The 8th eSTEeM Annual Conference 2019

STEM Scholarship: From Inquiry to Implementation

Conference Booklet

8-9 May 2019

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ACKNOWLEDGEMENTS

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

Diane Butler, Director eSTEeM, STEM Faculty

Diane Ford, eSTEeM Manager, STEM Faculty

Mick Healey, Higher Education Consultant and Researcher, Emeritus Professor, University of Gloucestershire

Clem Herman, Director eSTEeM, STEM Faculty

Rachel Redford, eSTEeM Centre Support Assistant, STEM Faculty

Jane Seale, Professor in Education and REF Unit Panel Chair, Faculty of WELS

Open University colleagues who have contributed to the conference

Open University Audio Visual, Events and Catering staff

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Wednesday 8th May 2019

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PROGRAMME – DAY 2

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	Soraya Kouadri Mostéfaoui and Christine Gardner	How Can we Better Support OU Degree Apprenticeship Students?	
	Hilary MacQueen and Fiona Aiken	Cushions in the workplace? What vocational students need to succeed	
	Claudia Eckert	What will engineering design practice be like in 2040: insights from a workshop on trends in product development practice to 2040 and implications for engineering teaching	
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11.00 – 16.00	**Students as Partners Interactive Workshop**		**Hub Lecture Theatre**
16.00	**Close**		

WELCOME AND INTRODUCTION

Welcome to the 8th eSTEeM Annual Conference *STEM Scholarship: From Inquiry to Implementation* which takes place during the Open University's 50th birthday!

The aim of this conference is to highlight recent scholarship supported by eSTEeM and reflect on the future of STEM-specific teaching and learning in order to maximise the success of students in achieving their objectives and aspirations.

The conference programme for day one is an exciting mix of short oral presentations, workshops and structured discussions showcasing work from colleagues in the STEM Faculty and wider university. Once again all conference delegates will be invited to vote for the best poster. We will also be announcing the winners of the eSTEeM Scholarship Projects Awards. Prizes will be awarded for projects in two categories;

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

The finalists and prize winners will be announced at the end of the day on the 8th May following the closing keynote session.

The success of our students lies at the heart of eSTEeM's scholarship activity; our portfolio of ongoing and new projects presented at this conference includes studies about the role of students as partners, tutors, technologies for STEM learning, and online/onscreen STEM practice. During the parallel sessions, the workshops, poster sessions and breaks for refreshment there will be plenty of opportunities for joining the STEM scholarship debate and we look forward to your contributions.

On our second day we will be running a specialist workshop which will focus on the theme of 'Students as Partners'. Led by Professor Mick Healey, we will explore the challenges and opportunities we encounter in engaging our students as partners across the full range of our activities including the scholarship of teaching and learning, curriculum and learning design and subject based research and enquiry. We are delighted to be including a number of our OU STEM students in, as well as Associate Lecturers in this innovative workshop.

We welcome you to our 8th eSTEeM conference and hope you have an informative, stimulating and enjoyable two days.

Diane Butler (left) and Clem Herman (right) eSTEeM Directors

OPENING KEYNOTE SPEAKER BIOGRAPHY

Jane Seale graduated from Plymouth Polytechnic in 1987 with a degree in psychology. She then went on to join the Computer Applications to Special Education Research Unit at Keele University where she completed her PhD focusing on the management of special needs technology in adult special education. In 1993 she joined Southampton University, taking on various roles including lecturer in higher education and innovation. Between 2000 and 2002 Jane set up the first ever UK based Masters in Assistive Technology at Kings College, London. In 2010 Jane became Professor in Education at Plymouth University, moving in 2013 to take up a position of Professor in Inclusive Education at Exeter University. Jane joined the OU in April 2016.

Jane has developed a national and international profile in the field through key roles such as President of the Association for Learning Technology (2006-7) and Digital Inclusion consultant to the ESRC funded Technology Enhanced Learning (TEL) Programme in the UK (2009-2012). Between 2007 and 2010 Jane was Co-Director of the ESRC National Centre for Research Methods. She has recently served on the REF 2014 Education panel in the UK which had the responsibility for assessing the quality of research conducted in UK universities.

CLOSING KEYNOTE SPEAKER BIOGRAPHY

Mick Healey is an HE Consultant and Researcher and Emeritus Professor at the University of Gloucestershire, UK. Until 2010 he was Director of the Centre for Active Learning, a nationally funded Centre for Excellence in Teaching and Learning. He is currently The Humboldt Distinguished Scholar in Research-Based Learning at McMaster University, Canada. From 2014-17 he was visiting professor at UCL, helping them embed the Connected Curriculum across the institution. He was one of the first people in the UK to be awarded a National Teaching Fellowship and to be made a Principal Fellow of the HE Academy. In 2015 he received the Distinguished Service Award from the International Society for the Scholarship of Teaching and Learning. Since 1995 he has given over 500 educational presentations in 25 different countries.

