ESTEEM
THE OU CENTRE FOR
STEM PEDAGOGY

The Open University

The 11th eSTEeM Annual Conference 2022

Scholarship Success Stories – Innovation Through Community

Conference Booklet

11th May – 12th May
Via MS Teams

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ACKNOWLEDGEMENTS

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PROGRAMME – DAY 1

Wednesday 11th May 2022

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	Trevor Collins and Mark Jones, eSTEeM Directors		
11.10-11.15	**Welcome Address**		**Hub Lecture Theatre**
	Nicholas Braithwaite, Executive Dean, STEM Faculty		
11.15-11.45	**Day One Opening Keynote Presentation**		**Hub Lecture Theatre**
	David White, Head of Digital Education and Academic Practice, University of the Arts London You can't repeat the past: Community and placemaking in the distributed university		
11.45-12.00	**Break and Posters**		
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Chair: David Sharp	Louise MacBrayne, Jennie Bellamy, Elaine McPherson and Angela Richards	Black student experience on S112: improving a Level 1 STEM module	
	Andrew Potter, Diane Butler, Clem Herman, Nicole Lotz, Daphne Chang and Peter Wood	STEM Inclusive Curriculum Project	
	Fidele Mutwarasibo, Tracie Farrell, Miriam Fernandez, Martin Hlosta and Vaclav Bayer	Closing the Awarding Gap	
12.00-13.00	**Parallel Session B: Short Oral Presentations – Supporting Students & Assessment and Feedback**		**Room B**
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	Karen Kear, Helen Donelan and Jon Rosewell	Synchronous Online Learning: Addressing the Challenges of Student Engagement	
	Jenny Duckworth and Harriet Kopinska	Tutor and student experiences of marking grids for assessment on a Level 3 interdisciplinary module	
13.00-14.00	**Lunch**		
14.00-15.00	**Parallel Session C: Short Oral Presentations – Academic Community, Employability and Supporting Students**		**Room A**
Chair: Julie Robson	Cath Brown and Susan Pawley	Building a sense of community through social activities on MST124	

	Janet Haresnape	Employability skills gained through engagement with practical investigations	
	Martin Braun, Ian Bates, Keith Carter, Joanne Holford and Katherine Kirk	Investigating how to enhance the idea generation process for academic projects by engineering students	
14.00-15.00	**Parallel Session D: Workshop/Demonstration – Equality, Diversity and Inclusion**		**Room B**
	John Butcher and Rehana Awan	How do we talk about race and mental health?	
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15.15-16.15	**Innovation Through Community: A Panel Conversation**		**Hub Lecture Theatre**
Chair: Mark Jones	This session will explore innovation in teaching and learning through the experiences of several established eSTEeM project leaders. The focus of this session will be to reflect on the interactions within and between stakeholder communities in fostering innovation, carrying out scholarship, and in driving impactful change of practice. Panel members will offer their reflections on how various communities enable effective scholarship and suggest ways in which we may strengthen collaborations, enhance interactions, and further develop a shared sense of common purpose.		
16.15-16.45	**Afternoon Tea and Networking** Colleagues are invited to join other conference delegates to reflect on day one and look ahead to day two.		**Medlar and Juniper**
16.45	**Close of Day One**		

PROGRAMME – DAY 2

Thursday 12th May 2022

Time	Session		Online Room
9.45-10.00	**Registration and Coffee** Grab a cuppa and have a chat with colleagues before day two of the conference commences		**Medlar and Juniper**
10.00-11.20	**Parallel Session E: Short Oral Presentations – Supporting Students & Assessment and Feedback**		**Room A**
Chair: Sally Jordan	Rachel Hilliam, Carol Calvert, Emma Steele and Di Haigney	Statistical anxiety: will qualification focussed student support help?	
	Cath Brown and Catherine Halliwell	Extensions - student use, impact, and implications	
	Chris Gardner, Michael Bowkis and Alexis Lansbury	Early Start for TM470 project students	
	Karen New and Fiona Moorman	L markers on TMAs: better late than never?	
10.00-11.20	**Parallel Session F: Short Oral Presentations – Technologies for STEM Learning, Equality, Diversity and Inclusion & Learning Design**		**Room B**
Chair: Jonathan Nylk	Ann Grand, Sarah Davies, Trevor Collins and Eileen Scanlon	Alternative fieldwork, "real-world" communities	
	Mustafa Ali, Magnus Ramage, Zoe Tompkins, Steve Walker, Ray Corrigan, Clem Herman and Andy Hollyhead	Milestones and Challenges in Decolonising Computing	
	Mark Hall and Soraya Kouadri	Infrastructure for an Online Computing Lab	
	Tom Olney, Carlton Wood, Anne Higson and Alison Edwards	Evaluating the Impact of Implementing Learning Design Approaches in STEM over 4 Years (July 2017 – July 2021)	
11.20-11.35	**Break and Posters**		
11.35-12.35	**Parallel Session G: Short Orals Presentations – Equality, Diversity and Inclusion**		**Room A**
Chair: Frances Chetwynd	Susan Pawley and Sally Organ	Exploring the extent of maths anxiety within the STEM faculty	
	Lisa Bowers, Elouise Huxor and Theo Philcox	AL Disability Champions; Reflections and actions of a peer-peer disability support group	
	Nicole Lotz and Muriel Sippel	Embracing the voices of the marginalised learners with a declared mental health disability	
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	Trevor Collins	Birds of a Feather Conversations:	

		Generating New Project Ideas	
12.35-13.30	**Lunch**		
13.30-14.00	**Day Two Closing Keynote Presentation**		**Hub Lecture Theatre**
	Cate Cropper, Lecturer, Central Teaching Laboratory, University of Liverpool The importance of Community in developing the delivery of online labs during the COVID-19 Pandemic		
14.00-14.15	**eSTEeM Scholarship Projects of the Year and Best Interactive Poster Presentation Awards followed by Closing Remarks by Kevin Shakesheff, Pro Vice Chancellor, RES**		**Hub Lecture Theatre**
14.15	**Conference Close**		

WELCOME AND INTRODUCTION

Welcome to the 11ᵗʰ annual eSTEeM Conference titled *Scholarship Success Stories – Innovation Through Community*. Our aim for this year's conference is to bring the eSTEeM community together to share and celebrate the successes of our scholarship and reconnect as a community of scholars. As we emerge from the pandemic, our working practices have changed significantly. The benefits of flexible home working are causing us to rethink how we coordinate and connect with one another through online or hybrid events.

With the theme of community in mind, we have invited two keynote speakers to challenge and inspire us: David White, Head of Digital Education and Academic Practice at the University of the Arts London, will give the Opening Keynote and share his insights on community and placemaking, and the opportunities these bring for distributed universities like the OU; and Cate Cropper, Lecturer at the Central Teaching Laboratory at the University of Liverpool, will present the Closing Keynote, which will focus on the role that communities played for staff and students across the UK when developing and delivering online labs throughout the pandemic.

Trevor Collins

To complement the Keynotes, we are hosting a Panel Conversation at the end of the day one and a set of Birds of a Feather Conversations before lunchtime on day two. Holding this year's conference online enables more colleagues to participate than at a place-based event, but without some facilitation the opportunities for interesting conversations can be limited. We hope that these two sessions will seed and encourage further conversations among all the delegates that offer insights for our teaching and inspiration for future projects.

This year's programme also includes twenty short oral presentations and one workshop, grouped in two parallel strands across two days. Organised thematically, the sessions will focus on: Academic Community; Assessment and Feedback; Employability; Equality, Diversity and Inclusion; Supporting Students; and Technologies for STEM Learning. We also have a collection of six online posters, and we will award a best poster prize, so please make sure you get a chance to review them and vote for your preferred poster. This year we will be joined by Kevin Shakesheff, Pro Vice Chancellor for Research, Enterprise and Scholarship, at the end of the conference

to award the Project of the Year prizes and give his Closing Remarks.

Mark Jones

Sharing our scholarship and constructively critiquing our teaching and learning practices enables us to believe in the quality of our support to students and to one another. We hope you will find the conference programme insightful and enjoyable.

Trevor Collins and Mark Jones, eSTEeM Directors

DAY ONE OPENING KEYNOTE SPEAKER BIOGRAPHY

David White
Head of Digital Education and Academic Practice, University of the Arts London

David White is the Head of Digital Education at the University of the Arts London, President of the Association for Learning Technology and a Principal Fellow of the Higher Education Academy. He is best known for the Digital Visitors and Residents idea which provides a framework to explore modes of online engagement. David is a keen advocate for Open Educational Practices and a well-known thinker in online education. You can find out more about him and his work at daveowhite.com or follow him as @daveowhite in Twitter.

DAY TWO CLOSING KEYNOTE SPEAKER BIOGRAPHY

Dr Cate Cropper
Lecturer, Central Teaching Laboratory, University of Liverpool

Cate is a chemistry lecturer based in the Central Teaching Laboratories at the University of Liverpool. She is committed to the continuous improvement of student and staff experience through her role as student voice coordinator within the Department of Chemistry. Cate received a CATE award in 2016 for her collaborative work within the CTL to improve employability of students and continue to develop collaborative initiatives with other departments across the university, with industry and with other institutions.

CONFERENCE INFORMATION

Conference Programme
To join the online conference which will take place in Microsoft Teams, please visit the eSTEeM & Co website at the following link – https://bit.ly/esteem-and-co. It may be useful to bookmark this page as this is the link you will need throughout the conference. If you become disconnected from a MS Teams call at any time, make your way back to the eSTEeM & Co website to find all the links you need. Please click on the conference programme for the relevant day and select the link for the required session.

If you do not already have the Teams app installed on your computer, upon clicking the link you will be asked whether you wish to 'Download the Windows app' or 'Join on the web instead', we would recommend that you install and use the app version which will allow you access to all of the features within Teams.

