hutton
STEM Faculty

There is strong emphasis on the importance of employability skills in degree level education, with the requirement that they be embedded in courses across the HE sector. How well this has been achieved has been reviewed (Wakeham, 2016). Institutional approaches vary, though there has

been strong focus on e-portfolios for recording, evidencing and assessing skills (Peyrefitte and Nurse, 2016; Strivens, 2007; Strivens et al., 2009).

Our research concerns evaluating how students self-assess their employability skills development using radar diagrams on S112 - Science: concepts and practice. (A radar diagram contains a variable number of “spokes” radiating from a central point, with each spoke relating to a skill. Students self-assess their competence from 0-10 against each criterion, and this determines the length of the spoke. A labelled plot results, showing the length of each spoke. Changes in the shape of the diagram over time can enable students to see progression.) This was an innovative method of PDP in a new module; each assessment required radar diagrams and reflection on skills development. The aim of this research was to evaluate students' perceptions and development of employability skills on the module, including the use of radar diagrams.

Research so far includes analysis of a sample of students' self-assessment scores in radar diagrams (n=18) from assessments throughout the length of the module. Six hundred and thirty-six students from the 2018-19 presentation of the module were also sent a questionnaire about their experience of skills development and use of radar diagrams (response rate = 18%, n = 115).

We will present interim results which indicate that the use of radar diagrams as a means of recording employability skills development as part of the students' PDP were not popular. Skills such as “business and customer awareness” were not seen as important by students on this module. Based on results so far, we recommend the need to embed skills across a qualification rather than all in one module, and the need to contextualise skills development for students to perceive it as relevant. Unsurprisingly, we also found evidence that linking skills development and PDP to summative assessment drives engagement with it.

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Parallel Session L: Short Oral Presentations – Supporting Students & Equality, Diversity and Inclusion

TMA Extensions: How are they used and what is their impact on student success?

Catherine Halliwell¹ and Cath Brown²
STEM Faculty¹ and OU Students Association²

OU students typically have substantial calls on their time in addition to study, including employment, family and caring responsibilities. In light of this, the university takes a more flexible approach to deadlines than typically used elsewhere, with it being common to grant short extensions readily provided a suitable reason is given. Studies of non-traditional students elsewhere have confirmed the importance of such accommodations to students (Stone, 2019), an increasing degree of expectation that these be provided (Masinter, 2019) and reported positive impacts on student success (Meyers et al, 2019; Patton, 2000).

However, there is a perception that at the OU, extension use is growing. It has been suggested this could be linked to our changing student demographic and increasing numbers of students studying at full time intensity. Such growth is a concern since the overall impact of extensions on student success is unclear; whilst in some cases extensions are vital to retain students, in others they can impact adversely the student's ability to cope with the remainder of their course.

Our project considers students studying the five OU modules available in Life and Health Sciences at Level 2. The qualitative component examines how extensions are used; this is being conducted using student-facilitated student focus groups and tutor-facilitated tutor focus groups. The quantitative part involves a statistical analysis of data on extensions and performance for the last two years; this will entail:-

- establishing any relationships between study intensity and extension use and between extension use and success
- identifying problematic clashing demands between modules
- potentially creating a predictive model for student outcomes on these modules based on early scores and extensions.

The intended impacts of the project include informing the university's future policy on extensions, enabling module assessment timings to be modified to reduce clashes, and supporting discussion with students about their choices.

In this short talk we will outline our findings to date and their potential implications.

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Developing “use value mindsets” to enhance undergraduates’ perceptions of learning mathematics in a first-year service mathematics environment

Gerry Golding and Andrew Potter
STEM Faculty

In this short presentation, we will introduce some ongoing scholarship work aimed at better understanding perceptions of level-one study on our introductory (service) mathematics module “Discovering Mathematics” (MU123). We are concerned about anecdotal evidence which would seem to suggest that level 1 students “do just enough to pass”. We wonder how a lack of deeper learning, normally associated with proactive engagement, might impact their future study.

To investigate our concerns and to provide a deeper understanding of the issue, we use the concepts of “use value” and “exchange value” to explore student perceptions of their mathematical study. We define a “use value mindset” as a frame of mind that endorses the perception of studying mathematics being inherently enjoyable and/or useful to future study and career goals. It promotes engagement with deep conceptual learning and self-gratification – in contrast to the perception of studying mathematics having only a tangible exchange value. An “exchange value mindset” fosters a strategic focus on imminent assessment, where passing grades are exchanged for progression and accreditation.

We believe that many of the students studying MU123 develop what we have defined as an exchange value mindset, focusing solely on strategic approaches to gaining a passing grade, and failing to appreciate the use value that their mathematical studies may have. It may well be that those students with previous mathematical ability develop this mindset as a result of finding that earlier module concepts presented them with limited challenge. It may be based on some negative perceptions of the usefulness of mathematics. Our primary objective is to investigate, keeping an open mind, whether our concerns are justified and if appropriate, use emerging evidence to develop suitable interventions that encourage a use value mindset. The intention is to complement, rather than prioritise one mindset over the other.

In this session, we present our methodology and some initial findings. We have recruited five ALs to keep reflective journals on their students at two key assessment stages – after TMA01 and TMA04. These assignments contain questions designed to encourage students to reflect on the usefulness of their mathematical studies. Our aim is to explore students’ perceptions through the eyes of their tutors in relation to their mathematical studies. We hope that our insights will encourage participants to think about students’ perceptions at level one across other disciplines and that our findings aid with the design of interventions to support retention and progression.

Evaluating the accessibility of an alternative format of module materials in Maths & Stats

*Chris Hughes¹, Chetz Colwell², John Clarke³, Kaye Williams⁴ and Alison Bromley¹
STEM Faculty¹, Independent Consultant², Academic Services³, LDS⁴*

The community of Open University disabled students includes those that are blind or visually impaired and rely upon assistive technology, such as screen readers, to access their materials. It is these students for whom this project was primarily developed.

We report on an eSTEE/school funded project that aimed to evaluate an alternative format designed for students in mathematics and statistics who use assistive technology to access their materials. At the heart of the evaluation was a consultation with the Royal National Institute of Blind People (RNIB).

Factors influencing female participation in Physical Science Postgraduate Research Programmes

*Anne-Marie Gallen¹, Clare Reger¹ and Mark Bowden²
STEM Faculty¹, University of Liverpool²*

Why do female graduates within Physics and Engineering choose certain doctoral research areas above others?

While women are generally underrepresented in most areas of postgraduate and postdoctoral research within Physical Sciences, the gender balance varies between different research fields, and, in some areas, is significantly below even the sector average.

The lack of information around undergraduate to postgraduate progression makes it difficult to design evidence-based strategies that can attract women to these areas. With the OU participating in various Centres for Doctoral Training within STEM, insight into the decision-making processes of female undergraduates should enable the design of more inclusive recruitment.

Alongside a colleague from the University of Liverpool, we are currently undertaking a study to identify issues influencing the progression choices of women into postgraduate research within the physical sciences. By focusing on one particular group of women in an underrepresented doctoral field, we are hoping to gain insight into why the proportion of women pursuing postgraduate research in nuclear fusion, is less than half of the rate that might be expected considering the sector average for physical science-based postgraduate research. Following a survey of the cohort of women that have studied for PhDs within this nuclear fusion CDT, we have interviewed participants. It is hoped that outcomes from the survey and interviews will yield information that can be used to inform better recruitment strategies for the OU, and Liverpool based physical science based doctoral training centres.

In this presentation we will share the outputs of the survey of female fusion participants as well as signposting outcomes from the semi-structured interviews.

Parallel Session M: Workshop/Demonstration – Technologies for STEM learning

Putting Innovation into Practice – Enhancing the STEM curriculum through scholarship

Trevor Collins¹, Rebecca Ferguson² and Eileen Scanlon²
STEM Faculty¹, WELS Faculty²

Putting the findings of research into practice is a challenge within many disciplines, but none more so than education. Within business, translating research prototypes into commercially viable systems has been referred to as ‘bridging the valley of death’. In education, moving ‘beyond prototypes’ refers to the fraught process of translating the outcomes of proof-of-concept trials and pilot studies into full-scale deployment. Implementation in education is therefore a necessary focus for scholarship to achieve impact. In this workshop, we’ll introduce some of the implementation literature and explore the barriers and enablers to putting innovation into practice.

In a workshop format, we’ll ask table groups to share their experiences of scholarship and the findings they have adopted in their practices. We’ll then provide a synopsis of relevant literature from systemic reform, technology-enhanced learning and implementation science, to provide a framework for delegates to review their experiences. We’ll ask delegates to consider what actions they could take to help others adopt the findings from their current and future scholarship. In a closing plenary discussion, we’ll reflect on the barriers and enablers to adoption and explore the forms of institutional support required to increase the impact of scholarship.

Delegates attending this workshop will gain insights into the challenges of implementing educational research at scale and the implementation strategies they can apply to improve the impact of scholarship.

Parallel Session N: Short Oral Presentations – International Partnerships & Supporting Students

‘More Learning Designers are Needed’: Identifying the instructional design competencies required for the successful implementation of the UK Open University learning design approach in three Chinese Open Universities.