Mick has written and edited around 200 papers, chapters, books and guides on various aspects of teaching and learning in HE. He has over 8,500 citations. He was co-editor of the *International Journal for Academic Development* (2010-13) and is currently Inaugural Senior Editor *International Journal for Students as Partners*. He is often asked to act as an advisor to projects, universities and governments on aspects of teaching and learning, including the Canadian Federal Government and the League of European Research Universities. He gave an eSTEeM workshop in February.

Selected references
A full list may be found at www.mickhealey.co.uk.

2009 *Developing undergraduate research and inquiry*. York: HE Academy (Healey M and Jenkins A) 152pp
http://www.heacademy.ac.uk/assets/York/documents/resources/publications/DevelopingUndergraduate_Final.pdf

2013 *Developing and enhancing undergraduate final year projects and dissertations*. York: HE Academy (Healey M, Lannin M, Stibbe A, Derounian J) 93pp
http://www.heacademy.ac.uk/projects/detail/ntfs/ntfsproject_Gloucestershire10

2014 *Engagement through partnership: students as partners in learning and teaching in higher education.* York, Higher Education Academy. Healey M, Flint A, Harrington, K) 76pp
https://www.heacademy.ac.uk/engagement-through-partnership-students-partners-learning-and-teaching-higher-education

2015 Assessing capstone projects and dissertations, Hong Kong University *WISE Assessment Briefing 4*

2015 Students as partners in learning, in Lea, J (ed) *Enhancing learning and teaching in higher education: Engaging with the dimensions of practice*, Open University Press (Healey M, Bovill C and Jenkins A)

2016 Students as partners: Reflections on a conceptual model, *Teaching and Learning Inquiry* Special Issue (Healey M, Flint A and Harrington K)

2017 Responding to the challenges of student-staff partnership: The reflections of participants at an international summer institute, *Teaching in Higher Education* 22(6), 720-735 (Marquis E, Black C and Healey M)

2018 Connecting learning, teaching, and research through student-staff partnerships: toward universities as egalitarian learning communities. In V. Tong, A. Standen, A., & M. Sotiriou, (Eds.) *Research equals Teaching: Inspiring research-based education through student-staff partnerships* (pp.17-29). London: University College of London Press (Matthews, K.E, Cook-Sather, A., & Healey, M.)

2018 "It depends": Exploring the context-dependent nature of students as partners' practices and policies. *International Journal for Students as Partners, 2*(1) (Healey, M., & Healey, R. L.)

2018 Enhancing outcomes and reducing inhibitors to the engagement of students and staff in learning and teaching partnerships: Implications for academic development. *International Journal for Academic Development* (Matthews, K. E., Mercer-Mapstone, L., Lucie Dvorakova, S., Acai, A., Cook-Sather , A., Felten, P., Healey, M., Healey, R. L., & Marquis, E.)

2019 Growing partnership communities: What experiences of an international institute suggest about developing student-staff partnership in higher education. *Innovations in Education and Teaching International* 56(2), 184-194 (Marquis, E., Guitman, R., Black, C., Healey, M., Matthews, K. E., & Dvorakova, L. S.)

CONFERENCE INFORMATION

Registration
Conference registration will take place between 9.00-9.30 on Wednesday 8th and between 8.45-9.15 on Thursday 9th May in the Hub Suite. There is a map of the campus on the back cover of this booklet.

At registration you will receive a personalised programme reminding you of the sessions you have registered for.

Helpdesk
A helpdesk will be manned by eSTEeM conference staff in the Hub Reception throughout the conference to help you with any queries that you may have.

Luggage storage
If required, we will have a secure room available for you to store light luggage until the end of the day on Wednesday 8th and Thursday 9th May. Please ask at registration for more details.

Conference sessions and recordings
The opening and closing keynote presentations on day one will be webcast and made available as replays soon after the conference via the eSTEeM website.

Some of the sessions may be attended by a journalist or photographer; however this should not cause any disturbance. The video footage and photographs may be made available to the public via the internet. Audience members are participants in this process. If you have any concerns please speak to a member of the eSTEeM conference team.

Session etiquette and electronic equipment
We respectfully ask that all delegates use any personal electronic equipment with respect for session presenters and fellow delegates. We suggest using mobile phones and electronic equipment in silent mode.

Poster Presentations
There will be a poster presentation session from 12.45-13.15 and you are welcome to continue browsing posters over lunch between 13.15 –14.00 in the Hub Lecture Theatre on the 8th May. Conference delegates are invited to vote for the best poster. The winning poster will be announced at the end of day on the 8th May during the closing keynote session. Posters will continue to be displayed throughout the conference.

Session changes
We will try to keep 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 posted on the notice board by the helpdesk.

Conference refreshments
Conference registration includes tea and coffee on arrival, morning and afternoon breaks as well as a buffet lunch on both days.

GENERAL INFORMATION

Parking and transport
Due to the volume of staff on campus parking spaces can be limited. Therefore, we recommend using the South West, Church or East Parking overspill car parks. Any vehicle clearly parked in an unauthorised location will be issued with a parking charge notice by campus security.