Interactive Poster Presentations – watch now and vote!
Poster presenters were again invited to pre-record an interactive poster presentation up to a maximum of 2 minutes. Recordings are available to watch now via the eSTEeM & Co website allowing conference delegates to watch and vote at their leisure. Voting will close at **13.30 on Thursday 12th May**. The winning poster will be announced at the end of the conference on Thursday 12th May between 14.00-14.15.

Registration and Coffee
Between 10.45-11.00 on Wednesday 11th May, and between 9.45 and 10.00 on Thursday 12th May, conference delegates are welcome to grab a tea or coffee and meet with other delegates and have a chat before the conference gets underway.

Session etiquette and networking
We respectfully ask all delegates to mute their microphones and switch off their cameras during the sessions when you are not speaking. You may also wish to set any mobile phones/devices to silent. Do not forget to set your status to 'Do Not Disturb' in Skype for Business, especially if you are presenting.

Social Media
You can also get involved with the discussions throughout the conference via Twitter @OU_eSTEeM using #eSTEeMConf22

Helpdesk
eSTEeM conference staff will be available throughout the conference to help you with any queries that you may have. There will be a member from the conference team based in the Medlar and Juniper online room, but they can also be reached by emailing esteem@open.ac.uk.

Conference Breaks and Afternoon Tea
Please feel free to use the Medlar and Juniper room during the coffee/tea breaks as a social space between sessions throughout the conference. Don't forget to join us at the end of day one between 16.15 and 16.45 for afternoon tea and networking.

Recording and publicity

Please note that the conference sessions will be recorded and made available as replays via the eSTEeM Conference website to OU staff shortly after the event. Conference staff may also capture images from the sessions for further dissemination via the eSTEeM website and social media channels. Audience members are participants in this process. If you have any concerns, please contact esteem@open.ac.uk.

eSTEeM Scholarship Projects of the Year Awards

We will be announcing the 5th eSTEeM Scholarship Project of the Year Awards which celebrate excellence in eSTEeM projects. The winners will be announced by Kevin Shakesheff (Pro Vice Chancellor, RES) at the end of the conference between 14.00-14.15 on Thursday 12th May.

Session changes

We will try to keep any session changes to a minimum but inevitably there may be some last-minute changes or cancellations. Any information about changed or cancelled sessions will be added to the programme on the eSTEeM & Co website.

Feedback

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

BOOK OF ABSTRACTS

Day One Opening Keynote Presentation

You can't repeat the past: Community and placemaking in the distributed university

David White
University of the Arts London

There has been much discussion of 'what we should keep' from our experiences of teaching and scholarship during the pandemic. However, this approach implies an immutable version of 'university' which can always be extended. In this talk I will argue that, much like the Great Gatsby, we can't repeat or recreate the past but must collectively develop new modes of working and connecting. To this end, I will propose methods of placemaking and facilitating community which do not draw on building-based paradigms. Methods which unapologetically lead with the digital, and positively reposition the value of our physical estate in an era where 'online' is the primary location for scholarly activity.

Parallel Session A: Short Oral Presentations – Equality, Diversity and Inclusion

Black student experience on S112: improving a Level 1 STEM module

Louise MacBrayne[1], Jennie Bellamy[1], Elaine McPherson[1] and Angela Richards[2]
STEM Faculty[1], STEM and WELS Faculties[2]

It is now well known that there is an awarding gap between Black and White students' outcomes at the Open University, and indeed HE sector-wide. The gap exists at qualification and module level, and for outcomes (for example the degree class awarded) and rates of completion and progression.

The Open University's Access, Participation and Success Strategy details the University's strategic approach to supporting students from underrepresented and disadvantaged backgrounds to access HE and achieve equitable outcomes. Data for the module S112, Science Concepts and Practice, seems to indicate that pass rates for Black students are much lower in comparison to white students and students from other ethnicities, despite completion rates closer to the rest of the cohort.

There were two overarching research questions:

- What are the needs of Black students in S112 and barriers in S112 to their study?
- What reasons could be influencing the exam performance of Black students in S112?

This presentation will report preliminary findings from an eSTEeM funded project with four main aims: -

- To develop understanding of issues faced by Black students throughout S112 module presentation, including a focus on the revision period leading up to and including the exam.
- To raise awareness of these issues amongst STEM staff including tutors, tutor and student support staff, and module teams.
- To consider how S112 tutors could adapt their tuition practice to respond to Black students' needs throughout the module presentation as well as to support exam preparation and practice.
- To consider module wide interventions (including module material modification and changes to assessment strategy and tuition) to support and improve Black student experience and success on S112.

These findings aim to include key outputs from an online focus group run in December 2021 in which former S112 Black students were invited to informally share their own experiences of studying S112 and whether they experienced any specific difficulties or barriers (including in relation to assessment and the exam). The presentation will also present initial findings from an intersectionality study performed to consider any relationships between ethnicity and other HEA descriptors such as 'first in family' factors, caring responsibility, PEQ and socio-economic status with respect to module pass rate.

It is anticipated than longer-term outcomes from dissemination of these outputs will include developed understanding amongst tutors (and others who support students) of the needs of

Black students, increase representation of Black scientists in module content, and more inclusive tuition practice. This should help develop tutors' confidence and ability in supporting this student group which should have a positive impact on students' experiences and performance including fostering a greater sense of belonging for the Black student demographic. Findings may also help identify training needs for tutors and others who support students.

Aims of the session: -

- To raise awareness of the existence of the university's awarding gaps, in particular that on S112 for our Black students.
- Enable participants to apply our project findings to their work with Black students and/or their module development.

STEM Inclusive Curriculum Project

Andrew Potter[1], Diane Butler[1], Clem Herman[1], Nicole Lotz[1], Daphne Chang[1] and Peter Wood[2]
STEM Faculty[1], FASS Faculty[2]

The Inclusive Curriculum Tool – developed by the Access, Participation and Success Team in collaboration with academic, support and professional staff across the university – is a tool which supports practitioners in evaluating and improving the inclusivity of learning materials. The tool consists of a series of prompts that practitioners can use as a lens to analyse whether diverse student experiences are represented in module materials. It is hoped that, by creating a more inclusive curriculum, that we contribute to tackling the awarding gaps which disadvantage students from under-represented groups.

In the STEM Faculty, we recruited a diverse pool of Associate Lecturers to pilot the Inclusive Curriculum Tool to review the module materials of 14 modules in presentation from across different Schools. We were particularly interested in using and evaluating the tool as applied to STEM subjects, where assumptions about the content and context of learning can be different to other discipline areas. At the end of this first phase, the Associate Lecturer reviewers fed back to module teams the good practice and opportunities for improvement that the Inclusive Curriculum Tool helped them identify. We were keen to embrace the voices of minoritized and marginalised people in our approach, and as such, asked each Associate Lecturer to keep a reflective journal to record the impact that going through the process had on them as individuals and as teaching practitioners.

This short oral presentation will summarise the key findings from Phase 1 of the Inclusive Curriculum Project. We will share common inclusivity issues identified in module materials, explore the transformative learning experience that undertaking a review had on the AL reviewers, and give practical suggestions for module teams and Associate Lecturers for improving the inclusivity of their teaching practice.

Closing the Awarding Gap

Fidele Mutwarasibo[1], Tracie Farrell[2], Miriam Fernandez[2], Martin Hlosta[2] and Vaclav Bayer[2]
FBL Faculty[1], STEM Faculty[2]

The OU has an awarding gap for Black students that is significant and potentially growing. In fact, it is higher than the predicted percentages documented in the Closing the Gap report. This is a critical equality and student support issue that requires investment and reflection to resolve. In our eSTEeM project, we looked more deeply into the awarding gap in Science, Technology, Engineering and Maths (STEM) at the OU, using both computational and qualitative studies. In particular, we explored the potential of learning analytics (called OUAnalyse at the OU) to surface new information about where the awarding gap is originating and what we might do to mitigate it. We showed evidence of the awarding gap from OUAnalyse to Black students and diverse educators at the OU. We recorded their responses to this data and how they felt about its utility to shed new light on the awarding gap. We then compiled their responses into five major themes that Black students and diverse educators feel are relevant to closing the awarding gap at the OU. In this presentation, we will be sharing those themes and inviting responses to this work regarding the next steps that should be taken to action some of the points brought up by students and staff.

Parallel Session B: Short Oral Presentations – Supporting Students & Assessment and Feedback

Improving students' engagement with Python

Gemma Warriner and Andy Diament
STEM Faculty

SM123: Physics and Space is a Level 1 module aimed at preparing students to study physics, astronomy or planetary science at OU level 2. One issue students face is getting to grips with programming In Python, taught in four study weeks spread across the presentation. Learning to write code and think algorithmically for the first time, can cause anxiety, evidenced in feedback from previous presentations. To delve deeper into the reasons that students had difficulty, we developed a project looking at engagement with Python on SM123. We used two surveys to ask students about their experience in studying Python and how it compared with the rest of the module. We had 55 students complete our first questionnaire and 87 complete the second out of a possible 538.

We found that students typically had no prior experience of programming. A sizeable proportion reported difficulties with Python, including lack of time and insufficient guidance from the module materials. Responses to the second questionnaire indicated that this was not isolated to the first Python week but continued in the later Python weeks, so that progressively more students gave up on Python throughout the module. Some students reported that they found the learning experience very stressful. We were able to identify which particular activities and content students struggled with, which other resources they were using and their own views on what might help. It was apparent that students were spending a lot of time searching the internet to help with their studies.