*Tom Olney, Mark Endean and Duncan Banks
STEM Faculty*

As part of a drive to improve the quality of learning and teaching in Western higher education institutions (HEIs), including the Open University UK (UKOU), the development and adoption of learning design approaches and frameworks has grown rapidly over the last 10 years. At the same time, there has been a dramatic expansion in the traditional and widespread distance learning environment in China and a need for robust approaches to quality that could enhance teaching and learning standards in these institutions has been identified. As an extension of long held and well-established international scholarship partnerships, members of the STEM faculty from the UKOU facilitated a series of bespoke 3-day Learning Design & Course Creation (LDCC) workshops at three large Open Universities in China between 2017 and 2019 which were designed as professional development activities.

This research is concerned with identifying which skills and competencies further professional development activities might focus on should Chinese Open Universities wish to embed all or part of the UKOU approach to learning design and course creation in their institutions. Using content analysis methodology, textual response data, collected from 220 academic and academic-related staff who participated in the seven workshops, was analysed and compared against the Instructional Design Competencies framework provided by the International Board of Standards for Training, Performance and Instruction (IBSTPI). The results suggest that the participants perceive teamwork, student focused design and technical support as the main challenges for Chinese staff wishing to embed the learning design approaches they were presented with. The specific learning design skills and competencies that would require developing to meet these challenges are then identified and discussed.

OpenSTEM Africa: Strengthening science education in Ghana

*Kerry Murphy¹, Jane Cullen², Eric Addae-Kyeremeh², Kris Stutchbury², Maria Velasco¹, Sarah Davies¹, Janice Ansine¹, Clem Herman¹, Olivier Biard² and Joshua Mallet³
STEM Faculty¹, WELS Faculty², CENDLOS³*

Currently, there is an undersupply of skilled professionals across biology, physics and chemistry disciplines to drive Africa’s growth and transition to an innovation-led, knowledge-based economy. A deficiency caused by factors, such as the quality of secondary-level science teaching, socio-cultural attitudes, lack of female STEM role models, and limited access to the physical infrastructure and resources required to teach practical science.

In 2016, only 33% of students in tertiary education in Ghana were studying science subjects, well short of the 60% target set by the Ministry of Education (MoE). In 2017, the fees for studying at Senior High School (SHS) were abolished and the number of students entering SHS doubled. In 2018, a double-track system was introduced to cope with the increased number of students. This increase has highlighted the pressures on the teaching of science. There is a serious shortage of qualified science teachers. Moreover, the pressure on school infrastructure has increased. The need to improve SHS provision was articulated in the MoE Ghana Education Strategic Plan 2018-30, including the need to improve the quality of teaching and learning materials by improving the student textbook ratio from its current level of 0.5, and to recruit more girls into STEM subjects. In Ghana there is recognition that at all levels up to and including tertiary education there is a lack of access to practical activities in the sciences, with an urgent need for well-equipped modern science laboratories.

The need is particularly acute in the lowest resourced schools, made worse by a lack of internet connectivity. To address this the MoE launched the Secondary Education Improvement Project; as part of this initiative an agency of the MoE, the Centre for National Distance Learning and Open Schooling (CENDLOS), has pioneered a technology-based approach to enhance both teaching and the quality of materials by introducing the 'iBox' into 148 of the lowest resourced SHSs. The iBox is a local file server with both wired and WIFI connectivity. It provides a means to deliver high-quality teaching and learning materials that have been created by CENDLOS for these low resource schools. However, CENDLOS has yet to address the teaching of practical science in these schools.

The OU has partnered with CENDLOS to address this urgent need by leveraging the OU's experience in the creation of onscreen interactive practical experiments to teach biology, chemistry and physics. To date, we have held three co-creation workshops with Ghanaian SHS science teachers and have identified 12 areas where OpenScience Laboratory-like onscreen applications, applicable to up to 100 curriculum-relevant experiments, could provide a high-quality alternative for the teaching of practical science. In October 2019 the OpenSTEM Africa (Ghana) project was formally launched at the MoE in Accra. The project will not only create onscreen applications and exemplar lessons, it will also support teachers and school leaders to engage with these new approaches to teaching practical science by developing CPD and school leadership materials.

OpenSTEM Africa will create a step change in the quality and relevance of secondary-level STEM education in Ghana.

Giving practical support to MSc students in the Global South

Stephen Burnley and Sinead O'Connor-Gotra
STEM Faculty

Over the past five years the OU's Environmental Management MSc programme has secured a number of bursaries from the Commonwealth Scholarship Commission (CSC). These bursaries are open to Kenyan citizens and covers the students' tuition fees, provision for additional AL support and in-country tutorials. The scheme has proved highly successful and the first cohort of students

graduated in the autumn of 2019.

CSC bursaries are highly sought after and the students are well-qualified and motivated. However, many of the students are disadvantaged compared to the “typical” UK student in several ways. Internet access and IT equipment are proportionally more expensive than in the UK and some students do not have internet provision and, in some cases, mains electricity in their villages. Many students (women in particular) have considerable caring responsibilities in their extended families and their studies may be considered to be unimportant by family members. Some students received their previous education in a system where rote learning is praised, critical skills are not developed and attitudes to plagiarism are different.

The aim of this eSTeEM project was to use the qualification team’s experience along with the findings of a CSC student focus group and one to one interviews to identify the most effective ways of supporting CSC students. Our key findings are summarised in the points below.

Study materials – Key texts should be provided in both print and online (PDF) formats supported by online study guides. The study guides should be suitable for delivery via smartphones.

AL support – Wherever possible face-to-face in-country tutorials should be provided and paced to take account of the very long journeys some students make to reach the venue; food and relaxation breaks must be built into the timetable. Where AL expertise permits, each AL should deliver more than one module to allow a stronger student/AL relationship to develop.

Study support - Additional support should be provided to introduce students to UK academic traditions and to the importance of adopting a critical approach to their writing. Adopting good academic practice needs to be stressed throughout the programme. Students should be provided with international student ID cards by the OU to give them access to local libraries and resources.

Peer support – Tutorials for different student cohorts should take place at the same time to allow students to meet and mix. Support should be given to students and graduates to form alumni and self-help groups. In-country “graduations” provide photographic evidence that the students have achieved a reputable qualification and allow students to celebrate with their families.

Whilst many of these recommendations are common sense, setting them out with supporting evidence will help to create a corporate memory within the University. Implementing these recommendations will be of great value to CSC students and other groups in the Global South but will also benefit many UK-based students.

Parallel Session O: Workshop/Demonstration – *Employability*

Decentralised Qualifications on the Blockchain

Alexander Mikroyannidis
STEM Faculty

The emergence of the Blockchain promises to revolutionise not only the financial world, but also education in various ways. Blockchain technology offers a decentralised peer-to-peer infrastructure, where privacy, secure archiving, consensual ownership, transparency, accountability, identity management and trust are built-in, both at the software and infrastructure levels. This technology offers opportunities to thoroughly rethink how we find educational content and tutoring services online, how we register and pay for them, as well as how we get accredited for what we have learned and how this accreditation affects our career trajectory.

The QualiChain research and innovation project (<https://qualichain-project.eu>) focuses on the assessment of the technical, political, socio-economic, legal and cultural impact of decentralised solutions on education. QualiChain investigates the creation, piloting and evaluation of decentralised solutions for storing, sharing and verifying education and employment qualifications and explores the potential of Blockchain technology for disrupting the domain of public education, as well as its interfaces with private education, the labour market, public sector administrative procedures and the wider socio-economic developments.

This workshop will explore the different ways that employability is affected by decentralisation. More specifically, we will outline the ways that education and employment qualifications can be awarded, managed and verified on the Blockchain, as well as how learners can receive personalised job or course recommendations based on the qualifications they have acquired. Participants will also have the opportunity to try out and evaluate the tools offered by the QualiChain project for the award and verification of decentralised qualifications.

Parallel sessions P: Workshop/Demonstration – *Supporting Students*

STEM ISSS - where are we now? Evaluating awareness, usage and effectiveness of individual student support sessions

Fiona Moorman and Karen New
STEM Faculty

Our student's study in isolation and are an increasingly diverse cohort, many with disabilities and balancing work, family and caring commitments alongside study workload, with many students opting to study at high intensity. There is increasing evidence from other institutions that students appreciate higher levels of pastoral and academic support (Schlusmans, K. (2018); McKie, A. (2018)); indeed, a survey study done by Neves and Hillman (2017) found that 36% of all respondents cited too little interaction with University staff as the reason for a negative university experience and many conventional universities now recognise the importance of individual tutor-student contact (e.g. <https://www.sheffield.ac.uk/lets/pp/support/tutors>). Within the OU model, additional individual tutor-student support above a threshold built into the tuition strategy for each module is delivered on a piecemeal basis via the provision of individual student support sessions (ISSS). However, there is uncertainty about the source of requests for ISSS (e.g. student-, AL- or SST- driven), the format and content of sessions, or the reasons why the sessions are required. Furthermore, there has been relatively little recent study into evaluating perceived effectiveness of this type of individual support, as well as consideration of whether this resource could be used more creatively.

Our project seeks to evaluate the current perceived effectiveness of ISSS within the context of our school of Life, Health and Chemical Sciences (LHCS). We have captured a snapshot of the AL perspective on individual student support by surveying LHCS ALs about aspects such as their awareness of the process and scope for using ISSS, uptake and reasons for offering ISSS, as well as their insights on what makes for effective or less effective ISSS. We have also obtained views from LHCS staff tutor colleagues. We will present these findings within the broader context of usage of ISSS in STEM and will also provide an update about other planned work for this project including analysis of demographics data of LHCS students associated with an ISSS.

As well as presenting our preliminary findings, we anticipate running 'small group' activities, to draw on the experiences and thoughts of colleagues from across the faculty and the wider university. We anticipate that participants will gain a wider understanding and appreciation of the potential for using individual support sessions in an effective manner.