Security
For security purposes, please ensure you wear your conference badge while on campus. If you have any emergency security issues please ring ext 53666 for the security lodge, or contact a member of the eSTEeM conference staff. Please do not leave personal items unattended. The University will not accept liability for loss or damage to personal items or equipment.

Disabled access and elevators
All venues at the Open University have disabled access. Please see a member of eSTEeM conference staff if you require assistance. Please contact us immediately if you have any mobility requirements of which you have not made us aware.

No Smoking Policy
The Open University operates a non-smoking policy. We ask you to respect this policy whilst on campus. All premises are designated smoke-free. Smoking is not allowed in any part of, or entrances to, any building, including bars and eating areas. Smoking whilst on site is only allowed outdoors in designated green areas.

Other queries
eSTEeM conference staff will be glad to help you with any other queries you may have.

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

BOOK OF ABSTRACTS

Opening Keynote Presentation

My personal journey into the student voice arena: making the connections between policy, research and scholarship

Professor Jane Seale
Faculty of WELS

My research takes place at the intersection of technology, disability and inclusion and it is my interest and knowledge of these three fields that has drawn me to explore approaches for implementing student voice initiatives in my own teaching practice and in higher education more broadly. In this presentation I will share my student voice journey with you. In doing so, I will draw on three student voice projects that I have undertaken between 2007 and 2014 to illustrate three particular arguments I wish to make about how best to approach student voice work:

1. Theoretical and epistemological frameworks can provide a useful foundation on which to build valid and meaningful student voice initiatives
2. There is a real need to critically examine the outcomes of student voice initiatives in order to make valid conclusions about their success or effectiveness
3. If we as a community can do one or both of these things, then when we write up our internal student voice projects there is no reason why what we produce should not be labelled research instead of scholarship.

Parallel Session A: Short Oral Presentations – *Innovations in Assessment & Supporting Students*

90% Student Retention by Design

Jeff Johnson
STEM Faculty

High retention up to 90% can be achieved by a new assessment strategy and integrating ALs into module teams, as demonstrated by T212 Electronics which was designed to have the highest possible retention.

Assessment can be designed to encourage students to complete their TMAs (especially TMA01), even when they have to cover a lot of material in a last-minute pre-submission rush. We do this by allocating 40% of the marks to ten short questions that are relatively easy to answer by referring to the module materials. The idea is that a student who has left their TMA to the last weekend will be able to complete this first part by Saturday lunchtime, knowing they have scored at least 30% of the marks required, and only 10 marks from 60 are required to pass the TMA. This then motivates them to stay with the TMA rather than give up and go to the pub.

A further aid to completing the TMA involves indicating in the VLE when students can answer the TMA questions. This allows them to answer the questions as they go along when the material is fresh in their minds, and again to get their TMA off to a flying start.

Associate Lecturers play a crucial role in retention, and for T212 we integrated the ALs within an 'extended module team', empowering them to participate proactively in achieving high retention. AL feedback was invaluable as the module developed, as was their feedback on the assessment questions and the marking guides. ALs work closely with the module team in moderating conferences including special technical conferences for our laboratory exercises. Without doubt this contributed to the 88% retention achieved on the first 2018J presentation.

Acronyms: AL = Associate Lecturer, TMA = Tutor Marked Assignment, VLE = Virtual Learning Environment (module website)

Confidence Building assessment for Level 1 Computing and IT students

Paul Piwek
STEM Faculty

According to Jenkins (2002), learning a complicated skill such as programming is a slow and gradual process. Different students will learn at different paces. Students often start a programming course with the preconception that programming is difficult, which has a negative effect on their motivation and can be reinforced if they are subjected to summative assessment too early.

We describe several strategies that were used in TM112 (Introduction to Computing and IT 2) to

build student confidence and encourage sustained practice and reflection. This includes gradually increasing weighted single component summative assessment, formative quiz-based assessment that focuses on student engagement and reflection, and interleaving of skills and topics to provide students with practice and feedback opportunities throughout the module and increase recall.

We will present both quantitative results on engagement of students with the formative and summative assessment and qualitative analysis of student reflection (returned as part of the formative assessment) and student experience feedback. We will discuss a pros and cons analysis of the approach. We will also highlight the use of formative quizzes where students submit evidence of engagement via the TMAs for a small number of marks. A significant benefit of this was the ability of students to discuss their queries and answers as they completed the quizzes on the module forum. This appears to have led to a genuine learning community, with evidence of peer support and vicarious learning.

The presentation is aimed at providing an overview of the strategies for confidence-building and sustained practice used in TM112 and discussing the pros and cons of the approach.

Using technology-enabled learning networks to drive module improvements in STEM

Lesley Boyd[1], Rob Janes[2] and Tom Olney[2]
Faculty of WELS[1], STEM Faculty[2]

This presentation describes a work-in-progress action research eSTEeM project aiming to illustrate one innovative approach to the integration of theory and practice. The action research approach is being underpinned by Grounded Theory Method, in the search for actionable knowledge, which is usable by practitioners whilst being sufficiently theoretically robust. Thus a structured and rigorous action-based methodology is being used, which also aims to make a clear theoretical contribution.