One output from our project was that the in-house resource, Python for Physical Sciences website was updated in time for the 21J Presentation, to better support SM123 students before and during the module. The site now has a new section aimed at SM123 students, with embedded pdfs of guidance and additional activities. The expanded website has been retitled as "Programming for Physical Sciences". News about the updates were disseminated to colleagues and links were put on the SM123 website within the Python week information on the Study planner. An email was sent to all prospective 21J students highlighting the Python content. Links were given to the "Are You Ready For" activity and the updated "Programming for Physical Sciences".

This presentation will detail some of our findings, how they were used in the website update and further actions that we hope will be put into place in the future, to enhance student experience and to support student engagement and retention.

Synchronous Online Learning: Addressing the Challenges of Student Engagement

Karen Kear, Helen Donelan and Jon Rosewell
STEM Faculty

Online synchronous tutorials are an important part of the OU's tuition strategy and have recently been vital in replacing face-to-face tutorials during the pandemic. However, there are challenges which need to be addressed (Rogers et al., 2019). The most significant of these is a lack of active participation by students. Even at the OU, where tutors are experienced in running online tutorials, previous research has shown that tutorials tend to be didactic in nature, and interactive elements are often not used (Butler et al., 2018). Students' unwillingness to use audio or video channels is one factor, which denies tutors the non-verbal cues intrinsic to face-to-face teaching (Wang et al., 2018).

There is a need to address two related challenges: designing tutorials which have active learning built in; overcoming students' inhibitions regarding active participation. Our pan-university scholarship project, 'Synchronous Online Learning: Addressing the Challenges of Student Engagement', is therefore investigating these issues across all OU faculties.

A considerable amount of relevant work has already been done within the OU through scholarship projects, e.g., Crisp et al. (2019); Mackie et al. (2020); Jones and Gallen (2016). These studies, and others, highlight that achieving active student engagement in online tutorials is an ongoing issue.

Our project addresses the following research questions:

- To what extent do the challenges of student engagement vary across faculties?
- What are the factors affecting student engagement in online tutorials?
- How can these challenges be addressed?

We have collected quantitative and qualitative data via a large-scale online survey of students across the university, to gain an understanding of students' experiences and views. For example, what value do students place on active participation? What kinds of activities do they find engaging? What do they find off-putting? How do these aspects relate to students' conceptions of learning?

This conference session will introduce these ideas and present data from the cross-university student survey. We will invite discussion of the issues and findings with participants. We particularly welcome participation from the many OU colleagues who have investigated these issues previously, in order to share our findings and experiences.

References:

Butler, D.; Cook, L.; Haley-Mirnar, V.; Halliwell, C. and MacBrayne, L. (2018) Achieving Student Centred Facilitation in Online Synchronous Tutorials. In: Towards Personalized Guidance and Support for Learning, 76–82.

Crisp, L., with Bailey, M., Lavery H., Robson, J., Smith, D., and Smith, K. (2019) 'Understanding the influence of demographics on attendance and access of synchronous and asynchronous online tuition'

Jones, M.H. & Gallen, A-M. (2016) Peer observation, feedback and reflection for development of practice in synchronous online teaching, Innovations in Education and Teaching International, 53:6, 616-626,

Mackie, R., Hynd, M., Padley, S., Sheperd, J., Sharman, M. and Voigt, A. (2020) 'Investigating tutorial attendance on synchronous face-to-face and online classroom events on Arts modules'. Rogers, K., Thomas, C. & and Holmes, H. (2019) 'Active learning in synchronous online tuition: increasing student interaction'

Wang, Q., Huang, C., and Quek, C. L. (2018) Students' Perspectives on the Design and Implementation of a Blended Synchronous Learning Environment. Australasian Journal of Educational Technology 34(1).

Tutor and student experiences of marking grids for assessment on a Level 3 interdisciplinary module

Jenny Duckworth and Harriet Kopinska
STEM Faculty

Assessment criteria need to be clear so that they can be applied consistently by markers and interpreted by students. Whilst the provision of feedback (e.g., Hattie and Clarke, 2018) and grading of assessment (e.g., Bloxham et. al. 2016) are relatively well studied, there have been few comparative studies on tutor experience of applying assessment criteria to written assignments and student experience of interpreting them.

Interdisciplinary modules can present a unique assessment challenge as they represent the coming together of different disciplinary cultures (Jessop & Maleckar, 2016). Here we focus on the Level 3 interdisciplinary module 'Environment: responding to change' (SDT306), which uses criterion-based marking according to learning outcomes (LOs). Tutors provide assessment feedback in the form of marking grids containing a detailed breakdown of the criteria relevant for each LO. The grids are designed to facilitate application of LO grading scales and to enable parity between tutor mark allocations, whilst giving constructive feedback to students around LOs. However, tutors have reported challenges in applying the criteria consistently, whilst student perception of the grids is unknown, which led to our research question: "How do students and tutors use the marking grids on this module and what is their experience of this approach?"

We used a mixed methods approach to collect quantitative and qualitative data on how tutors use the marking grids to apply criteria and award marks, and how students interpret the grids and apply them to their learning. Online surveys involving Likert scale and free text questions were completed by students from the current module cohort and tutors supporting them. These were followed up by more detailed interviews with a subset of students and tutors.

In this presentation we will outline our approach, report on the preliminary findings and discuss their implications. This analysis will give an insight into student and tutor perspectives on the use and interpretation of marking grids, which will enable the approach to be tailored for the module to give greater clarity and ease of use and interpretation. Our findings could also have wider applicability to other modules using criterion-based marking in other STEM disciplines.

References:

Bloxham, S., den-Outer, B., Hudson, J. and Price, M. (2016) 'Let's stop the pretence of consistent marking: exploring the multiple limitations of assessment criteria', Assessment & Evaluation in Higher Education, 41(3), pp. 466-481. doi: 10.1080/02602938.2015.1024607.

Hattie, J. & Clarke, S. (2018) 'Visible Learning: Feedback' London, Routledge.

Jessop, T. and Maleckar, B. (2016) 'The influence of disciplinary assessment patterns on student learning: a comparative study', Studies in Higher Education 41(4), pp. 696-711. doi: 10.1080/03075079.2014.943170

Parallel Session C: Short Oral Presentations – Academic Community, Employability and Supporting Students

Building a sense of community through social activities on MST124

Cath Brown and Susan Pawley
STEM Faculty

A strong sense of community amongst learners has been shown to contribute to development of resilience (Barber et al (2019), attainment ((Cançado et al (2018)) and retention (Foster et al (2012)). However, from NSS data, many OU Mathematics & Statistics students do not appear to feel part of a community (53.2% positive response), but their social media activity indicates significant numbers of students value communities.

In this project, we are aiming to create a sense of community amongst students on MST124. This has both the direct aim of enhancing the student experience, and also the indirect aim of improving retention and success, not just within MST124 but in their studies going forward.

This builds on a number of initiatives elsewhere in the OU, including the general interest events run by the Open Programme in 2020 (Cooke, H 2020), the co-curricular visits developed for Design students (Lotz and Holden, 2020) and the online journal clubs for Biology students (New and Moorman, 2020)

Our approach is to run social activities, such as quizzes, games and talks. These will entail students interacting in small groups synchronously, but in a non-threatening way, and with enjoyable activities to carry out to remove the potential for awkwardness for less outgoing students. The types of activities are being kept under review and informed by student focus groups.

We are planning to monitor the effectiveness of the programme using student questionnaires alongside an analysis of demographic and academic data on participants.

Whilst this project initially focuses on MST124, as a module where it is considered that students would particularly benefit from an enhanced sense of community, the longer-term intention is to take the learning from this project and extend it further to other modules within mathematics, and other areas of STEM.

References:

Barber, W., van Oostveen, R. and Childs, E (2019), Situating Resilience, Grit and Growth Mindset as Constructs of Social Presence in the Fully Online Learning Community Model, ECEL 2019 18th European Conference on e-Learning. Available online: - https://books.google.co.uk/books?hl=en&lr=&id=ZMjBDwAAQBAJ&oi=fnd&pg=PA65&dq=community+growth+mindset&ots=NNKXoZWbGR&sig=BJrOjmHbI-9nJ5FxhOHrGa0hHtQ&redir_esc=y%22%20\l%20%22v=onepage&q&f=false#v=onepage&q=community%20growth%20mindset&f=false

Cançado, L., Reisel, J. and Walker, C (2018), Impact of first-year mathematics study groups on the retention and graduation of engineering students, International journal of mathematical education in science and technology 49. Available online: - https://www-tandfonline-com.libezproxy.open.ac.uk/doi/pdf/10.1080/0020739X.2017.1423120

Cooke, H (2020) What's next? The series finale, Blog: Celebrating "Open" curriculum at the Open University. Available online: - http://www.open.ac.uk/blogs/openquals/?p=599#more-599

Foster, E., Lawther, S., Keenan, C., Bates, N., Colley, B. & Lefever R. (2012) The HERE Project Toolkit: Higher Education: Retention & Engagement. London: Paul Hamlyn Foundation. Available online: - http://www.improvingthestudentexperience.com/library/UG_documents/Toolkit_-_HERE_Project.pdf

Lotz, N. and Holden, G (2020). Developing a sense of community through cross level engagement between staff and students in creative industries subjects. Available online: - https://openuniv.sharepoint.com/sites/units/lds/scholarship-exchange/documents/Developing%20a%20sense%20of%20community%20through%20cross-level%20engagement%20between%20staff%20and%20students%20in%20creative%20industries%20subjects.pdf

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Employability skills gained through engagement with practical investigations

Janet Haresnape
STEM Faculty

Within the HE sector, there is increasing awareness of labour market detail, policy impact, and student expectations, and ensuring that the curriculum equips students with appropriate employability skills is therefore of strategic value to HE institutions, as well as being valuable and relevant to their students. HE institutions have therefore striven to develop and strengthen activities which relate to employability.