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Day Two Closing Keynote Presentation

Achieving Positive Outcomes for All: What can we do and why does it matter?

Helen May

Never before has it been more important to evidence the impact of our work on student outcomes or the wider society. The Teaching Excellence and Student Outcomes Framework (TEF) and Access and Participation Plans (APP) require universities to demonstrate they are systematically monitoring and evaluating student outcomes; identifying any differentials; taking positive action to address them; and can evidence the impact of those interventions on the achievement of positive outcomes for all.

Over recent times, there has been a noticeable shift of emphasis away from a focus on the inequity of opportunity towards inequity of outcome. This is exemplified in the recommended use of 'Theory of Change' by the Office for Students in the preparation of APPs, and the equal emphasis given within the TEF criteria to 'Student Outcomes' to that of 'Teaching Quality' or to 'Achievement' 'Continuation' and 'Progression' as to 'Access'. There are significant differential outcomes – whether of attainment, progression to employment/further study – particularly amongst those with protected characteristics, which Universities now need to urgently address.

So, what does this mean for those working with students? What actions could you take? How do you know what difference you have made? This presentation will reflect on the differences you can make through your daily practices; the power of monitoring students' engagement and targeting as well as the importance of scholarship as a source of evidence.

Helen will draw on her specialist background in inclusion as well as her significant experience as a national leader of learning and teaching. Her presentation will also be informed by her leadership of an institutional wide TEF pilot and leading the Access and Participation evaluation plan as Head of Learning and Teaching in a city based, widening participation institution.

POSTER PRESENTATIONS

GROUP A:

1. Do students understand Learning Outcomes in general and in T176, T192, T193 and T194 in particular?

Alan Yate
STEM Faculty

Learning Outcomes (LOs) should be used to help students to achieve the objectives of a course of study. However, there is concern that, because higher education institutions are being put under increasing pressures to provide accountability data on the quality of teaching and learning, they are neglecting information on LOs (Nusche 2008). Furthermore, Brooks, Dobbins, Scott, Rawlinson & Norman report that ...” limited attention has been given to understanding whether and how students actually use them” (LOs). This study intends to gather more data to find out more on the topic and how LOs could be improved.

Drawing on the framework of Constructive Alignment (Biggs & Tang, 2007) this research looks at whether students understand the descriptors they are given as part of their course work and how these could be made more accessible to engage study.

Essentially, constructive alignment is a learning-teaching approach in which students ‘construct’ evidence of their learning by ‘aligning’ their activities to the LOs....but these LOs and activities have to be carefully designed and this is a concern which has stimulated this study as there is anecdotal evidence from tutors that students do not always ‘understand’ them.

PHASE 1 (2019) used constructive alignment to investigate how LOs are being used within four modules (T176, T192 – T194) by checking the readability of the LOs for these modules and comparing the LOs and the activities for the students.

PHASE 2 were student led activities for T176 carried out at residential school as a pre-test for survey design. Results analysed and reported back to eSTeEM.

PHASE 3 (2020) was an online survey conducted for the chosen modules - see results on poster.

PHASE 4 further student activities will be carried out in 2020 with another group of T176 students at a residential school.

See page 73 for poster.

2. Students as partners in a Level 1 Computing and IT module: Co-design of formative quiz questions

Paul Piwek and Simon Savage
STEM Faculty

We will provide an update on the progress of an ongoing eSTeEM project in which students are partners in co-designing formative quiz questions. The project is now half-way. A co-design

workshop with students took place at the end of 2019 and we are now implementing the results from the workshop for the 20D presentation of TM112 (Introduction to computing and information technology 2). We will describe the lessons learned so far and provide a timeline for the remainder of the project.

See page 74 for poster.

3. Evaluating the level 1 Engineering Tutors' shared resources

Anne-Marie Gallen, Clare Reger, John Bromley and Cheng Lee
STEM Faculty

Following a tutor debrief on the first presentation of a brand-new engineering module, we asked the Associate Lecturers (ALs) to vote on what changes they would like to see in the support around teaching this innovative module. The overwhelming response was that they needed an area where they could access and share resources to help ensure students received the most appropriate tutorials possible.

Two ALs volunteered to investigate all the available VLE-supported options and then create both a Level 1 engineering tutor shared resource site and detailing a procedure for its use.

The level 1 engineering tutor shared resources site
<https://learn2.open.ac.uk/course/view.php?id=206224>

is a unique approach to sharing resources as it allows the sharing of tuition resources, not just across a presentation and module but across all presentations and modules within level 1 engineering. The materials are posted and maintained by the contributors themselves, using a set of guidelines developed by the ALs that built the site.

This poster summarises the recent evaluation of those resources.

See page 75 for poster

GROUP B:

4. Teaching distributed computing using Raspberry Pi clusters at a distance

Daniel Gooch, Jon Rosewell and Mike Richards
STEM Faculty

TM129 Technologies in Practice is a compulsory Level 1 BSc (Honours) Computing & IT module. It hosts around 1,800 students annually and is based on three topics – Robotics, Networking and Operating Systems.

We want to provide greater exposure to novel computing concepts, specifically computer clusters which provide large amounts of processing power to solve a range of everyday problems

including decrypting data and image processing. One relatively low-cost approach to clusters is using everyday hardware such as the inexpensive Raspberry Pi computer. Our project focuses on exploring the benefits and challenges of teaching about computer clusters at a distance using low-cost Raspberry Pi clusters.

See page 76 for poster

5. Are virtual insight visits an effective way to engage learners?

David Conway, Janet Hughes and Christine Gardner
STEM Faculty

It is accepted that insight visits have wide ranging benefits to students including reinforcing and expanding upon taught learning, improved ability to relate theory to practice, encouragement of collaborative learning and enhancement of motivation. Subsequently this enhances teaching and learning, student support and employability, all fundamental parts within student experience (Universities UK, 2016).

Learners often choose distance learning (DL) due to its flexibility and potential to fit around their circumstances. Typically, DL environments involve large numbers of students across a vast geographical location. Learners often have competing priorities for time such as work and childcare. Furthermore, many have physical or mental disabilities and social economic issues. These issues are clearly seen in the Open University (OU) School of Computing and Communications (C&C) at stage 1.

Advances in information and communications technologies mean it is now possible to design and implement interactive Virtual Insight Visits (VIV) at low cost where students online can gain many of the same benefits as attending traditional insight visits. Despite this, the concepts of VIV have not been exploited to their full potential.

The purpose of this ongoing study is to investigate if a VIV for OU stage 1 C&C students to the Bletchley Park Museum using the Stadium Live platform is an effective method of exposing students to real world environments, relating theory to practice and enhancing student experience.

See page 77 for poster

6. Developing programming problem-solving skills using individualised screencasts

Sarah Mattingly, Christine Gardner and Richard Walker
STEM Faculty

Does video screencast TMA feedback help novice computing students develop skills in problem-solving in programming? Is creating such screencasts for individual students feasible for tutors in the normal course of correspondence tuition?

Prompted by successful use of problem-solving screencasts in TM111 module materials, this project is investigating whether screencasts might be used by TM111 tutors to provide feedback on TMA answers, tailored to each student's misconceptions, mistakes and areas for improvement.

In Stage 1 five experienced tutors were given free rein to create TMA screencast feedback in any way they felt might be useful for their individual students. Based on analysis of student and tutor feedback, and the screencasts themselves, the project team drafted pedagogic and technical guidelines for screen casting TMA feedback.

Stage 2 (currently underway) involves tutors trialling these guidelines with the aim of refining them for eventual dissemination for use by tutors across TM111, and potentially more widely. This poster presents our methodology and initial results, highlighting relevant pedagogical and practical considerations.

See page 78 for poster

7. Remote Pair Programming: Enhancing Teaching and Learning of Programming at a Distance

Adeola Adeliyi, Michel Wermelinger, Jon Rosewell and Karen Kear
STEM Faculty

In many face-to-face universities around the world, student's program in pairs in their computer labs. In industry, professional developers sometimes code in pairs, to spot errors more quickly and find better solutions, because 'two heads are better than one'. Despite the proven academic benefits of using Pair Programming in teaching, it is mostly available to students learning programming on campus and these students therefore already have an employability skill advantage over students learning online. The OU Remote Pair Programming Project aims to investigate whether OU students could also benefit from pair programming and how best to achieve it online. The results of this research project will be the basis for piloting and evaluating RPP in the current Open University teaching of computing-related subjects.

See page 79 for poster

GROUP C:

8. Day time tutorials for apprentices – what is best practice in computing?

Chris Thomson, Marina Carter, Dave McIntyre, Emily Wood and Alison Leese
STEM Faculty/Apprenticeship Change Team

Apprentice students on the computing degree apprenticeship programmes (Digital Technology Solutions Professional Degree Apprenticeship England, IT: Software Development/Cyber Security Graduate Apprenticeship Scotland, Digital Degree Apprenticeship Wales) took part in this study. Uniquely for the Open University we know these students are all-in full-time work, and that they have been provided time during their work hours to study (20%). Some of these students have strongly voiced the opinion that tutorials should be provided during their work hours. However, it is far from clear how this relates to the majority of the students.

We have conducted an early stage pilot on TMXY130J where we provided 16% of tutorials (1 of every topic) during work hours with the same tutor, with that tutor also providing a tutorial repeated identically in the evening of the same day. The initial findings were that workday tutorials were significantly better attended. The range was between 33-320% greater attendance in the weekday daytime compared to the evening.