This project investigates how technology-enabled learning networks can be used in STEM to achieve practical organisational improvement outcomes. It is a collaboration between the PhD research work of Lesley Boyd (IET) and the STEM faculty, and builds on a previous eSTEeM project on Tricky Topics.

A learning network is defined in this research as a technology-enabled and structured way of collaboratively learning how to problem-solve and improve, connecting together different role players across our various organisational boundaries and contexts. The emphasis in this type of 'organisational' learning network is on collaborative and equitable participation, and joint ownership of the unfolding improvement process and outcomes from it.

In the previous project, learning networks were hosted in dedicated VLE sites for each of three pilot modules on Tricky Topics, or aspects of academic work that students consistently find tricky or challenging. Discussion forums and online workshops were used to seek feedback from tutors, in order to collaboratively identify Tricky Topics and suggest improvements or produce learning interventions. In one module, S215, the discussion was particularly engaged and successful. ALs

and the module team identified a list of conceptual Tricky Topics, plus a list of additional issues or student challenges including prerequisite knowledge, and pace and volume of material. ALs designed and implemented four innovative intervention videos, which have been in use on the module website and emulated elsewhere.

In this current project, a second cycle of collaborative action research is following on from the issues raised in the first. The learning design 'mapping' for the module, plus relevant learning analytics and aggregated VLE usage data, was presented in the form of 'visualisations' to tutors, to assist towards the further co-construction of issues and the planning and taking of action. Discussion forum feedback was again sought on ideas for in-presentation teaching improvements or adjustments. There were five different types of active participants in the discussion: ALs, module team chairs, the senior manager in STEM with responsibility for learning design, a staff tutor and a module team chair for the follow-on module.

An action under trial in the current 18J presentation is the development of 'signposting' materials to assist students who may be struggling to keep up with the planned study schedule. These signposts will be described, plus further actions under consideration. A flavour of the underpinning GTM analytical process will be explained.

Parallel Session B: Short Oral Presentations – *Supporting Students & AL Development*

Learning from Associate Lecturer Experience in Tuition Strategy Design and Review

Sharon Dawes and Simon Savage
STEM Faculty

We will report on the outcomes of the eSTEeM project "Towards a Structured process for Involving ALs in Module Tuition Strategy Design and Review".

Following the introduction of the Group Tuition Policy (GTP) in 2016, Associate Lecturers (ALs) were given the opportunity in 2017 to feed back into a review of the newly created module tuition strategies. This project examined how the review feedback was collected and acted upon for undergraduate modules within the school of Computing and Communications, with a view to developing a structured process that could be piloted within the school before disseminating recommendations more widely.

For the review, feedback was collected through synchronous meetings, forum discussions and emails. This project gathered evidence of the feedback from meeting recordings and forum posts. The 2016 and the 2017 tuition strategies were compared to see what changes had been made as a result of the review.

Although the intention of the review had been to collect feedback about the tuition strategy designs, much of the feedback was about how the strategies had been implemented and some feedback was about other aspects of the AL role. The resulting changes to the tuition strategies varied from module to module.

Some clusters found a synchronous face-to-face or online meeting beneficial whereas other groups found forum discussions were effective in meeting their requirements. It is recommended that module teams are given enough flexibility in their approach to such meetings and involve ALs in deciding that approach.

If under GTP we continue to review module tuition strategies, it is important to allow strategies to stabilise and the ALs to develop their practice, and not necessarily have a review with every presentation.

At the same time as reviewing the tuition strategy, staff tutors and ALs should have the opportunity to review how the strategy is implemented.

The emphasis should be on increasing flexibility within the tuition strategies, to enable ALs to develop and work within a community of shared professional practice, to share their professional expertise between themselves, to trial new ideas and to provide dynamic and innovative tuition for the benefit of our students. We should learn from our ALs because they know how to deliver supported open learning at a distance to an exceptionally high standard.

Assessing the effectiveness of the induction process for novice Associate Lecturers (AL) in the School of Life Health and Chemical Sciences (LHCS) in preparing them for the AL role

Hannah Gauci and Janette Wallace
STEM Faculty

Prior to the closure of regional centres, AL induction took place face to face and included workshops on key aspects of the AL role allowing managers and ALs to meet and form connections. Since then, in addition to support from their staff tutor and mentor, AL induction has been generic, online, and self-guided. Anecdotally, this has resulted in some ALs feeling inadequately prepared and unsupported in their new role, which potentially impacts on teaching, learning and student experience. To address this, we developed an online program to complement the generic induction training. Our research aims to evaluate the effectiveness of this combined approach over two cohorts of novice ALs in LHCS. Here we report the results of the first phase of the project.

23 novice ALs appointed on a new module, SK299 Human Biology in LHCS in September 2017 were invited to participate in an online induction that consisted of a support forum moderated by staff tutors, and a program of staff tutor and peer-led, online workshops. Workshops covered key areas such as tutorials, student support, and TMA marking and took place at key points over the duration of the module presentation. The program complemented the generic “AL Essentials” and “Tutoring Online” courses and support from ALs’ staff tutors and mentors. ALs (n=16) were surveyed at the end of the module presentation to gather information about their previous experience, confidence levels, and perceptions of the effectiveness of their induction. This was followed up with a focus group (n=5).