Student participation in experiential learning activities (Kolb, 2015) - which include practical work - helps students to make connections between theoretical academic knowledge and practice, and hence develop skills such as reflection, evaluation, and self-confidence, and increases their level of understanding (Pitan and Muller, 2019). A degree is only one step in starting or progressing a career and is unlikely to be enough on its own for finding graduate level employment, so engaging with practical activities has the potential to improve employability since these are important skills for the workplace. Including more such activities in the curriculum should therefore improve student employability (Olo, Correira and Rego, 2021).

Life Sciences degree students at the OU undertake one particular practical investigation which is introduced in one module, and subsequently revisited in another where they design their own follow-up investigation. This presentation focuses on the results of a survey of students who had successfully completed both modules. The survey explored to what extent they had (i) developed and progressed practical and problem-solving skills by undertaking these practical investigations and (ii) could articulate these as employability skills.

Students undertaking both the initial and the follow-up investigation not only reported having progressed their practical and problem-solving skills, but also having developed personal attributes such as patience and perseverance. The main themes to emerge from the analysis of the respondents' comments were that many students found the practical investigations satisfying, rewarding and thought provoking, although some reported frustration with - and dislike of - repetitive work and a few viewed the investigations at face value and did not recognise the more far-reaching skills they were developing.

Approximately half the respondents had equated the skills developed with employability skills, but very few had articulated these in a job situation, e.g., on an application form or in an interview.

Delegates will be invited to consider their own modules and whether more could be done to make the employability skills students develop more obvious.

The main outcomes of this work are: -
- It has now been made clearer to students on the Life Sciences pathway that they are developing crucial employability skills through engaging in the practical investigations within their modules.
- An additional learning outcome 'Developing creativity and innovation' has been added for the modules involved.
- Online workshops have been delivered to Life Science tutors - more are planned for students - to help them appreciate the full set of skills which can be developed through engaging with practical investigations.

Investigating how to enhance the idea generation process for academic projects by engineering students

Martin Braun, Ian Bates, Keith Carter, Joanne Holford and Katherine Kirk
STEM Faculty

In the UK, as elsewhere, final year undergraduate projects (FYPs) are very common as a synoptic module and may be required for the degree's accreditation. Literature highlights the importance of the initial topic selection and mention approaches which can be split into academic-led and student-led models. As the distance learning engineering project module investigated here adheres closely to the constructivist approach, it requires students to develop project ideas with minimal guidance. Unsurprisingly literature reports unsatisfactory results for such student-led project development as most students do not have research experience. To understand how to mitigate such deficiencies a toolkit to scaffold the ideation process was developed.

Literature research showed that various classifications of ideation tools have been proposed, some of these tools having been used in engineering education. Based on this review and a survey of FYP modules at the Open University, a Google Forms based toolkit was produced to test the hypothesis that students need significant guidance to generated useful initial project ideas within their idea space and a project idea generation toolkit can increase the number and quality of such ideas.

An ideation toolkit prototype was designed serving five of the seven feeder modules and containing two sections: One for students who have no clear idea about their project covering three ideation tools (random stimuli, brainstorming and previous project titles). The other intends to focus an initial student idea by requiring students to choose from dropdown menus or provide short answers. This prototype was introduced to nine students from the five tutor groups of the participating lecturers in a two-part workshop. The first section set the context before allowing the students to explore the toolkit, and second discussed the ideation tools contained in this toolkit further and explored them in breakout room sessions.

The eight returned student questionnaires which explored the contribution of the feeder module, workshop and actual toolkit to their ideation process were analysed. It was found that only one student noticed the informal guidance given by tutors on feeder modules and only one student had a clear project idea prior to attending. Students' main concern was the required project depth. Six students found the actual ideation tool discussion helpful, and four students mentioned three specific ways that the toolkit assisted them in generating an idea.

The results so far indicated that students do need significant input in an easily accessible format to support their initial idea generation to more fully explore their project space and a purely constructivist approach may be sub-optimal. A toolkit similar to the one used here, together with a dedicated workshop, may be one way of providing this guidance, thus making subsequent tutor student interaction more efficient and meaningful.

Parallel Session D: Workshop/Demonstration – Equality, Diversity and Inclusion

How do we talk about race and mental health?

John Butcher and Rehana Awan
WELS Faculty

The voices of a small number of Black African and Black Caribbean students on an Access module at the Open University are heard through aggregated personas which will be presented during the session. The personas illuminate the students' attitudes on declaring mental health conditions to enable a better understanding of how policies, practices, language and culture might disadvantage students and prohibit them from notifying the university, as well as identifying solutions to minimise or mitigate these barriers. They capture the 'impact of belonging, isolation, marginalization', as well as the need for culturally appropriate services which recognise the complex lives and 'racialized plights' of our students (Arday, 2018).

The barriers to accessing mental health support for ethnic minorities directly impacts upon attainment outcomes and psychological well-being (Arday, 2018). This ultimately affects the learning experience and consequently impacts upon the good degree awarding gap (Pilkington, 2013).

This session will present the findings from the scholarship project with space to discuss how they might be used to impact practice.

Innovation Through Community: A Panel Conversation

Chair: Mark Jones; Panel Members: Catherine Halliwell, Karen New, Soraya Kouadri, Rachel Hilliam
STEM Faculty

This session will explore innovation in teaching and learning through the experiences of several established eSTEeM project leaders. The focus of this session will be to reflect on the interactions within and between stakeholder communities in fostering innovation, carrying out scholarship, and in driving impactful change of practice. Panel members will offer their reflections on how various communities enable effective scholarship and suggest ways in which we may strengthen collaborations, enhance interactions, and further develop a shared sense of common purpose.

Parallel Session E: Short Oral Presentations – Supporting Students & Assessment and Feedback

Statistical anxiety: will qualification focussed student support help?

Rachel Hilliam[1], Carol Calvert[1], Emma Steele[1] and Di Haigney[2]
STEM Faculty[1], STEM and FASS Faculties[2]

Students taking qualifications in data science and economics are now the largest cohort of students on the second-year undergraduate statistics module, M248. The module has been steadily growing, with a current cohort of 738 students compared to 561 in 20J and 457 in 19J. The module was re-written in 2017 when it was a specialist module for statisticians and the material is very much focussed on these students, however over a quarter of the current cohort are Data Scientists and nearly a fifth Economics students. To support the differing study intentions of these students the way in which students on M248 are supported has been gradually changing since 2019.

Students studying Economics have a limited exposure to some of the mathematical techniques that are used in M248. A large amount of revise and refresh material exists for these students on the Mathematics and Statistics Study Site. By working with the School of Economics we have been able to provide these students with dedicated support during the summer months prior to the module start; through targeted material, a forum and tutorials.

A more radical change has been the way in which students are allocated to tutors. Since 2019 this has been based on the qualification the student is studying. For 21J it was clear there was going to be an increase in the number of students and therefore an obvious extension was to recruit tutors with knowledge and expertise in the qualification areas that students were studying.

In 20J the tutorial resource consisted of existing 'core' tutorials which covered the content of the module, supplemented by a limited set of qualification focussed tutorials. Evaluation in 20J showed that students tended to view the recordings of the 'core' tutorials, but attendance was greater for qualification focussed tutorials. One explanation is the value that students place on the social aspect of these tutorials and the fact that they are amongst qualification peers. Based on feedback the number of qualification tutorials have been increased in 21J.

Whilst pass rates have been more heavily influenced by the change in assessment due to covid19, evaluation has shown that student appreciate the qualification focus of the support received. In 20J students who declared disabilities had a 2.4% gap in good module pass rates compared to the faculty gap of 6.8%. Though these numbers are based on a small number of students it does support the idea that students feel more comfortable in tutorials with students on similar qualifications. Perhaps because they feel more able to express their misunderstandings.

These early findings suggest that the qualification-based support could be helpful in reducing statistical anxiety in students. To explore this further we are adapting existing statistical anxiety rating scales to see if these can be used to identify different forms of statistical anxiety and in the first instance explore if these different forms are related to different qualification groups. The talk will outline our intended approach to this evaluation and invite feedback.

Extensions – student use, impact, and implications

Cath Brown and Catherine Halliwell
STEM Faculty

The sector move towards more personalised, adaptive learning has led to research into the importance of completion deadlines and their impact on student performance. Ariely and Wertenboch (2002) recommended that evenly spaced deadlines promoted completion of tasks, but Koch et al. (2015) found that while extrinsic motivators, such as assignment deadlines, can increase engagement, effects on performance were mixed. The timing and flexibility of deadlines has been explored; Burger et al (2011) found that what they had considered to be well-chosen deadlines to help people overcome procrastination and make people more likely to complete had the opposite effect and could indeed impose additional hurdles to completion. Miller et al (2019) found that rigid deadlines had a negative relationship with participation.

In an OU context, assignment extensions have become of increasing interest due to the ongoing growth in students studying at high intensity. Supporting these students is an institutional priority, but the OU's model means that clashing assignment deadlines are very likely. Anecdotally, even before the pandemic, increasing demand for extensions was reported.

A mixed methods approach was used to investigate how students are using extensions, whether this depended on variables such as module choice, study intensity, qualification, disability, and the impact on success metrics such as TMA scores and module outcomes. The modules considered were five level 2 thirty credit modules in Biology and Health Sciences.

The key findings were: proportionally twice as many extensions were granted to disabled students; at a module level no clear relationship between study intensity and number of extensions taken; a higher proportion of Q71 (Health Science) students took extensions than Q64 (Natural Science) students; that significant extension requests on TMA 1 can be an indication of struggle; and that on S294 there was a statistically significant negative correlation between length of extensions and OCAS and OES scores. However, on other modules there were at best weak correlations. It was apparent on all modules that extension requests are not confined to low academic attainers.

The qualitative data, from both student and AL focus groups, suggested that there was no systematic use of extensions to manage and spread workload – rather that extensions were requested on an 'immediate need' basis.