We plan to further investigate these results by surveying and interviewing students from this first-year cohort to gather their reasons for selecting tutorials and compare these with a third-year cohort with the same tutor, but who only had access to evening and weekend tutorials. This will ask the students to reflect on how engaged they felt and their ability to participate in the tutorials. We will use this to inform tutorial provision for modules in 20J and develop a further evaluative process of those proposals.

See page 80 for poster

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

Marina Carter and Richard Mobbs
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 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 poster we will share our findings on these initiatives and best practices which can be taken forward by other module teams.

See page 81 for poster

10. Evaluating the impact of a qualification-based approach to student engagement and success in engineering study

*Alec Goodyear, Sally Organ, Zahra Golrokhi, Maria Kantirou and Carol Morris
STEM Faculty*

This eSTEEem project considers the impact on student outcomes of a series of curriculum changes conducted over a number of years. The main project question is focused on whether, and if so how, a whole qualification approach of designing and developing the various components of the BEng (Hons) (Q65) and MEng (M04) has had a positive impact on student success. Student engagement, satisfaction, and depth of learning are recognised as important criteria for student progression through a qualification.

In response to poor retention and progression rates throughout Stage 1 of our BEng(Hons) and MEng degrees, we have undertaken a radical reshaping of our general engineering curriculum in which mathematics skills, personal and professional development planning, remote experimental work, practical laboratory based residential schools, and wider study skills are all integrated into broader modules that provide context and relevance to students while they are studying engineering topics.

Assessment is integrated and paced throughout, reducing the number of 'pinch points', and staged across the qualifications. Diversity and inclusivity considerations have been central to curriculum developments, providing an additional core theme to the transformation. In addition to curriculum changes ongoing professional development for academic teams features as an important mechanism to support continuous improvement.

Through the eSTEEem project we seek a greater understanding of influencing factors that should help inform teaching quality assessments, such as annual quality reviews for internal and QAA purposes or towards future benchmarks such as TEF criteria.

See page 82 for poster

11. Complementary Tuition Initiatives to Support Key Skills Development: Best Practices from a Level 2 Web Technologies Module

Marina Carter and Soraya Kouadri Mostefaoui
STEM Faculty

Web Technologies (TT284) is a key Level 2 module in the Computing & IT programmes, with over 1000 students per presentation over the last 3 years. TT284 requires students to rapidly build on the skills gained from their Level 1 studies to present their work in written reports and develop code using a number of web technologies. Over the years, both student and tutor feedback have established that students struggle with the programming and report writing demands of this module. Additionally, past experience highlighted that there is a high number of students requesting extensions to complete their TMA02 and a significant drop in student retention around the TMA02 submission point as students are expected to quickly develop their programming skills.

To address these issues, the module team have implemented a series of complementary tuition initiatives to support students. These include several topic focussed tutorials into the module tuition strategy, which cover the key topics that students struggle with, including report writing, project management, a series of programming Adobe Connect recordings to aid students with learning; and module wide programming Q&A sessions each hosted by two experienced tutors.

In combination these initiatives have had a positive impact on students experience and outcomes. For example, the programming tutorial recordings have been viewed almost 1500 times in a six-week period and have resulted in a substantial drop in student complaints about insufficient coding support on the module. Additionally, in 19J there has been a 30% drop in the number of TMA02 extension requests, together with a positive effect on student retention.

In this presentation, we will share our preliminary findings on these initiatives and best practices which can be taken forward by other module teams.

See page 83 for poster

GROUP D:

12. Inclusive Language: exploring student-led approaches to talking about disability-related study needs

Elaine McPherson¹, Kate Lister², Tim Coughlan³, Anne-Marie Gallen¹, Vic Pearson¹ and Nathaniel Owen³
STEM Faculty¹, RES², WELS Faculty³

To access support for their OU studies, we ask students to ‘disclose a disability’. This pathologises them, requiring them to identify as ‘different’. Many students say they feel uncomfortable with this and do not identify as ‘disabled’. It discourages them from telling us about their ‘disability’ and creates a barrier to accessing support. We wanted to understand students’ language preferences concerning disability and study requirements, to investigate the language that students feel comfortable using and to create guidance for staff and students engaging in these conversations.

In the initial research, we found that the word ‘disabled’ was uncomfortable for many students (particularly those with mental health conditions or specific learning difficulties); many preferred ‘additional study needs’. However, we found divergence in preferences across contexts, rather than a consistent preference. This led us to understand the importance of context in discussions around disability.

We worked collaboratively with OU staff and students to develop guidance for student-facing staff on talking to students about disability and information to explain to students the language used by universities around disability. We wanted frontline staff to have a sense of ownership and involvement in the guidance, so we followed an iterative approach, collecting input from stakeholders, then refining the guidance accordingly. This collaborative process of transforming research findings into practical guidance was extremely beneficial, with stakeholders raising a variety of important issues. For example, issues were raised around the sensitivities both staff and students may feel regarding terminology such as ‘needs assessments’ and ‘adjustments’, the practicalities of mirroring language and the need to use clear examples.

This staff guidance document developed will now be used to support staff and influence language used to discuss disability-related study needs, with a view to moving towards inclusive, student-led language approaches. The student guidance is now being promoted by OUSA.

Reference:

Lister, Katharine; McPherson, Elaine; Coughlan, Tim; Gallen, Anne-Marie and Pearson, Victoria (2019). Towards Inclusive Language: Exploring student-led approaches to talking about disability-related study needs. In: Proceedings of the 12th annual International Conference of Education, Research and Innovation (ICERI 2019), IATED pp. 1444–1453. (<http://oro.open.ac.uk/68408/>)

See page 84 for poster

13. Online journal clubs: an innovative opportunity to develop skills and community?

*Karen New, Fiona Moorman and Kate Fox
STEM Faculty*

Anecdotal evidence suggests that many students lack confidence/skills associated with digital and information literacy and have low confidence in an online environment. Furthermore, evidence from scholarship projects and internal quality control processes indicate that student attendance in online tutorials is decreasing and, where students attend, there is a reluctance to fully

participate. This, coupled with the fact that face-to-face tutorials are diminishing and concerns that ALs are increasingly adopting a didactic approach to their online tutorials, may result in fewer opportunities for rich peer-peer online interaction, increased sense of isolation and lower student satisfaction. In this poster, we present the results from our project exploring the use of online journal clubs (OJC) to attempt to develop online / digital skills, build online confidence and develop an academic community. We report on the experience of developing the 'OJC' website and feedback from student participants. We also report on the experiences of our team of AL facilitators.

See page 85 for poster

14. "To see ourselves as others see us" – the gift of insight from visiting scholarships

Mark Endean, Tom Olney, Duncan Banks and Daphne Chang
STEM Faculty

Scholarship visits have been normal in academic communities since time immemorial.

A scholarship programme has been in place for about 20 years between the UKOU and the Open University of China (OUC) whereby staff from the Open University/Radio and TV University (RTVU) networks in China obtain financial support for around 3 months at the OU. In all, over 40 scholars have benefited from the scheme.

Most recently, two scholars studied here between October 2019 and February 2020, jointly supervised by Duncan Banks, Mark Endean, Tom Olney and Daphne Chang.

Dr Shangjing (Jessie) Yin, Lecturer in the School of Medicine, OUC, Beijing, is a gerontologist with an interest in education for the elderly and the choices they make when studying at university level. She spent her time at the OU exploring attitudes to and provision for elderly learners in the UK.

Juan Luo, Director of the Office of Academic Affairs in Secondary Vocational Education, OUC, Beijing, came to investigate team-based approaches to curriculum development and presentation.

In both cases, our scholars found dramatic differences between the UK and China in their respective areas of investigation.

Jessie identified 5,575 students (60+ years, 3.54% of the total student population) of which 2928 are at least 65 years old. The most popular modules being studied by this group are the humanities and social sciences.

Through interactions with production and presentation module teams, Juan identified 'communication' as the team-working factor most frequently cited as the key to effective teams. She subsequently sent a short survey to all members of the STEM Faculty and at the time of writing she is analysing more than 60 responses.

This poster highlights the richness of the findings of these two scholars and showcases the benefits that can come from such a scholarship programme.

See page 86 for poster

15. An equal experience for all students? An analysis of continuous assessment and exam performance on a second level biology module

Karen New, Duncan Banks and Martin Bootman
STEM Faculty

Gender imbalances in the sciences have been reported for many years, and whilst physics, engineering and computer sciences remain male-dominated, the literature suggests that biological sciences are approximately gender balanced. Nonetheless, this does not mean that disparities do not exist.

Biological sciences may, for some students, be perceived as a 'softer' science, with limited need for maths skills. However, simple calculations and data handling skills are vital for the professional biological scientist. Historically, there have been differences reported in performance in assessment tasks, with females tending to perform better in essay-type questions and males performing better in data handling/multiple choice questions. However, there is limited exploration of whether this is the case within a tertiary setting, and even less within distance education.

In this poster presentation we present preliminary results from a substantial data set, exploring student behaviour over continuous assessment and examination, from four consecutive presentations of a second level biology module.

See page 87 for poster

Do students understand learning outcomes in general & in T176 & T192 - T194 in particular?



ALAN YATE & STEVE DUTCH.