Novice ALs have varying experience of working in HE and of teaching online at a distance.

Confidence levels in key areas relating to the AL role before induction varied, but ALs were most concerned about the using online rooms. Confidence levels had increased by the end of the presentation. ALs valued the support from their staff tutor and mentor, but the amount of support received varied. ALs reported that the program of workshops was useful overall. The timing of workshops was important, and should be linked to tasks as they come up in the module presentation. ALs preferred workshops containing activities (e.g. marking) and liked the use of webcams. ALs appreciated the opportunity to support each other in forums and completing induction training together, particularly as part of the "tutoring online" module. They found "AL Essentials" useful but overwhelming and identified the need for a 'quick start' guide that outlines essential tasks for the first few days and weeks.

Results from phase 1 highlighted the induction requirements and preferences of novice ALs and have informed a modified induction program (phase 2) that is being offered to ALs who joined LHCS modules in October 2018. Phase 2 will be evaluated and recommendations made to be shared across schools and faculties.

Situated learning via the STEM-ByALs-ForALs programme – feedback from participating ALs over different phases of the programme

Janet Haresnape, Nirvana Wynn and Fiona Aiken
STEM Faculty

This presentation explores the extent to which ALs at the OU who have participated in the ByALs-ForALs programme have found sharing practice through participating in a tutor-led online programme of events helps them to support their students more effectively. The programme of regular online sessions, was initially introduced as a staff development initiative to (i) provide science tutors with opportunities to share good practice and hence improve their online interactions with their students, and (ii) to help nurture a sense of community among science tutors, providing a supportive situated learning environment (Lave and Wenger, 1991) which fosters peer support and in which they can share ideas and concerns. After OU Faculty restructuring in August 2016, when Science became part of the much larger STEM Faculty, the programme was extended to include all STEM ALs. From October 2017, the delivery platform for the programme moved from OU Live to Adobe Connect. Qualitative and quantitative analysis (using NVivo) of feedback obtained from participating ALs has demonstrated that the programme has succeeded in providing a friendly supportive environment, relieving some of the isolation felt by ALs at the OU, nurturing community spirit, and providing valuable development opportunities. One particular challenge has been to maintain the supportive, community feel of the programme among the much larger cohort of STEM ALs than those from Science, and the extent to which this has been achieved will be explored. A programme run on similar lines could potentially help strengthen the tutor community and provide valuable opportunities for sharing concerns and good practice not only in other Faculties in the OU, but also at other institutions where tutors may feel isolated, for example where much tuition is delivered online, where staff are located on different sites or where many staff have insecure contracts.

Parallel Session C: Workshop/Demonstration – *Technologies for STEM Learning*

PiMaze: Teaching Programming through Tangible Interfaces

Danny Barthaud, Amel Bennaceur and Vikram Mehta
STEM Faculty

In this demonstration we present a tangible interface to introduce students to a range of programming concepts. A dynamic LED matrix controlled by a Raspberry Pi is used to represent a maze environment that students interact with using the Python programming language. The LED representation allows us to easily deploy different maze configurations according to the target learning outcomes of any given activity. To control the activity, students can use a number of custom functions as well as the Python standard library to create mazes and control their player.

We will demonstrate an activity that we have designed to help students solidify their understanding of variable assignment, Boolean logic and loops. The activity begins with an easily solvable maze where the student only needs to create a loop of 'move forward' commands to escape. The student will be presented with mazes of increasing difficulty by introducing turns and dead ends so that the student refines their algorithm to eventually solve any random maze using a wall following technique.

The maze platform we have developed is easily extensible and other activities could include: optimising maze escape algorithms, testing and correcting a given escape algorithm, dynamic elements (such as moving obstacles), interactive elements (such as keys and doors) and introducing maze generation algorithms. The maze already has strong gamification elements and we can build on this by allowing students to create and share their mazes, challenging others to complete them.

The activity was proposed as part of the OpenSTEMLab Challenge workshop and presented at last year's esteem conference and this demonstration shows the first prototype. It focuses on basic Python programming structures that are vital to master before a student can tackle more complex problems. The platform can also introduce the notions of complexity and adaptation, adding faults to introduce resilience, Raspberry Pi programming and programming autonomous robots. By offering a range of activities at different levels of difficulty, this experiment can be used by several computing and engineering modules that develop programming skills, especially TM112 for the simplest version and M269 for more advanced versions.