Based on the findings, recommendations have been formulated concerning extensions feeding into analytics and MILLs interventions, assessment design on a module basis, and university policy on extensions. Further research on the impact of assessment policy on disabled students is strongly recommended.

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Early Start for TM470 project students

Chris Gardner, Michael Bowkis and Alexis Lansbury
STEM Faculty

Students on IT/computing named degrees must complete a compulsory project at the end of their studies (TM470). Some students face challenges completing the project due to difficulty with independent work and little direct teaching content. Studies have shown that additional tutor support and feedback can help improve student retention (Sharp, Wray and Maxwell, 2020) and such support is particularly important for student retention in distance learning (Arhin and Ekow Laryea, 2020).

A small TM470 20B early start pilot was conducted examining viability of the intervention approach and to determine opportunities for scalability. Candidates were identified using an inclusive selection mechanism that considered: multiple prior registrations, breaks in study, not studying another module, and only requiring TM470 to complete their degree. Each candidate was deemed capable of passing TM470. From November through to module start, students explored project ideas with a chance to reflect on feedback. The pilot provided opportunity to accelerate into TM470 at module start and to continue with the same tutor through to completion.

The prompt for this study was students' poor performance on TM470 if restarting the module, to potentially improve retention among this cohort and thereby improve the overall completion/ pass rate. A specific issue identified was that students often have concerns regarding returning to study after a break (Robson, 2020). This is particularly relevant for TM470, as it is a different kind of module to those that are modules, with more emphasis on self-directed study.

However, self-directed study is different from unsupported study. By providing direct tutor support before module start it is hoped that students would feel more confident about successfully completing their project and, ultimately, their degree. A concern was that students might not have time to commit to the early start project, therefore each potential student was contacted to ensure that they could commit spending time on refining ideas before module start. A further project aim is to explore whether the students successfully engage in TM470 project preparation work, and whether they feel that the time was well spent.

The project commenced in 2021 with initial analysis of students' performance, comparing pass rates for those on early start and those who were not. Feedback was gathered from tutors who

engaged in the early start program, selected via an IIT (Interest In Task) process for their ability to support students facing difficulties through a project's early phases.

This project has been extended in 2022 to gather student feedback, via interviews, providing further insight into the effectiveness of the early start activities. Further comparisons will be made of pass rates for those on the programme with those who were identified as potential candidates but either declined the opportunity or could not be offered due to place constraints. Pass rate comparisons will also be made with the main cohort of students. By evaluating a specific Level 3 module in the School of Computing and Communications it is hoped that this will inform module teams in helping students achieve their degree.

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L markers on TMAs: better late than never?

Karen New and Fiona Moorman
STEM Faculty

Context for project:

Assessment is at the core of teaching and learning at the Open University. It is used to measure student learning against institutional and AQA standards and, most importantly, assessment has a pivotal role in consolidating student understanding and in supporting progression along their learning journey. The student response to their assignment is complex, with aspects such as student expectation, self-esteem and emotional reaction identified as key drivers for how effectively students engage with marked assignments (Walker and Mirabelle, 2009; Lipnevich, 2016).

Within the OU, there are specific circumstances resulting in a zero grade being applied to a piece of assessed work (aside from poor academic progress/achievement of learning outcomes for the assignment). This study focusses initially on L markers applied to assignments where students have submitted their assignment late without (or beyond) an agreed extension.

It is worth highlighting at this point that in recent years, and especially during the pandemic,

many of our tutors have been experiencing the workload challenges of supporting students through flexible assignment extensions while providing high standards of support to the cohort as a whole. However, there is the potential that the experience of receiving a zero grade may compromise the student's response to the assignment, and indeed, their ongoing study.

The extent which the L marker is used within the school is uncertain. Additionally, there is the potential for some variability in student experience. For example, some tutors may provide marking feedback to a student who submits late without an agreed extension (or beyond an agreed extension), but return it with an L marker, which will indicate that no score is awarded for the assignment; others may mark and grade as normal.

Methodology:

In partnership with ACQ/data analytics, we extracted all assignments which had L markers applied, for all modules within the school of LHCS. We also investigated gender, age, disability flag, ethnicity, WP flag, caring responsibilities for those students.

Preliminary findings:

In the time period investigated (2018-2020), 68 L markers were applied to TMAs. All of these markers were on undergraduate modules within the school and covered all stages of undergraduate study. 17 L markers were applied 2018; in 2019 J – the first pandemic presentation – the number of L markers almost doubled, and remained higher than pre-pandemic, for the 2020J presentation. This data will be presented during this session, along with an exploration of possible impacts of an L marker on the study experience of affected students. Data for 21B and J is now being collected. Results from a staff tutor and AL survey, and focus group, will be presented at a later date.

Parallel Session F: Short Oral Presentations – Technologies for STEM Learning, Equality, Diversity and Inclusion & Learning Design

Alternative fieldwork, "real-world" communities

Ann Grand[1], Sarah Davies[1], Trevor Collins[1] and Eileen Scanlon[2]
STEM Faculty[1], WELS Faculty[2]

Fieldwork has long had a respected place in education at all levels, however, in the face of a simultaneous decline in participation in 'real-world' fieldwork and a rapid increase in the range of analogous and alternative online 'field' experiences, we felt there remains a gap in our understanding of how the principles of fieldwork apply across different communities and the ability of alternatives to replicate and extend the engagement offered by real-world trips.

The 'Virtual fieldwork, real-world communities' project therefore investigated three questions: (i) to what extent can an alternative fieldtrip be a shared experience? (ii) what is the role of fieldwork in building learning communities? (iii) what is the role of different technologies in shaping analogues of traditional fieldwork?

Technologically-based fieldwork analogues offer those who cannot access traditional fieldwork a chance to experience its values. Analogues can be visually and interactively rich and reach people in formal and informal settings and across socio-economic divides. They can also create new opportunities for organisations such as small community-based environmental groups to engage wider audiences, including international ones, that they would not be able to reach in person.

However, analogues cannot entirely replace traditional fieldwork, as some of the methods by which they are delivered to very large audiences stifle individual participation. There are also important sensory elements and social bonding experiences which are hard to deliver online.

A blended approach to fieldwork, in which online learning communities of students are supported to develop questions which they can then take, individually, into their local setting may be one useful way forward, along with less frequent trips to more distant locations for which students are prepared in advance with virtual field trips.

Milestones and Challenges in Decolonising Computing

Mustafa Ali, Magnus Ramage, Zoe Tompkins, Steve Walker, Ray Corrigan, Clem Herman and Andy Hollyhead
STEM Faculty

Members of the Critical Information Studies (CIS) research group in the School of Computing and Communications are undertaking an exploratory project entitled 'Decolonising Computing – Resources for Educators'. Intended to complement the decolonising the curriculum (DTC) and decolonising the university (DTU) initiatives currently underway at The Open University, the project aims to set out a vision and roadmap for what computing could – and arguably should – mean for computing educators (and thereby, for students) once decolonised.

The project involves three phases. Part 1 of Phase I of the project has been successfully completed and resulted in the production of three documents: (1) an initial scoping document setting out the project team's sociotechnical view of computing, the latter's entanglement with the legacy effects of colonialism in the contemporary era, and proposals for how computing might be decolonised. The document includes an appendix containing core and supplementary readings; (2) a methods document used to inform the design and facilitation of various review workshops involving different stakeholders (academic colleagues, students, external experts); and (3) a decolonising criteria document setting out a series of questions that educators should raise when interrogating computing pedagogy, content, and assessment from a decolonial computing perspective.

However, Phase I has proven rather challenging, both internally and externally.

Internal challenges relate to the fact that the project is 'cutting edge' with little in the way of precedent to draw upon in terms of informing the work. In addition, differences in and different levels of awareness about European colonialism, its legacy effects, and how they relate to computing have necessitated extensive discussion and debate within the project team with a view to building a shared understanding about and language for describing what decolonising computing means.

External challenges, evidenced by feedback gathered at a recent AL staff development session to introduce the idea of decolonising computing, include: (1) tendencies to conflate decolonisation (a local-global world systemic issue) with EDI work (understood in rather individualistic terms); (2) confusion and uncertainty about how to engage with structural racism and its entanglement with computing phenomena (especially manifest in colleagues who self-identify as white and/or western); and (3) a perception that this project is driven by social science rather than computing concerns proper, arguably reflecting a bias toward seeing computing as technical rather than sociotechnical.

Proposals for how to address these challenges will be presented with a view to informing Part 2 of Phase I of the project, viz. review workshops involving different stakeholder groups (academic colleagues, students, external experts) aimed at refining the criteria document. In this connection, a SRPP application has recently been submitted for the purposes of conducting an online student questionnaire to inform the student review workshop.

Infrastructure for an Online Computing Lab

Mark Hall and Soraya Kouadri Mostéfaoui
STEM Faculty

One of the difficulties faced in distance-learning for technical subjects is how to provide students with the equivalent to the physical lab. Within the Open University's OpenSTEM Labs a number of remote labs have been developed and there is a computing-related lab built around a cluster of Raspberry Pi computers. What does not exist is an online lab where students can access a range of computing resources, with all the required software and tools already installed and available.

Due to this, individual modules have used a range of tools for providing students with a standardised computing environment, including virtual machine images, pre-defined software package definitions, container images, or custom on-line environments. The problem with these is that they create significant additional technical support requirements and require students to have appropriate hardware resources, a real problem for those who can only afford very limited hardware.

The Modern Container-based Learning Interface and Delivery Infrastructure (MCLIDI) eSTEeM project addresses this, by developing the structures for providing students with an online computing lab in which they can undertake the practical aspects of their modules using hardware resources provided by the university. The MCLIDI project splits into two workstreams. The first is focused on developing the necessary tooling to simplify how module teams develop container images that provide the module-specific computing environment. The second is focused on developing the necessary infrastructure to allow students to access these container images online.