1. Background and Issues Explored.

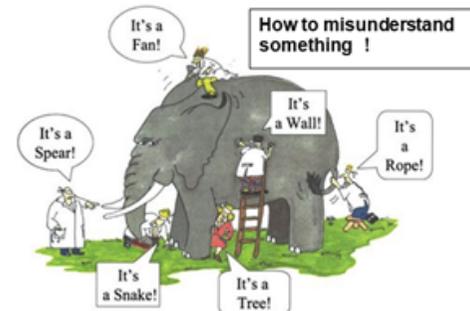
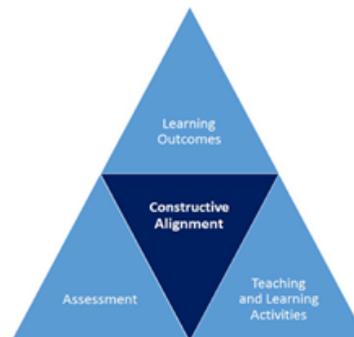
- **Learning outcomes** (LOs) are an integral part of today's course design in Higher Education.
- There is concern that LOs are not being used to improve students' **understanding** of their studies in the way they were intended.
- Drawing on the framework of **Constructive Alignment** (Biggs, 2003; Biggs & Tang, 2007) this research looks at whether students understand the descriptors they are given as part of their course work and how these could be made more accessible to engage study.
- The sample was chosen from students on courses at **Level 1** undergraduate courses in engineering with the Open University.

3. Preliminary findings.

- Readability testing:** lack of consistency between online testing websites and variation between some computerised results and manual counts. Suggestions that too many LOs had long sentences and complex wording.
- Student activity:** agreement that there were too many long sentences and complex words.
- Online survey:** distributed 03.02.2020 / survey closed 02.03.2020. Results pending

2. Work that has been carried out.

PHASE	DESCRIPTION
1 2019	LOs for T176 were analysed for readability. LOs and activities for T176 compared with T192-T194. Student led activity designed.
2 2019	Student led activities for T176 carried out at residential school as a pre-test for survey.
3 2020	An online survey was conducted for four modules T176, T192- T194.
4 2020	Possible post-test will be carried out in 2020 with another group of T176 students at a residential school.



Group A: Poster 2

Students as partners in a Level 1 Computing and IT module: Co- design of formative quiz questions

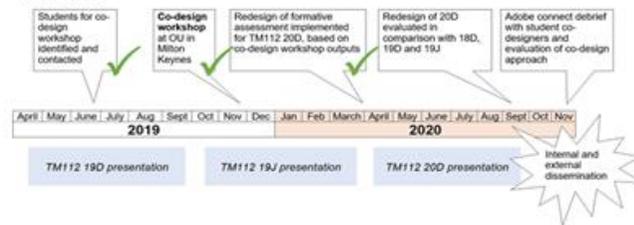
Paul Piwek & Simon Savage



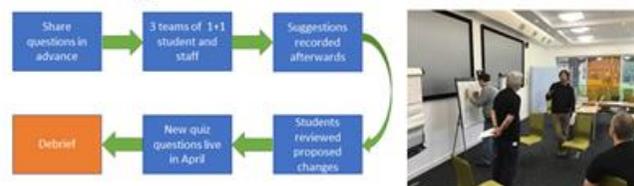
Aim

The aim of this project is to understand better how to involve students in the design of effective formative quiz questions. Central to the project is a co-design workshop with students to (re)design questions for TM112 (Introduction to computing and information technology 2). Students will be involved both in the co-design process itself and in an evaluation of the process.

Timeline



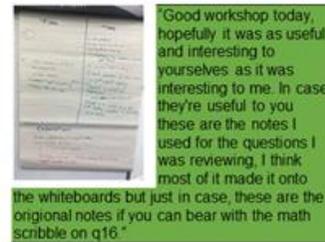
Methodology



Reflections



Student's Final Word



We would like to acknowledge the support from our colleague Michel Wermelinger during the workshop.

Evaluating level 1 Engineering Tutors' shared resources

Clare Reger, Anne-Marie Gallen, Cheng Lee, John Bromley



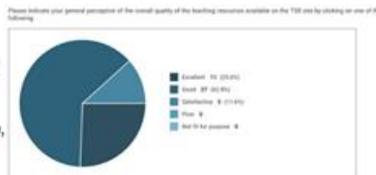
This project focused on the effectiveness of sharing tuition resources for student-centred teaching both online and face to face within level 1 Engineering and beyond

At a tutor debrief, Associate Lecturers (ALs) were asked to vote on changes they would like to see in the support around the module. The overwhelming response was for an area where they could access and share resources to help ensure students received the most appropriate tuition possible.

The level 1 engineering tutor shared resources site <https://learn2.open.ac.uk/course/view.php?id=206224#section-1> allows the sharing of tuition materials between ALs across presentations, modules and the whole of level 1 engineering. The materials are posted and maintained by the contributors themselves, using a set of guidelines developed by the ALs that built the site.

An evaluation of the sharing of tuition materials and the associated support and shared learning amongst ALs was carried out, with the hope of developing similar approaches with other departments, schools and even faculties. In addition, the evaluation attempted to identify how best to formalise the sharing of tuition materials amongst ALs to ensure efficiency, accessibility, availability and usefulness.

In total, 110 ALs were sent the JISC survey questions and 64 responded (58%) within the time frame. Of these, 83% of respondents had heard of the Tutor Shared Resources website, and 77% of had visited the site; with 93% having found the site



easy to navigate. Issues around the design and use of the site were highlighted within the survey.

Findings:

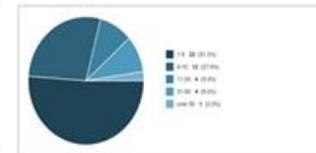
The TSR has been used by most respondents and provided them with good quality tutorial resources, saving them effort and time and promoting a better student experience. However, it appears to be under-utilised and the following reasons are suggested:

- The hyperlinks to the site are not obvious enough for most tutors, so they are not reminded to visit the site on a regular basis.
- There are no automatic mechanisms to notify that new content has been contributed, which may be infrequent depending on the maturity of the module.
- There are no automatic mechanisms to notify that feedback has been given on contributions.

There is clearly more work to be done in finding a medium for the delivery of this tutor shared resource site; but overall it is clear that the present system is meeting a need that was identified within the AL community.

With this in mind, a level 2 engineering site has been created and shared among level 2 engineering tutors with the hope of improving on the issues raised before sharing across other modules. It is being reviewed using VLE diagnostic tools.

Approximately how many times in total, on a number of content or as a contributor of content, have you visited the TSR website? Please select one of the following:



Group B: Poster 4

Teaching distributed computing using Raspberry Pi clusters at a distance

Daniel Gooch, Mike Richards, Jon Rosewell



1. Module Context

TM129 *Technologies in Practice* is a compulsory Level 1 BSc (Honours) Computing & IT module. It hosts around 1,800 students annually and is based on three topics – Robotics, Networking and Operating Systems.

We want to provide greater exposure to novel computing concepts, specifically computer clusters which provide large amounts of processing power to solve a range of everyday problems including decrypting data and image processing. One relatively-low cost approach to clusters is using everyday hardware such as the inexpensive Raspberry Pi computer. Our eSTEeM project focuses on exploring the benefits and challenges of teaching about computer clusters at a distance using low-cost Raspberry Pi clusters.

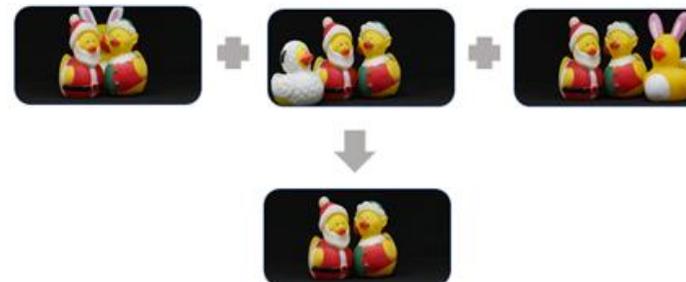
2. Device Construction

Six custom-made Raspberry Pi clusters have been constructed by the module team. These will be hosted in the OpenSTEM Labs and can be accessed by students over the Internet to perform a range of activities. Students will complete the activities and compare the performance of the clusters to a conventional single processor computer.



3. Learning Activities

Three processor-intensive programs have been developed for the cluster. The *'Image Combiner'* (below) is a graphical problem: how to create a single 'clean' image (the Christmas ducks) by removing obstructions that appear in several original images (the Christmas ducks with various visiting ducks). The maths is simple – each pixel in the final image comes from taking the median (i.e. the most common value) of the corresponding pixels in all images, effectively ignoring any obstructions. However, there are millions of pixels in each image...



4. Student Evaluation

Our eSTEeM project is based around running questionnaires alongside the Raspberry Pi cluster activities for the 20B presentations of TM129. The questionnaire will examine 1) increased engagement and interest of the students due to the novelty of the technology; 2) that the activities will increase students' knowledge of cluster computing; and 3) that the increased engagement and interest will improve retention.

The survey will be supplemented by examining SEaM data and a small number of structured interviews.

Group B: Poster 5

David Conway, Christine Gardner, Janet Hughes

Are virtual insight visits an effective way of engaging learners?



Introduction

Insight visits can have wide-ranging benefits to students including:

- Reinforcing and expanding upon taught learning
- Improved ability to relate theory to practice
- Encouragement of collaborative learning
- Enhancement of motivation

Benefits may lead to enhanced student experience, outcomes and employability

Questions

- Can a **virtual insight visit** to Bletchley Park Museum provide OU distance learners with effective interaction with a real world environment?
- Can virtual insight visits provide OU distance learners with similar benefits to traditional insight visits?