Parallel Session D: Workshop/Demonstration – *Supporting Students*

How do we support students who study full time? Findings from a Stage 1 interdisciplinary science module

Lynda Cook[1], Diane Butler[1], David Appleton, Anthony Short[2], Oliver Burnley[2], Dan Berwick[1] and Marcus Badger[1]
STEM Faculty[1], Academic Services[2]

The workshop will present some early data arising from an eSTEeM scholarship project examining student retention on the modules in the Stage 1 pathway of natural sciences (Q64). Q64 stage 1 consists of S111 (Questions in Science) and S112 (Science: concepts and practice) and this study focuses on students who attempted to study 120 credits (S111 and S112 concurrently) in 17J and 18J. The project team consists of a multidisciplinary group of staff with faculty staff (S112 Module team co-chairs and Staff Tutors), SRSC (senior advisors, educational advisor) and ALs (S112).

Our data show that a significant number of students (23% for 17J) on S112 are studying at a full time rate (120 credits). Whilst some of these students withdraw from one/all of their modules, some students are successful in completing 120 credits in one academic year – 19% of S112 17J students were still studying in March 2018 and at a full time intensity.

Preliminary analysis suggests that 40% of students studying at a full time study intensity have had prior study experience or contact with the Open University and tend to be younger in age. As the number of full time students across the university is rising year on year, we will use the early findings from this project to explore via discussion the key issues around the effective support of students studying full time, as follows;

- Given the nature of our curriculum, whether full time study is a realistic option for STEM students – for many students or for few?
- What can we do to advise students better pre module start – to encourage or discourage as appropriate?
- How can we support and guide students studying full time where it is appropriate choice for them?

Parallel Session E: Short Oral Presentations – *Online/Onscreen STEM Practice*

Achieving student participation and encouraging active learning in online tutorials

Claudi Thomas, Katrine Rogers and Hilary Holmes
STEM Faculty

Our study into the effectiveness of online tutorials at engaging students in active learning focused on comparing three different types of interactive activity available in Adobe Connect: polling, on-screen activities (such as drawing or moving objects) and answering questions by chat box or microphone. Only activities involving answering mathematical questions were included.

Data was collected on student participation in these interactive activities in online tutorials on three different Mathematics modules spanning Levels 1 - 3. This included 80 student survey responses, 9 in-depth student interviews, 11 online tutorial observations, survey responses from each of the three participating tutors after each observed tutorial and a focus group discussion with the three tutors. Data collection focused on how many students participated in the activities, how many students attempted the questions even if they did not share their answers, and whether students found the activities useful and enjoyable, and why.

Student participation was very high across all types of activity, and most students found the activities useful and enjoyable. Only minor differences were apparent across the types of activity, though surprisingly use of the chat box seemed to get less favourable responses. Students valued the opportunity to learn by doing and some also felt they had ample opportunity to ask questions, and that their misconceptions were identified. However, many students felt these latter two, which are important for deep learning, were lacking, something which was also evident in other parts of the data. We have identified specific areas of improvement to further encourage active/deep learning.

Other findings include that technological problems are not insignificant, that tutors must be highly conversant with the software and that an expectation of online tutorials being lectures already exists. Some of these issues are amplified in the use of recordings of tutorials.

Results from the study will be presented, highlighting aspects that work well when designing interactive online tutorials in Adobe Connect and also those aspects that appear to need further development.

Online Team Investigations in Science (OTIS) – Analysis of student interactions in team-working projects

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

OTIS (Online Team Investigations in Science) is an in-depth study of the factors affecting the student experience and pedagogical design of three different examples of online team projects for advanced undergraduate and taught postgraduate students in astronomy and space sciences at the OU. These three team projects are based on open-ended scientific investigations which respectively use an external research archive (the Sloan Digital Sky Survey), the OU's PIRATE robotic telescope, and the OU's Mars Yard and rover. Our key aims are to better understand how the success of online team-working depends on pedagogic design, the use of online communication tools, student engagement, group dynamics, peer-learning and assessment strategies. We are also interested in investigating whether there are any differences in behaviour in these teams based on student characteristics such as age or gender.

In this talk we will present an analysis of a sample of forum discussions that students use to work together in teams. We will describe how we have developed and refined a hierarchical thematic

framework which we have used to classify forum interactions. At the top-most level, this scheme has categories of group building, group learning, self-organisation, and expression of individual feelings, as well as direct teaching input from academic staff. We will present results that give a quantitative breakdown of a sample forums using our analysis scheme and highlight differences between the three types of project. We will also show our results of applying this thematic analysis of forums as a function of gender. We will comment on the significance of our results and how they relate to issues about team-working that are currently being investigated through in-depth interviews with students on these modules.

Improving Student Engagement via Interactive Videos

Bryan Singer[1] and Rafael Hidalgo[2]
STEM Faculty[1], Learner and Discovery Services[2]

Video presentation is a critical feature of online distance learning. Various publications have reported how online videos are useful educational tools that enhance knowledge. Despite this, the viewing of online videos tends to be a passive activity for students; this is antithetical to pedagogical studies that suggest how active learning promotes the understanding of the material. Furthermore, watching long videos can negatively impact cognitive load and thus reduce an individual's ability to encode and retain learned information into memory. Accordingly, we hypothesise that dividing online videos into multiple interactive segments may improve understanding and retention of course material. Through development of The Open University's virtual learning environment and collaboration with external learning design companies, we are taking a selection of module videos and embedding questions into them. During playback, the videos pause following the presentation of valuable information and students are required to answer a question before resuming. Existing passive videos are being upgraded into interactive videos. All questions are software-marked and we are assessing student performance, interaction, and satisfaction. Given the ease of converting old videos into interactive multimedia, we believe that interactive videos may quickly and positively influence current and future module presentation.