For both workstreams we use Docker container images and software components from the Jupyter project family as the core building blocks. This is because both have established themselves as core technologies for providing online computing environments. A Docker container is essentially a very cut-down virtual machine, which contains all the software required for the software to run. The Jupyter project provides a range of tools that run inside of containers, which together allow students to access custom computing environments online.

As part of the first workstream, we developed tooling that allows module teams to specify a configuration that includes required software packages and data to distribute to the students. Based on this configuration, the tooling then automatically generates a container image. The second workstream developed a modified JupyterHub installation to provide the students with a single point-of-entry into the system, from where they can launch the containers.

The project was initially conceived as a limited pilot, but due to interest has been rolled as a mixed pilot (TT284) / live (TM129, S397) deployment, which at this point has been used by almost 500 students. While the student evaluation is ongoing, the fact that this level of deployment has been achieved with only a single technical fault indicates that the approach is viable and should be widely rolled out.

In this presentation we will look at the technical setup, the student experience, the processes of developing the containers, the costing model, and how interested module teams can take advantage of this provision.

Evaluating the Impact of Implementing Learning Design Approaches in STEM over 4 Years (July 2017 – July 2021)

Tom Olney, Carlton Wood, Anne Higson and Alison Edwards
STEM Faculty

In 2016, the OU was restructured into four super-faculties (STEM, WELS, FASS & FBL). Each faculty was tasked with developing structures, governance and procedures that would support module teams in designing teaching and learning appropriate to their context. STEM was assisted in this by the outputs of the OU Learning Design Initiative (OULDI), the piloting work of the Learning Design Project in the Institute of Educational Technology (IET), the permanent formation of the Learning Design team in Learner Support Services (LDS-LD), and the extensive design for learning experience and practice that was already in place in the Maths, Computing & Technology and Science Faculties.

However, to date, little work has been done either within faculties or in the wider sector to measure the impact of the implementation of learning design and the arrangements that have evolved to support learning design practice. HEI studies have identified a wide variety of sources of support which include, colleagues, literature, workshops, seminars, conferences and institutional support services, but concluded more effort needed to be made to understand how these supported learning design practice (Agostinho, Lockyer & Bennett, 2018). A literature review looking at the adoption of learning design tools and methods found that whilst there had been a focus on the usability of specific tools there was a lack of studies that investigated barriers to adoption such as institutional support (Dangino et al, 2018).

This presentation will present the findings of an eSTEeM study designed to document and evaluate the impact of arrangements put in place to support module teams in implementing learning design in STEM over the period of 4 years (July 2017 – July 2021). Impacts on practice, product and process plus four recommendations for future arrangements which are centred around (i) time, (ii) contextualisation, (iii) experience, and (iv) a re-orientation of learning design will be presented.

Parallel Session G: Short Orals Presentations – Equality, Diversity and Inclusion

Exploring the extent of maths anxiety within the STEM faculty

Susan Pawley and Sally Organ
STEM Faculty

Maths Anxiety can be described as "an emotion that blocks a person's reasoning ability when confronted with a mathematical situation" [Spicer 2004]. Unsurprisingly, students with maths anxiety who are required to study mathematics, often to support a related discipline, frequently react with avoidance techniques such as delaying study or not studying regularly and this puts them at high risk of failure. Whilst maths anxiety has been recognised by academics for over half a century, little work has been done within the Open University (OU) to establish its extent within our population of mainly mature adult learners, how it may be affected by distance learning and what techniques can be used to mitigate its effects in this context.

To begin to investigate this issue we have undertaken a quantitative study, across core OU introductory modules in STEM: this includes modules with a primary focus on mathematics, engineering, science, computing, design, environment and health studies, requiring varying levels of engagement with mathematical content. Using the recognised Maths Anxiety [Betz 1978] and Maths Resilience [Kooken et al 2013] scales augmented with additional questions to investigate factors specific to distance learning we measured the extent of the problem. Qualitative data has been gained through in-depth semi-structured interviews which further investigate specific issues and explore how these might be addressed and supported. The interviews included questions about previous experiences with learning mathematics, attitudes towards mathematics, and any teaching methods or personal strategies that have been particularly helpful or unhelpful.

Initial findings suggest 44% of students who responded are visibly anxious, with 26% of these students believing that studying at a distance will increase their anxiety and a further 27% undecided on whether it will have an effect. The survey results reveal clear differences in levels of maths anxiety between students studying in different disciplines, along with some interesting, though less pronounced, variations in different aspects of maths resilience. The data is further analysed by student characteristics such as age, disability, ethnicity and gender to see what conclusions can be drawn.

Our presentation will cover the key results obtained from the surveys and some initial insights gained from the interviews.

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AL Disability Champions; Reflections and actions of a peer-peer disability support group

Lisa Bowers, Elouise Huxor and Theo Philcox
STEM Faculty

Introduction and Theory:

The project entitled 'AL Disability Champions' – funded by eSTEeM, developed and explored the opportunities of the provision of a peer-peer disability teaching group. This project aimed to offer U1O1 (Design thinking) tutors timely teaching support for their students who were increasingly presenting with complex learning needs. The role of the AL Disability champion was to act as an expert and to work as a support agent between the tutor and their student, thus aiming to increase the overall effectiveness of the student's learning process.

Concept and Implementation:

The AL Disability Champion project was structured using two streams of communication and support 1) The helpdesk forum, located in U101 tutor forum 2) a virtual Tool Kit, that acted as a growing central resource for the champions and U101 tutors to support knowledge and guidance of student issues and barriers to learning.

Discussion:

We present the discussions and findings from the project and on the design and development of the virtual toolkit and accompanying designed artifacts from the project. We review the evaluation tools used to gauge the U101 tutors' appraisal of the disability champions project as well as their thoughts on the tool kit. In this presentation, we will offer the tutors' feedback which aided the project team's review of the concept and process. The outlook addresses potential next steps to solidify the resources and further thoughts on services offered by the project.

Embracing the voices of the marginalised learners with a declared mental health disability

Nicole Lotz and Muriel Sippel
STEM Faculty

Our session will start with a brief presentation of the inspirations, aims and outcomes of our innovative scholarship work. For this we have embraced the voices of the marginalised student to gain in depth evidence that justifies new developments to our practice, the design curriculum, student support services and conversations beyond our own faculty. Our intended audience will be educators and support staff wanting to develop their practice or the practice of others for the learner who has declared concerns with their mental wellbeing, researchers looking to explore ideas for an innovative qualitative methodology that could lead to a more in-depth data analysis,

curricula designers looking for ways to develop resources that will better support the progression of students in minoritized or marginalised groups.

For our study, the overall methodological approach was experiential, phenomenological, qualitative, and longitudinal. Seven students were recruited for a mixed method study which included repeat-interviews and experience samples over a period of 4 months. Students were interviewed twice during their modules' study to ascertain pinch points and best practice in retaining them. The interviews were focused on the intersecting factors of discipline (knowledge and skills, coursework, assessment), personal circumstances (work and family, caring commitments, life events) and support received during their studies from Open University and elsewhere.

In addition to these interviews, experience sampling and diary methods were used to understand the participants' thoughts, feelings, behaviours, and environmental factors influencing their study experience in between interviews. Participants received mobile phone prompts from the interviewer to share their experiences at that moment whilst studying, doing other activities, or preparing for an assignment. Debriefs for interviewers and interviewees gave further reflections to ensure the validation of the gathered data.

Based on the analysis of this rich data set, we will share how we intend to use the insights gained from student voices as an evidence base to design more inclusive study experiences. We will present student experience cases that focus on the tensions and contradictions arising and make recommendations for support during study and tuition as well as for the learning design of modules and qualifications that heavily employ project-based learning approaches.

Finally, we would like to ask our audience how an institutional focus on decreasing the barriers to mental wellbeing could enable more students from marginalised groups to access, participate and succeed in distance education?

Parallel Session H: Workshop/Demonstration

Birds of a Feather Conversations: Generating New Project Ideas

Trevor Collins
STEM Faculty

How can we build on our collective knowledge to inform our future scholarship? Come and find out in this 'Birds of a Feather' workshop, where we'll split into topic-based discussion groups to share our insights and experiences.

We've invited some of our eSTEeMed colleagues, with a vested interest in each topic, to help facilitate these discussions. The aim of this workshop is to provide an opportunity for you to share your scholarship experiences, generate ideas for projects, and identify potential collaborators.

Within eSTEeM we hope to draw upon this discussion to help guide our future calls for proposals and plans for impact.

Day Two Closing Keynote Presentation

The importance of Community in developing the delivery of online labs during the COVID-19 Pandemic

Cate Cropper
University of Liverpool

During the COVID-19 pandemic, universities across the world were required to rapidly replicate their teaching and learning online. Reflecting on this for the first time in two years, this presentation will draw out the importance of community and collaboration in successfully addressing the challenges faced in delivering laboratory teaching during the pandemic.

Specifically, this presentation will discuss the importance of communities of teaching focussed practitioners, and how the DryLabs community, hosted by Oxford University inspired an analogous community of practice for physics (Physics LTHE). Through discussions and advice sharing across these networks, institutions were able to successfully and confidently deliver degree programmes with a degree of consistency.

The Central Teaching Laboratories at the University of Liverpool were active in these communities and provided consultation to other institutions through DryLabs, Physics LTHE and Royal Society of Chemistry.

In addition, this presentation will discuss how the community environment present in live teaching laboratories was replicated online through a synchronous virtual chemistry experiment. Key to the success of this online lab environment was access to remote services and key features in Zoom and Microsoft Teams.