Fieldcast (similar to used in S206)

HOW?

Interactive Stadium Live Widgets



Scan barcode to learn more or contact David.conway1@open.ac.uk

Test & Learn

- Virtual visit offered to Level 1 computing module students
- Visit content relates to Level 1 module material and employability
- Attendees interact with presenters and environment using Stadium Live widgets
- Data: Authors' reflective account, student feedback (online questionnaire), attendance and cost
- Evaluation of approach: does it provide a cost and resource effective way of enhancing student experience?

eSTEeM
The OU centre for STEM pedagogy

Developing programming problem-solving skills using individualised screencasts

Christine Gardner, Sarah Mattingly, Richard Walker



Context



30 credits
D and J presentations
4600 students per year

Issue
Problem-solving in programming involves:

- analysing, designing, implementing, testing...
- tricky programming concepts (iteration, selection...)
- complexity
- problems for novice programmers!

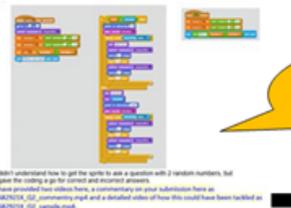
Inspiration
Problem-solving screencasts in TM111 online teaching: videos of programmer thinking aloud their approach to solving a problem – making mistakes, backtracking, testing, finding errors, correcting code

Project outline
Tutors provide screencast instead of written feedback on individual TMA answers, giving audio-visual insight into how an experienced programmer solves a problem, following the student's own initial thought processes

Aims

- Are problem-solving skills enhanced?
- What screencast content is most beneficial?
- How time-consuming for tutors?

Activities
Stage 1 - Free-rein screencasting exploration Five experienced, funded TM111 tutors created individual screencast TMA feedback, deciding on which solutions to focus, the content and structure of screencasts, and the technologies
Stage 2 - Guided screencasting Two volunteer tutors created individual screencast TMA feedback, following guidelines developed from Stage 1



... easier to follow the visual feedback within OU Build than just being presented with screen captures and written explanation

Two Stage 2 screencasts were selected to be used as examples for tutors in future presentations:
[Sample 1](#)
[Sample 2](#)

"... addressed to me, easy to understand and I found it very useful"

Findings

↓

Pedagogic and technical guidance

Successful screencasts:

- focus on developing transferrable programming concepts and skills
- exploit the visual aspects of code creation
- focus on student solutions that are substantially right and can made fully correct with a small amount of tutor guidance
- are planned, but only roughly
- are shared via a simple delivery mechanism such as YouTube
- are imperfect. Students benefit from seeing tutors make and recover from mistakes

Contacts: sarah.mattingly@open.ac.uk, r.c.walker@open.ac.uk, c.f.gardner@open.ac.uk

Group B: Poster 7

Remote Pair Programming: Enhancing Teaching and Learning of Programming at a Distance

Adeola Adeliyi

Dr Michel Wermelinger

Dr Jon Rosewell

Dr Karen Kear



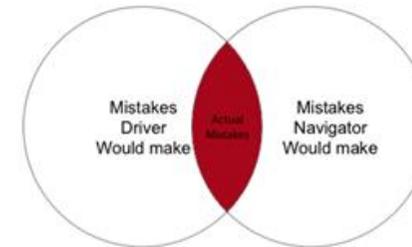
Pairing is not a new concept. It is already in use in several professions – Sports, Medicine, News casting etc.

The human eye has an almost infinite capacity for not seeing what it does not want to see. Programmers, if left to their own devices, will ignore the most glaring errors in their output—errors that anyone else can see in an instant. - G. M. Weinberg, The Psychology of Computer Programming



Pair programming encourages informal and immediate communication over joint coding work.

The technique involves two developers: one in a driver role writes the code, controlling the keyboard and mouse, and the other, the navigator, reviews the code as the driver writes it.



Does Pair Programming Work?

Formal Experiment showed: Increased success rates in introductory courses, increased retention rate, higher quality software, higher student confidence in solutions, and improvement in learning outcomes.

Evidence that women benefit from pair programming.



Reduce collaboration obstacles enough to make remote pair programming worthwhile and attractive to students at the Open University.

Contribute to the wider academic research think-tank, the development of collaborative techniques for delivery of teaching programming at a distance.



Day time tutorials for apprentices – what is best practice in computing?

Emily Wood, Dave McIntyre, Chris Thomson, Alison Leese, Marina Carter



Who are degree apprentices?

These students are in full time employment with study funded through the apprenticeship levy and other government sources. Apprentices study 90 credits a year in England and Wales and 120 credits a year in Scotland. They are provided with 20% of their paid time to study, about 1 working day a week. Many students use this time, during the working day as their main study time.

Why look at tutorial times?

Evening and weekend attendance at tutorials is an issue for apprenticeship students. Daytime tutorials have been suggested as apprentices may be able join during work hours. However it is not only apprentices who study during weekday daytimes, other groups such as shift workers and those who care for others also have an interest in tutorials at this time. Thus the results of this trial are also relevant to non-apprentice modules.

What seems to be happening?

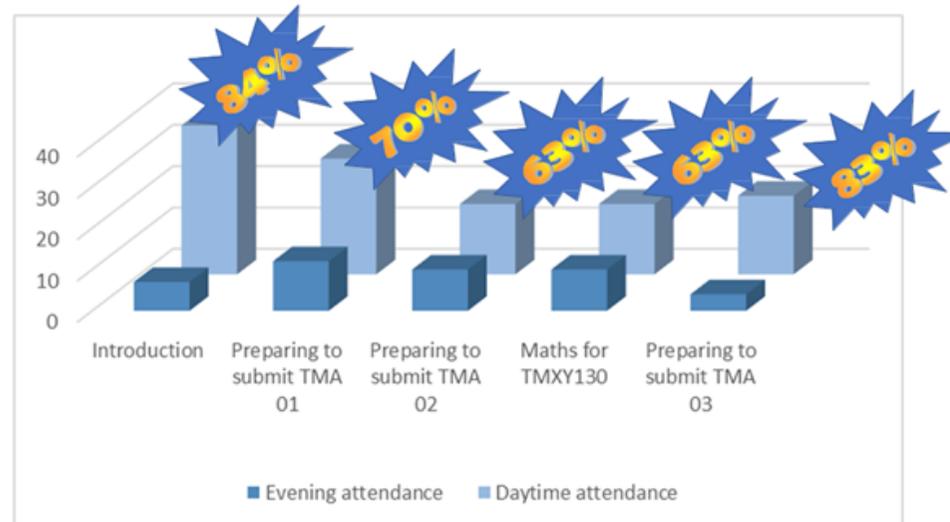
We conducted an early stage pilot on TMXY130 (Introduction to Computing technologies) in 19J, one of the first modules apprentices' study. We provided 16% of tutorials (1 of every topic) during work hours with the same tutor, with that tutor also providing a tutorial repeated identically in the evening of the same day. The initial findings were that workday tutorials were significantly better attended. We found that where this choice was given 63%-84% apprentices decided to attend during the day.

What are our concerns?

Whilst this time is clearly preferable to apprentices it is not clear if this is only because it is during the day, maybe the evening tutorials were too early. It is also unclear how effectively apprentices can participate, particularly if they are joining from a busy office. We also don't know if this is a response to the particular module and tutor involved.

What are our next steps?

We have proposed an eSTEeM project which will allow us to survey and interview apprentices to better understand their motivations. We hope to use this to inform our provision of tutorials across the apprenticeship programme in computing for 20J module starts. We will also share our results with other apprenticeship programmes in the University.



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

Marina Carter, Richard Mobbs



What is the framework?

The AL collaborative framework is a process facilitated by a staff tutor cluster manager working closely with ALs on a shared forum before and during the module presentation.

Why change the way ALs work?

The Group Tuition Policy provided tutorials shared in clusters but did not set a vision for how these could be co-ordinated. We formed an AL collaborative framework so students can benefit from consistent, coordinated and enhanced support and the sharing of the tuition workload amongst ALs.

Why use forums for collaboration?

A community of practice of ALs is facilitated using OU forums as staff tutors and ALs are familiar with the format. In addition, this integrates messages into the dashboard of tutors allowing them to access information without having to go elsewhere.

Enhancing AL satisfaction?

Active moderation of the forums allows the bond between ALs to develop, to reduce isolation and share the teaching experience, best practices and tuition tasks. ALs are encouraged to use their specific skills and expertise to work together to develop tuition resources, including topic focussed tutorials and to run specialist threads in the student cluster forums. The forums also facilitate the recording of tutorial attendance and assessment submissions to identify trends within the cluster. It is essential that staff tutors take a leading role, including setting up threads such as a student forum posting plan, weekly email rota and tutorial update planning.



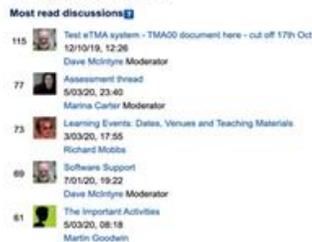
Enhancing student satisfaction?

Students benefit from the expertise of ALs as they can draw on their specialist subject knowledge to provide a comprehensive set of tutorials, including topic focussed sessions. The cluster forums are active from two weeks before module start and ALs provide extra support resources and run specialist threads, such as mathematics and study skills. Working together ensures students receive prompt answers to their questions and ALs can share the workload.

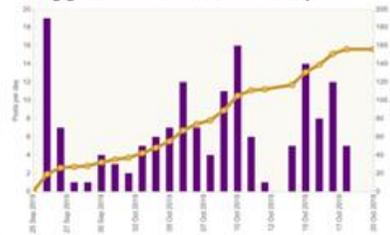
Other benefits of this framework?