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

Are we making progress? A longitudinal study of OpenDesignStudio (ODS) in design education

Derek Jones, Nicole Lotz and Georgy Holden
STEM Faculty

High retention up to 90% can be achieved by a new assessment strategy and integrating ALs into module teams, as demonstrated by T212 Electronics which was designed to have the highest possible retention.

Assessment can be designed to encourage students to complete their TMAs (especially TMA01), even when they have to cover a lot of material in a last-minute pre-submission rush. We do this by allocating 40% of the marks to ten short questions that are relatively easy to answer by

referring to the module materials. The idea is that a student who has left their TMA to the last weekend will be able to complete this first part by Saturday lunchtime, knowing they have scored at least 30% of the marks required, and only 10 marks from 60 are required to pass the TMA. This then motivates them to stay with the TMA rather than give up and go to the pub.

A further aid to completing the TMA involves indicating in the VLE when students can answer the TMA questions. This allows them to answer the questions as they go along when the material is fresh in their minds, and again to get their TMA off to a flying start.

Associate Lecturers play a crucial role in retention, and for T212 we integrated the ALs within an 'extended module team', empowering them to participate proactively in achieving high retention. AL feedback was invaluable as the module developed, as was their feedback on the assessment questions and the marking guides. ALs work closely with the module team in moderating conferences including special technical conferences for our laboratory exercises. Without doubt this contributed to the 88% retention achieved on the first 2018J presentation.

Notetaking and on-screen learning: conclusions from a Level II science course

John Baxter
STEM Faculty

Research implies that undergraduate students in lectures who take handwritten notes learn more effectively than those who type into an electronic device, and that both in turn learn more effectively than those who do not take any notes.

There is much less evidence related to either book-based or on-screen teaching materials.

This presentation will present the results of an eSTEeM project that it is in its final stages. It will outline evidence that, in the context of on-screen learning, students who achieve higher outcomes in the end of module assessment tend to adopt different notetaking strategies from those who achieve marks at the lower end of the spectrum. Evidence will be presented that, whilst students who claim to take no notes do not achieve high marks, nonetheless they still manage to pass the module. It will explore some interesting, perhaps counterintuitive information, about how prior on-screen study influences the notetaking strategies that students adopt.

S201 Science and Society is an interdisciplinary level II module which integrates development of students' scientific understanding with a clear focus on skills development. One of the major aims of the module was to develop the students' skills in collating and analysing complex scientific and social information from a wide range of study materials and external sources.

This presentation will describe how the S201 module team integrated an optional on-screen notetaking tool in the design of the teaching and assessment materials; quantify student take-up of the tool; outline the various other notetaking strategies that students adopt; explore the evidence of a correlation between assessment outcome and intensity of notetaking; outline

differences in understanding between students and teachers as to what constitutes notes; and analyse the influence of prior study on student outcomes in an entirely on-screen module.

Live, interactive fieldcasts: How flexible and robust is our technology and teaching design to multiple changes?

Julia Cooke, Philip Wheeler, Kadmiel Maseyk, Sarah Davies and Trevor Collins
STEM Faculty

The process of conducting a scientific investigation underpins research and although simple in theory, the process is deceptively complex due to the skills and knowledge needed to confidently make decisions at many points. It can be daunting to students conducting an original investigation for the first time. Field studies can be an additional source of anxiety and barriers to participation in investigations. However, whether training researchers or interpreters of research findings, an understanding of the investigative framework and field experience is essential for many environmental scientists.

For the last four years, second level Environmental Science (S206/SXF206) students have remotely participated in a field investigation undertaken by three lecturers at an ecology field site on the OU campus, using the KMi developed platform Stadium Live. This involves two field broadcasts and one lab broadcast lasting around 30 minutes each. During the 'fieldcasts' students use the widgets to identify potential things to investigate; select the form of investigation, hypothesis, sampling method and analysis method; and decide the interpretation of the results. The aims of the fieldcast activity are to model the scientific method applied in the context of field investigations, to introduce students (and widen access) to practical fieldwork, demonstrate the practical application of environmental science and increase student confidence in attending field schools or conduct their own independent project. The fieldcasts employ a research-based, student-led approach and cutting edge technology to increase student perception of being part of the investigation and remote access the field site.

Over the four years, the fieldcasts have been subjected to several changes: they have become a compulsory part of the module, the broadcast date has moved from mid spring to late winter, the site has changed, the presenters are different, and technology has developed. In this presentation we will discuss how these changes have affected the production process, staff and student experiences, and challenged the robustness, flexibility and accessibility of the technology and teaching design.