INTERACTIVE POSTER PRESENTATIONS

Evaluating Print Packs: initial findings

Fiona Aiken and Christopher Hutton
STEM Faculty

The University's environmental science modules are delivered online through a virtual learning environment. Students in Secure Environments (e.g., prisons) and some students with an additional learning requirement (e.g., a disability) are provided with printed packs of the online module materials in order to facilitate their access to the module content.

Research has been carried out on reading speeds and comprehension (Kong et al., 2018) but there has been limited research assessing the efficacy of print packs as an accessibility adjustment for online learning. This project focusses on a small number of undergraduate environmental science modules from stages 1 - 3.

Three Associate Lecturers (ALs) from these modules who have experience of supporting students with print packs were recruited. The ALs attended an online focus group which explored their perspective of how they and students worked with print packs, and the strengths and challenges of this adjustment. Four Student Support Team Advisors who worked with students from the environmental science curriculum also contributed their first-hand knowledge through an online focus group.

The qualitative data from both focus groups were combined and used to draft a questionnaire for students who used print packs. This questionnaire was then reviewed by student representatives in order to refine it and improve its accessibility. The next step will involve students from the modules selected being invited to complete the questionnaire.

We will share and discuss our findings from this initial phase of gathering baseline evaluative data on print packs as an adjustment for online learning.

Kong, Y., Seo, Y.S. & Zhai, L. (2018). Comparison of reading performance on screen and on paper: A meta-analysis. Computers & Education, 123, 138-149. https://doi.org/10.1016/j.compedu.2018.05.005

See page 47 for poster, visit the <u>eSTEeM & Co website</u> for the interactive presentation.

Typical Support Seeking Behaviour of STEM Students, their Outcomes and Successes

Paul Collier and Fiona Aiken
STEM Faculty

Students contact Student Recruitment and Finance (SRF) and Student Support Teams (SST) through a variety of mediums, covering a multitude of topics and at different points in time. This project is investigating those interactions in terms of volume and topic to understand the overall position of our dialogue with Students. To keep the activities and scope of the project

manageable the investigation is focused around the crucial 6 weeks from Final Enrolment Date (FED) through to the submission of the 1st Tutor Marked Assignment (TMA) in a module. We have also focused on queries relating to STEM specific modules and qualifications. With a baseline established the work has moved onto interrogating the data by the characteristics defined as protected in the Access Participation Plan (APP). Based on the outputs of these investigations we will develop a series of recommendations or pilot interventions to augment the directed interaction between the University and the Student. Once the pilot intervention phase is completed, we can analyse the results and the impact that has been made. This will allow us to make recommendations on those results and seek opportunities to roll this out more widely across the faculty.

In this poster we will share results from our initial analysis and outline our plans for the next steps in the project.

See page 48 for poster, visit the [eSTEeM & Co website](#) for the interactive presentation.

Improving inclusivity in distance-learning group project work for engineering students

Fiona Gleed, Alice Moncaster, Hedieh Jazaeri, Silvia Varagnolo and Jo Smedley
STEM Faculty

Projects and teamwork are the predominant context in which most engineers work. Providing supported learning experience of such contexts supports employability for our students. However, group projects are particularly problematic within the OU setting, both because the distance learning format makes group cohesion more difficult, and because we have a relatively high number of students who might be disadvantaged through such activity particularly when it is assessed.

Meanwhile, inclusivity represents a critical issue for the engineering professions. While most of the UK engineering professionals are white, male, and able-bodied, recent publications have highlighted the relevance of understanding the needs and experiences of different groups in engineering design, and the positive impact that diverse teams can have. The OU has a critical role to play in supporting a more diverse engineering profession. However, to do so we need to make sure both that all our students are supported in their studies, and that they are aware of the importance of diversity and inclusivity.

Our scholarship project is about improving inclusivity for distance-learning group projects. The specific context is T229, a second-level engineering module which includes a group project. However, the scholarship project aims to add to the wider knowledge base on inclusivity in STEM distance-learning group projects.

The project first reviews the academic literature and the feedback from students and ALs on the T229 group project, to identify potential barriers to different student profiles. This will help us develop survey questions for OU Level 1 and 2 engineering students who have experience of participating in distance group projects, and some longer telephone interviews with students who have just completed the T229 21J group project.

The analysed data from the literature, surveys and interviews, will be triangulated to develop a guideline (or set of principles) for inclusive distance learning group projects.

See page 49 for poster, visit the [eSTEeM & Co website](#) for the interactive presentation.

Accessibility and usability of Jupyter Notebooks on M269

Sharon Dawes and Alexis Lansbury
STEM Faculty

M269 Algorithms, data structures and computability has been rewritten and now all teaching and assessment materials use Jupyter notebooks rather than the OU's VLE interface. These notebooks are an interactive web-based tool that allows a mix of executable practical activities as well as text-styled using mark-up language. Both tutors and students use Jupyter and this study has investigated the experiences of both.

Accesssibility and usabiity are equally important for tutors and students. This project has investigated the usability and the accessibility (Web Content Accessibility Guidelines) of this learning approach from the perspective of both. Participating tutors and students have kept diaries focussing on a small number of key questions. They have detailed their experiences of using the software, providing answers to key questions about accessibility and usability. The diary-format was chosen as it has allowed us to see how user-experiences have changed over the period of the study. The analysis of the diaries has been followed up by means of online focus-groups.

Our project has helped to determine whether guidance in adapting output from the Jupyter notebooks has made them sufficiently accessible and whether any adjustments are necessary to improve usability. Our project, further, has helped determine the effectiveness of using Jupyter notebooks for teaching, learning and assessment and may be of interest to other module teams who are considering migrating to this technology.

See page 50 for poster, visit the [eSTEeM & Co website](#) for the interactive presentation.

'Lamp post (as remembered)' - How Shrigley's artwork informed my qualitative research.

Linda Robson
STEM Faculty

Through his installation 'Lamp Post (as remembered)', David Shrigley intended to question the reliability of memory and demonstrate how it often diverges from reality. This poster relates my reflections on 'Lamp Post (as remembered) to my qualitative research into student experience. My research data comes from retrospective interviews with students who have experience of taking a study break through deferral. With my data collection happening months or even years since the students took their study break, I am relying on the students being able to accurately recall events and emotions in order to develop understanding of their experience. When working

with retrospectively recalled data, it is important to consider the reliability of memory and ensure data analysis is carried out appropriately.

'Lamp Post (as remembered)' is part of the art collection in Folkestone, Kent. Funded by the Creative Foundation, it is the largest outdoor urban art collection in the UK, featuring works by 47 artists permanently installed throughout the town. The majority of works in the collection were commissioned for the specific sites where they are installed and address contemporary social issues.

See page 51 for poster, visit the [eSTEeM & Co website](#) for the interactive presentation.

Teaching Programming at a Distance Using a Virtual Computing Lab

Phil Hackett, Michel Wermelinger, Karen Kear and Chris Douce
STEM Faculty

This poster describes a research project that will investigate the use of shared programming environments for students and tutors, to enable feedback, collaboration, and discussion whilst programming during tutorials.

Comparisons of three different methods of running online programming tutorials will be made. One approach (used at present in OU Modules) involves the students using an 'integrated development environment' (IDE) on their own computer and involves no collaboration and limited tutor support. Students' attempts at programming are not visible to the tutor. An alternative approach involves the use of a shared collaborative programming environment which allows tutors to interact with students' code as each student is coding in an online IDE (https://replit.com). This approach is used alongside Adobe Connect to deliver a practical programming tutorial, with real-time support for individuals and groups of students, whilst completing programming activities.

Another, approach to programming tutorials involves the use of a single platform (Coding Rooms https://codingrooms.com), which includes integrated video conferencing so Adobe Connect is not needed. This software enables an overview of multiple students programming activities at the same time, with tutors able to interact with and support individual students or groups in real-time.

Using REPLIT & Coding Rooms, students will also have their own IDE which the tutor can see being used in real-time – feedback and discussion can happen immediately. Students can also collaborate in these coding environments, outside of tutorials. Both REPLIT and Coding Rooms can be considered to be a 'virtual computer laboratory'.

Research Question: Does the use of a virtual computer lab environment during synchronous tutorials lead to greater student success on programming modules?

Aim: Produce recommendations for the use of virtual computer labs when teaching programming.

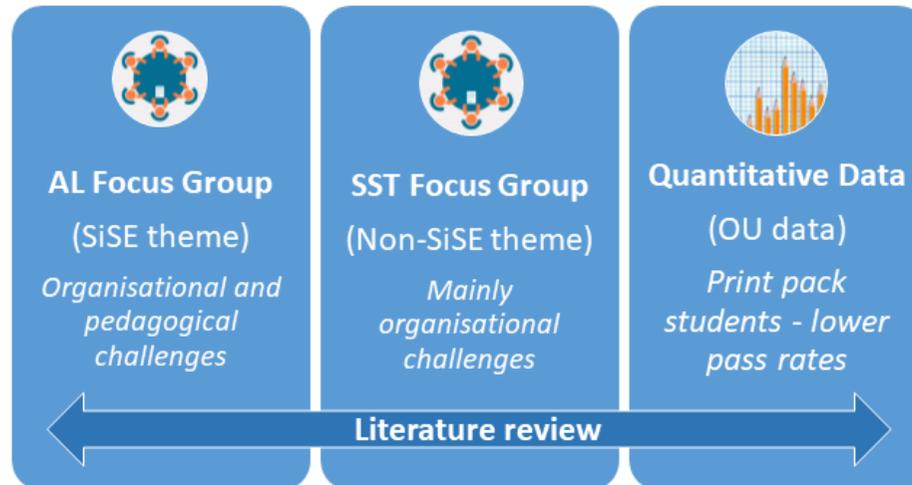**See page 52 for poster, visit the eSTEeM & Co VLE website for the interactive presentation.**