As ALs are now working closely together, other initiatives are taking place such as dual presenting of tutorials and the development of video resources. New ALs have positively reported the benefits of working within this framework and feel supported from the outset. Covering for AL sickness and holidays is straight forward. Since 2017, the approach has been adopted for level 1, 2 and 3 Computing modules and has resulted in extremely positive feedback from ALs and students.

TM111 19: Student Cluster Forum showing tutors running specialist threads.



TM111 19: Student Cluster Forum Postings showing engagement in the initial two weeks of study.



TM111 19: Using the tutor expertise to host topic focused tutorials giving more choice to students.

TM111 19: Topic Focused Tutorials	Recording Views
Databases and HCI	74
TMA03 support	60
Programming Part 2	42
Presentation Skills & PDP II	36
Block 3 Networking - TMA03 Support	34
Introduction to Audacity	33
Communication Skills & PDP I	31
Program Design & Algorithms	30

TM255 18: Tutor Cluster Forum in first presentation showing tutor collaboration.

18.1 Tutorial materials - final version	4/05/18, 18:41	Andrew Johnson	18
18.1 Tutorial Attendance - please log attendance here	4/05/18, 18:36	Andrew Johnson	31
18.1 Tutorial materials and planning	30/04/18, 18:22	Marina Carter	88
18.1 Sharing information and asking questions	22/03/18, 14:14	Dave Cleary	6
18.1 Project thread	11/02/18, 12:34	Dave Cleary	10
18.1 Chat thread	4/12/18, 08:37	Ashlan Pullin	11

Evaluating the impact of a qualification-based approach to student engagement and success in engineering study

Alec Goodyear, Sally Organ, Zahra Golrokhi, Maria Kantirou, Carol Morris



Introduction

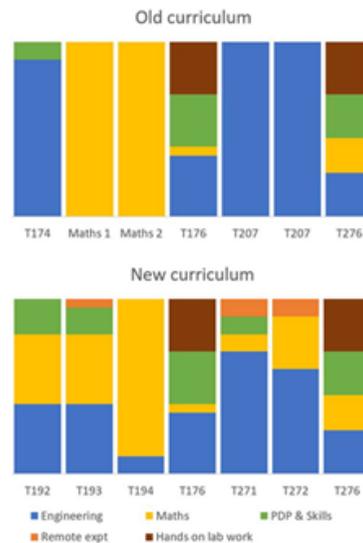
This eSTEeM project considers the impact on student outcomes of a series of curriculum changes implemented from 2016. The main project question is focused on whether, and if so how, a whole qualification approach of designing and developing the various components of the BEng (Hons) (Q65), MEng (M04) and FdEng (X11) degrees has had a positive impact on student success. Student engagement, satisfaction, and depth of learning are recognised as important criteria for student progression through a qualification.

Curriculum innovations

- Integrated mathematics, skills, and professional development for deeper learning
- A strong, explicit, engineering context embedded throughout personal development planning (PDP) and all other aspects of the new modules
- Even distribution of student workload by pacing learning through student activities and assessments
- An innovative and individualised learning log ePortfolio tool that students can use throughout their qualification has been developed.
- Improved student engagement through self-assessment of learning outcomes
- Practical engineering and employability at the core of the qualification design

Reshaping the curriculum

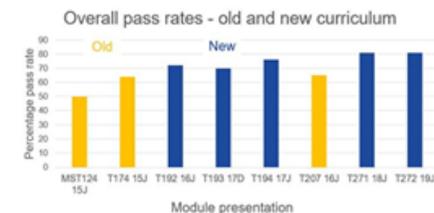
A radical reshaping of our general engineering curriculum in which mathematics skills, pdp and professional skills, remote experimental work, practical laboratory based residential schools, and wider study skills are all integrated into broader core modules that provide context and relevance to students while they are studying engineering topics.



Progression for Q65 & M04 students



Pass rates



- Improved overall success rates for students across all new modules with higher progression

Next actions

Associate Lecturer perceptions and observations of both the old and new curricula will be determined. Individual interviews will capture the tutoring perspective and effectiveness.



Complementary Tuition Initiatives to Support Key Skills Development

Best Practices from a Level 2 Module

Marina Carter and Soraya Kouadri Mostéfaoui



Focus of Research

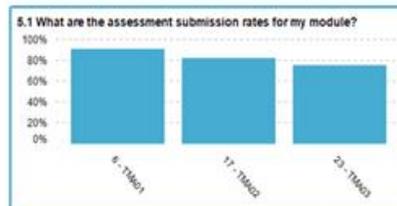
- Investigate the impact of complementary tuition initiatives to support key skills development in TT284.

The Case Study

- TT284: a key Level 2 module in the Computing & IT programmes.
- Over 1000 students per presentation over the last 3 years.
- Requires students to rapidly build on the skills gained from Level 1.
 - Programming.
 - Problem solving.

Issues

- Students struggle with the programming and report writing aspects.
- High number of students requesting extensions to complete TMA02 (the first programming TMA.)
- Significant drop in student retention around the TMA02 submission point.
- Low retention.



Complementary Tuition Initiatives

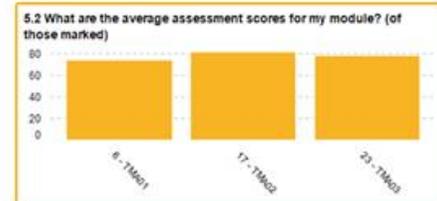
- Topic focussed tutorials into the module tuition strategy.
- Cover key topics that students struggle with, including programming support (JavaScript, PHP and SQL).
- A series of programming Adobe Connect recordings.
- Module wide programming Q&A sessions.

Preliminary results (2019J)

- Tutorial recordings views=1500 in 6 weeks.
- Drop in student complaints about insufficient coding support.
- 30% drop in TMA02 extension requests.

Future Work

- Continue the initiatives for the remaining TT284 presentations.
- Quantitative and qualitative data analyses (SeaM & ALs' surveys.)
- Complement with additional support initiatives: using bitesize programming videos.



Contact: Marina Carter (Marina.Carter@open.ac.uk) and Soraya Kouadri (Soraya.kouadri@open.ac.uk)

Towards Inclusive Language: exploring student-led approaches to talking about disability-related study needs



Kate Lister (IET), Elaine McPherson (EEES), Tim Coughlan (IET), Anne-Marie Gallen (E&I), Vic Pearson (SPS), & Nathaniel Owen (LAL).

CONTEXT: Universities often categorise students as 'disabled' in order for them to access support for their studies, and require them to engage with terms such as 'disclosing a disability' and 'reasonable adjustments'. Many students report that they feel uncomfortable with this; they do not identify as 'disabled' and this can discourage students from informing the university about their 'disability' and can create barriers to accessing support. There is little understanding of how members of these diverse populations identify themselves or their preferences for discussing 'disability-related' support.

1. The aim of this work is to investigate the language that students feel comfortable using when talking about their 'disabilities' and to create and evaluate guidance for university staff around language.

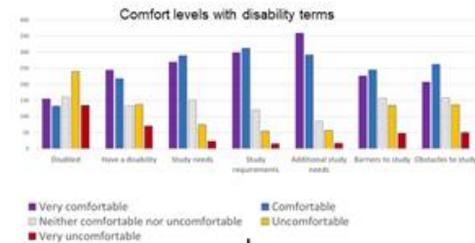
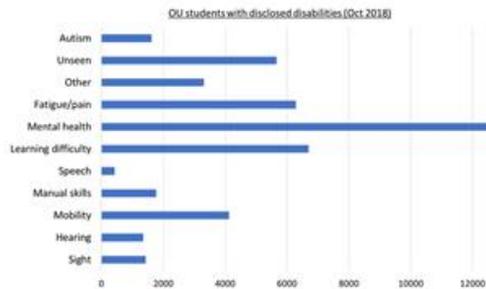
The work was initiated in partnership with the Disabled Students Group. The Disabled Students Group has been involved throughout the subsequent stages of the project.

2. Student Focus Groups

The start of this work was the ASSIST project which utilised a mixed methods approach to investigate students' perspectives of language. This combined a qualitative approach using discourse and positioning analysis techniques to investigate the language students use.

3. Student Survey Results

The term 'disabled' was uncomfortable for many; 'additional study needs' was preferred. There was a divergence in preferences across contexts) rather than a consistent preference for a single language model.



6. Closing the loop with students

The final phase of this project involves a further round of feedback from students themselves before the guidance is distributed and training opportunities offered.

5. Evaluating the Draft Guidance

The first evaluation phase took the form of a workshops with a wide range of stakeholders across the Nations and the Student Support Teams. Feedback was gathered and used to improve the draft guidance documents.

4 Creating Guidance Materials

As part of the IncSTEM project, results from the Student Focus Groups and Student survey were used to create two draft guidance documents for student facing staff, and for researchers and policy-makers to use when talking to students about disability. Guidance for students was also developed to explain the type of language commonly used by universities around disability. Changes were also negotiated for some student-facing communications (websites, disability support form, etc.)



Lister, K., & Coughlan, T., (2018) Student perceptions of the language of disability, deficit and empowerment, in Proceedings of the fifth Widening Participation Conference. Open University. <http://oro.open.ac.uk/58832/>



Online Journal Clubs: an innovative opportunity to develop skills and community

Fiona Moorman, Karen New and Kate Fox

Why Online Journal Club (OJC)?