Poster 1

Typical Support Seeking Behaviour of STEM Students, their Outcomes and Successes
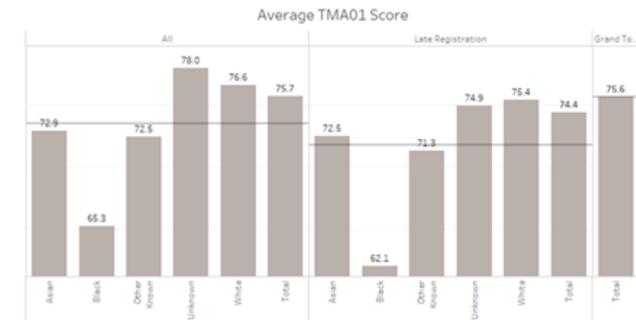
Paul Collier, Fiona Aiken

Introduction
➤ The importance of personal, non-academic support of students in a distance learning environment is well documented in literature (Jacklin et al 2007)
➤ The way that support is provided is important and negative experiences result from delays in students receiving a response
➤ Students indicated that it can be difficult to commence their studies and managing students' expectations vs the realities of life in Higher Education can be a challenge at the start of a module
➤ It is important students know who to contact, where to go and what support is available

Investigation
➤ This project will investigate student triggered interactions with the STEMA SST in terms of volume and nature to increase understanding of the position of our dialogue with students
➤ Focus will be on the 6 weeks from the Final Enrolment Date through to the submission of the 1st TMA

Average TMA01 Score

	All						Late Registration						Grand To...
	Asian	Black	Other Known	Unknown	White	Total	Asian	Black	Other Known	Unknown	White	Total	Total
	72.9	65.3	72.5	78.0	76.6	75.7	72.5	62.1	71.3	74.9	75.4	74.4	75.6

Findings
➤ Queries regarding Student Loans, Reduction in Study Intensity and Late Registration impact on different groups of student including, the over 50's, SiSE & Disability
➤ One of the key findings to date is the impact that Late Registration queries have on students from a Black ethnic background. This interaction dramatically reduces the 1st TMA score compared to other ethnicities and other queries into the University

Next Steps…
➤ Based on the investigation outcomes we are working with Academic Services to develop recommendations to enhance the directed interaction between students and the University
➤ Pilots of the recommendations will be carried out in 22J, the impacts will be evaluated and shared with colleagues

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Improving inclusivity in distance-learning group project work for engineering students

F. Gleed, S. Varagnolo, J. Smedley, H. Jazaeri, A. Moncaster

Context

Engineering as a profession
- Complex projects and wicked problems
- Project teams – in-house or interdisciplinary
- Diversity and inclusion are priorities[1]

Pedagogy of Engineering Education
- Problem based learning
- PEI accreditation drives subject benchmark[2]
  - o Laboratory investigations
  - o Design **AND** Research projects
  - o Groupwork

Distance learning context
- Defined paths, not cohort progression
- (very) Limited face to face interaction
- Diversity of experience and advantage[3]
- Asynchronous learning

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Methodology

Current practice for Engineering @ OU
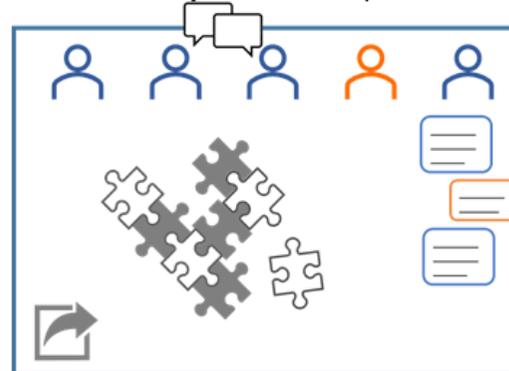Curriculum review
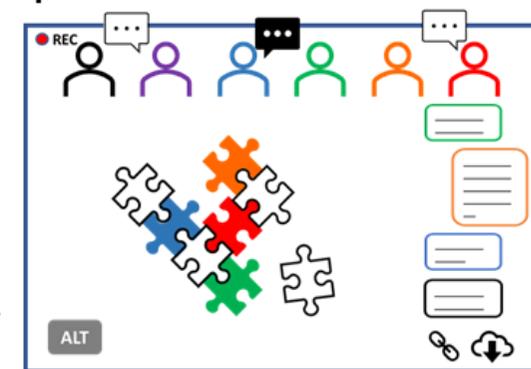- Groupwork context and process

Student experience
- Survey across previous projects
- Interviews with individual volunteers

Tutor perceptions
- Survey focused on specific module

Output

Developing groupwork guidelines for
Students
- participants and agents of inclusion

Tutors
- therapeutic pedagogy
- facilitation of inclusive teams

Module teams
- activity and assessment design

References
[1] Diversity and inclusion progression framework report, 2021,[online] Available: https://www.raeng.org.uk/publications/reports?fc=140
[2] Accreditation of Higher Education Programmes, 2020, [online] Available: https://www.engc.org.uk/ahep
[3] Evaluating inclusion in distance learning, 2021, [online] Available: https://www.tandfonline.com/doi/full/10.1080/13511610.2020.1828048

The Open University

Poster 4

Usability and Accessibility of Jupyter Notebooks on M269
Sharon Dawes & Alexis Lansbury

The Open University

Background
M269 Algorithms, data structures and computability has been rewritten to include all teaching and assessment materials in **Jupyter Notebooks** rather than the OU's VLE interface.

Aims of the project
We set out to investigate how the Jupyter Notebooks supported:
• **Learning and Assessment** for students
• **Teaching and Assessment** for tutors

Methodology
•We **recruited** 6 students and 6 tutors
•Participants wrote **diary entries** at key points in the first 12 weeks of the module, focussing on a small number of questions, detailing their experiences of using the software.
•We conducted follow up **focus groups** and **interviews**.
•We carried out **thematic analysis** on the diary entries and transcripts to evaluate how user-experiences changed over the period of the study.

A typical section of a Jupyter Notebook:

Length

The function `len` returns the size of a string.

```
In [6]:    len('')      # length of the empty string
Out[1]: 0
```

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Some recommendations:
•An index and summaries need to be produced
•Excellent technical knowhow of tutors needs gathering together and Module Team help provided to reduce TMA marking time
•More advice and guidance on finding materials is needed

Tutors reported: many of the same issues as students. While there were advantages there were also disadvantages for example greatly increased time in marking and feedback:
" I've hacked the CSS file to make it not black on white for accessibility reasons"
"It's great not having switch out to an IDE. It is very convenient"
"Finding things is a nightmare of open tabs"
"I think jupyter notebooks do assist with my teaching of M269 (and the marking). Being able to modify and extend code examples during tutorials is a great help"
"I wouldn't want there not to be the HTML version of the materials – being able to search is incredibly important"

What the students said:
Of tabs: *"It was very easy to open lots at once and they all look so similar"*
Of advantages for revision:
"Students will have a personalised set of notes, code and so on they can refer to and look back on as they work their way through the module"
Of working online: *"It can be tiring on the eyes looking at the screen"*
Of understanding materials:
"notebooks ….bring the material to life from within the book"
Of interspersing practical with theory: *"I do prefer doing practical activities onscreen"* but it would be easier *" to have the activity info on one side of the screen and writing the code on the other side, I don't like scrolling back and forth"*
Of finding information: *"There doesn't seem to be a search function, and trying to remember and find which notebook contained the information I was looking for was a bit hit and miss and time-consuming"*

Poster 5

'Lamp post (as remembered)'
- How Shrigley's artwork informed my qualitative research

Linda Robson

David Shrigley's Lamp Post (as remembered), fills a gap in a row of Victorian lamp posts on The Leas, Folkestone. Artist Camille Biddell took 40 seconds to memorise the original then later described the lamp post so David could produce a 'replica'.

Reflecting on this artwork highlighted to me the way that memory is fallible. Research participants provide honest accounts, but they may not be completely accurate. In an interview, Shrigley commented on some of the inaccuracies in the replica lamp post and speculated that Camille's memory may have been confused by other lamp posts she had seen (Creative Foundation, 2017). Similarly participant accounts in qualitative research interviews may be influenced by experiences prior to or since the incident of interest.

When conducting research into past events we can not necessarily establish an unchallengeable truth, rather we seek a plausible, coherent, and convincing account which provides insight into the individuals experience.

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Play

Creative Foundation, 2017. David Shrigley David Shrigley - Creative Folkestone Artwork

Teaching programming at a distance using a Virtual Computing Lab
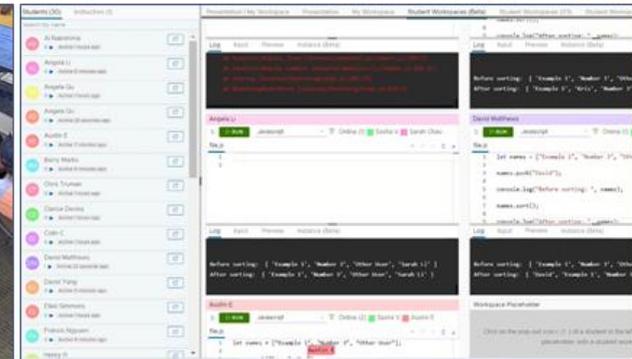## Phil Hackett, Michel Wermelinger, Karen Kear, Chris Douce

Research Question: Does the use of a virtual computing lab environment during synchronous tutorials improve teaching and learning?

Aim: Produce recommendations for the use of virtual computing lab environments whilst teaching programming at a distance.

Virtual Computing Lab: An environment that allows tutors to provide real-time feedback and support to students whilst they are programming.

A teacher supported computing lab.

A teacher supported virtual computing lab.

Recruit Tutors

Pre-Survey Students

Arrange, offer and deliver Virtual Computing Lab sessions

Tutor Focus Group

Post-Survey Students

Analysis

Recommendations

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