Often coming to The Open University (OU) with non-standard educational experiences and qualifications, there had been concerns that some students lacked confidence / skills associated with digital and information literacy and studying in an online environment.

Internal studies had suggested that student attendance in online tutorials was decreasing and, where students attend, there was a reluctance to fully participate (e.g. using microphones) (Butler et al, 2019).

Coupled with few opportunities for face-to-face tutorials, we were concerned that there were fewer opportunities for rich peer-peer online interaction, with the potential for increased sense of isolation and lower student satisfaction.

This project aimed to provide student OJC to attempt to develop online / digital skills, build online confidence and develop an academic community.

What is OJC?



Whilst there is no single type of OJC event, the common feature is that a small group of students come together in Adobe Connect, to each provide a short presentation on something of relevance to their study / interests, in the presence of an OJC facilitator. Presentations might range from a discussion of a piece of primary literature to recent items from mainstream news

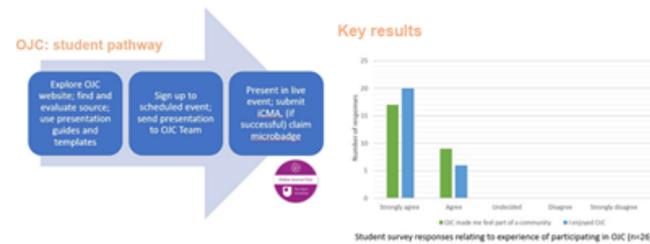
Hosted on a dedicated moodle platform, accessible to students and colleagues across the University, the OJC website (<https://learn1.open.ac.uk/course/view.php?id=100179>) serves as a 'one-stop shop' to support skill development and preparation for clubs (including guides, links to resources, a dedicated Adobe Connect room for OJC events and a forum space).

In this project, clubs were advertised on forums and on the library website and were run intra-module, -level, -qualification and cross-disciplinary. Participation was optional and events were not recorded or assessed. The role of facilitator was to



support ICT use and ensure smooth running of events (i.e. although all facilitators were experienced associate lecturers, their role was not to provide 'tuition').

OJC participants who also successfully completed an iCMA could claim a microbadge, to add to their electronic skills portfolio.



- Between 20.12.18 and 19.09.19, 945 individuals accessed website at least once
- The OJC demonstration recording was viewed by 48 individuals, 44 of whom were students (staff directly involved with OJC were excluded)
- Although use of forum was optional, there were 135 posts across 18 threads, 25 students posted on the forum
- Approximately 25% of all student presenters had a disability marker
- Fewer male students than females signed up (27% versus 73%, but of those who expressed an interest, a greater proportion of male students followed the whole OJC pathway
- All OJC participants successfully claimed a microbadge

Conclusion

We believe that OJC not only provides a low-risk mechanism to increase student confidence / skills in Adobe Connect, finding, evaluating and presenting information, but also provides a space for students to come together as a community.

OJC events have been included in early-start initiatives and module tuition strategies in some LHCS modules. They have been adapted for use for Students in Secure Environments. OJC events have also been extended to be available to colleagues and have been added to the STEM-ByALs-ForALs programme.

To see ourselves as others see us* The gift of insight from visiting scholarships

Mark Endean, Duncan Banks, Tom Olney, Daphne Chang, Luo Juan & Yin Shangjing




Visitors come from the distance learning sector in China for up to one year. They are drawn to the OU because of our reputation as global leaders in ODL. They spend their time investigating our approach to an aspect of ODL and specifically to compare our practice with that of others. We provide them with desk space, network access and a supervisor.



Many of our scholars come from The Open University of China. OUC has 4 million registered students.

An eSTeEM-funded project (Endean & Chang) following up former scholars revealed the profound influence the OU has had on a number of distance education communities in China.

Jessie came to find out how we catered for older learners. OUC has specific provision for learners over 60. Reflecting the different situation in the UK, she also looked at U3A.

Juan wanted to experience the way we work in teams, developing and presenting modules. Comparable teamworking is a challenge for many other institutions worldwide.

Our most recent visitors



Dr Yin Shangjing (Jessie) is a gerontologist and Lecturer in the OUC School of Medicine.



Luo Juan is Director of the Office of Academic Affairs (Admissions) in Secondary Vocational Education at OUC.

Juan took part in workshops, conducted interviews and carried out a survey. She found:

- OU staff believe that communication is the key to effective team working
- email is still most widely used but other tools are taking over
- communication within the team is considered highly effective but less so with other units
- staff are always searching for opportunities for improvement.

Jessie established through data analysis and interviews:

- over 5500 OU students are over 60 years old
- 4.8% of OU Level 3 students are over 60
- humanities and social sciences dominate the subject choices of older OU students
- digital photography the most popular module
- informal learning (U3A and OpenLearn) are important to the elderly and their communities.

Jessie feels strongly that China can learn from the UK by increasing the choice of subjects available to the elderly and encouraging them to work towards qualifications.

In addition Juan was deeply impressed by what she discovered in OU staff, and UK citizens more generally, that: 'they look for meaning in their work and they care for others'.





The OU centre for STEM pedagogy

*With apologies to Robert Burns

An equal experience for all students? An analysis of continuous assessment and exam performance on a second level biology module.

Karen New, Martin Bootman and Duncan Banks, School of Life, Health and Chemical Sciences



Introduction

A review published by Richardson in 2008 outlined known relationships between gender, ethnicity, and academic attainment in UK higher education. A recent update by the same author (Richardson et al., 2020) showed that there are persisting inequalities in both participation and attainment based on gender, social class, and ethnicity.

Gender imbalances in the sciences have been reported for many years, and whilst physics, engineering and computer sciences remain male-dominated, the literature suggests that biological sciences are approximately gender balanced. Nonetheless, this does not mean that disparities do not exist.

Is there a gender difference in attainment in Biology? Does the type of assessment influence performance between the sexes? Do BAME and non-BAME students do equally well? This poster attempts to answer these questions.

Methods

In this poster we present a preliminary meta-analysis of data from 16J cohort of the legacy second level biology module SK(YN)277 *Human Biology*. The analyses explore student behaviour and attainment related to the continuous assessment and examination components of SK(YN)277. Statistical analysis of the results were performed using GraphPad Prism 8.4 (one-way ANOVA, unpaired t-tests, two-tailed P values).

Results

- BAME vs non-BAME students: there was a significant difference for score achieved in the exam questions on data handling ($P < 0.0001$; non-BAME $n = 838$, mean = 67.72; BAME = 111, $n = 471$, mean = 57.20).
- BAME students' scores were significantly lower on either of the exam essay questions (Q1, $P = 0.04$; $n = 66$, mean = 61.62) compared to non-BAME students ($n = 471$, mean = 68.15). This was also the case for the other exam essay question (Q2, $P = 0.001$, BAME students, $n = 46$, mean = 49.63; non-BAME $n = 370$, mean = 60.88).
- BAME students' OCAS was significantly lower ($P < 0.0001$; $n = 113$, mean = 61.33) than non-BAME students ($n = 840$, mean = 69.76).
- BAME students' OES was significantly lower ($P < 0.0001$; $n = 113$, mean = 54.56) than non-BAME students ($n = 840$, mean = 62.51).
- When comparing genders, there was no significant difference in OES ($P = 0.77$) for males ($n = 207$, mean = 63.43) and females ($n = 758$, mean = 61.06).
- In exam short answer questions, males ($n = 206$, mean = 59.94) scored significantly higher ($P = 0.004$) than females ($n = 756$, mean 55.78). Males were also more likely to act strategically when deciding not to submit all their TMAs and performed better at data handling questions ($P = 0.02$; males $n = 206$, mean = 69.18; females $n = 755$, mean = 65.77).
- For students with a disability (D) marker, female students' scores were significantly lower on OCAS ($n = 128$, mean = 65.05) compared to females without a D marker ($n = 630$, mean = 69.64). However there was no significant difference between males with/without disability markers ($P = 0.07$, with, $n = 37$, mean = 64.24; without, $n = 170$, mean = 69.44).

Discussion

Biological sciences may, for some students, be perceived as a 'softer' science, with limited need for maths skills. However, calculations and data handling skills are vital for professional biological scientists, and those working in health/medicine. Historically, there have been differences reported in performance in assessment tasks, with females tending to perform better in essay-type questions and males performing better in data handling/multiple choice questions. However, there is limited exploration of whether this is the case within a tertiary setting, in Biology and even less within distance education.

Conclusion

The data presented here suggests that BAME students are performing less well than their non-BAME peers in data handling, essay writing and overall performance in examinations and continuous assessment. For gender, there was no significant difference overall between male and female students in their OES but when results were broken down by question type males outperformed females in short answer and data interpretation exam questions.

The apparent inequalities in module performance highlighted here are worthy of further analysis to explore whether there is a systemic issue with module presentation and assessment.

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- Richardson, J. T. E. (2008). Degree attainment, ethnicity and gender: a literature review. York, UK: Equality Challenge Unit, Higher Education Academy. <http://oro.open.ac.uk/id/eprint/11535> [Accessed 24 April 2020].
- John T. E. Richardson, Jenna Mittelmeyer, Bart Rienties, (2020). The role of gender, social class and ethnicity in participation and academic attainment in UK higher education: an update. *Oxford Review of Education*. DOI: 10.1080/03054985.2019.1702012 <https://www.tandfonline.com/doi/abs/10.1080/03054985.2019.1702012?abn=emissions&scrolltop> [Accessed 24 April 2020].