Parallel Session G: Workshop/Demonstration – *Technologies for STEM Learning*

VISION Visual Interface for students and professionals to annotate, map and outline academic papers in STEM

Ale Okada
Faculty of WELS

Online annotation is an increasingly important task for students to select the key issues, add their own reflections, and map knowledge for writing essays. There is a growing set of web annotation tools, however, literature is limited on the impact of these technologies for authentic writing, assessment and meaningful learning. This exploratory workshop aims to examine the use of annotation mapping tools by STEM students and tutors in online courses for personal and collaborative annotation. First, we will reflect on some successful and unsuccessful examples of annotation, mapping and outlining of academic references developed by STEM students. Then we will discuss the benefits and challenges of using annotation for students and academic professionals in STEM to increase their authorial identity and reduce plagiarism.

Parallel Session H: Structured Discussion/Briefing – *Innovations in Teaching Through Assessment*

An exploration of effective teaching through feedback on students' assignments

Sue Forsythe, Cathy Smith and Charlotte Webb
STEM Faculty

The provision of detailed feedback on students' work is considered to be a part of teaching (Open University, 2017). Sadler (2010) describes typical written feedback on students' assignments as a form of teaching by exposition with the feedback sheet being the instructional medium, a form of communication from the tutor to the student which is carried out asynchronously. In other areas of study we do not generally expect students to learn best by exposition and yet feedback typically uses a transmission style, by informing the student of what they did well and describing how they could improve. In contrast Walker (2009) showed that feedback which includes explanation of why the student's work falls short and of why the suggestions the marker gives are an improvement could be considered to be more effective in the constructivist sense of helping the student make sense of the feedback and to learn something from it.

If students are to be able to interpret feedback on their work and use it to improve then they need to be able to assimilate what they have learnt from reading the feedback into their understanding of the skills examined through the assessments. This implies that students need to understand the language and discourse used in feedback in order to be able to interpret it in the context of their own assignment (Sadler, 2010). Price et al (2010) found that students often do not understand how to use feedback nor do they always understand the discourse used in feedback and the former probably feeds into the latter. Wilson (2015) describes an initiative, at the Open University, to address these issues through designing a markers' feedback guide. This promotes, among a number of strategies, the use of clear language and the signposting of

feedback summary to script comments with the aim of making feedback more usable by students. In the discussion session we will consider these issues and invite colleagues to offer their views. We will explore current practice in providing feedback and are especially interested in innovative feedback practices, used in Open University modules, which make them more effective.

References:
Open University, 2017 Correspondence tuition in computing and communications
Price, M., Handley, K., Millar, J. and O'Donovan, B., 2010. Feedback: all that effort, but what is the effect? Assessment & Evaluation in Higher Education, 35(3), pp.277-289.
Sadler, D.R., 2010. Beyond feedback: Developing student capability in complex appraisal. Assessment & Evaluation in Higher Education, 35(5), pp.535-550.
Walker, M., 2009. An investigation into written comments on assignments: do students find them usable? Assessment & Evaluation in Higher Education, 34(1), pp.67-78.
Wilson, A., 2015. An exploration of tutor feedback on essays and the development of a feedback guide. European Journal of Open, Distance and E-learning, 18(1).

Parallel Session I: Short Oral Presentations – *Innovation in Teaching and Learning, Supporting Students, Equality, Diversity and Inclusion & International Curriculum Delivery*

Online journal clubs (OJC) in distance higher education: an opportunity to develop skills and community?

Karen New and Fi Moorman
STEM Faculty

Journal Clubs (JC) are a well-established aspect of academic life in many Universities and areas of employment. Traditionally face-to-face, they provide opportunities for peer-to-peer learning, networking and dissemination of current developments. For students and early-career individuals, JC improve core undergraduate competencies such as communication skills and awareness of 'the scientific processes. However this traditional face-to-face approach is not available to our students. Furthermore, any student-student interaction is largely conducted in an online environment such as a tutorial conducted in Adobe Connect; research indicates that students are reluctant to use microphones in this online setting which may decrease the opportunity for interaction and hence community building and may impact upon motivation and engagement.

Our eSTEeM project expands on a pilot (on S112 and S294 Early Start Sites) to develop and evaluate an innovative online model of JC, tailored to our distance education setting. Events take place online in Adobe Connect, where small groups of students each present a science news item of their choice, and hence differ from traditional JC which are often centred around a single article selected by the lead/facilitator. Unlike some OU tutorials, online journal club (OJC) events are student-led, participation is optional and events are not recorded. OJC facilitators take a 'back-seat' role, offering encouragement and administrative/ICT support. Currently, OJC has a science focus; our initial project targeted a few L2 Biology and Health modules (S294, SK299,

SXHL288 and S295) but we have widened our clubs and are trialling different models of OJC, not only within STEM but also cross-faculty.

We have a dedicated student-facing OJC website, providing key infrastructure such as a forum, a quiz and the Journal Club online room as well as guidance about finding and presenting 'science news'. Students have the option to obtain a microbadge following participation in OJC and completion of the quiz and club events are advertised via the science student website, module student forums, news posts and associated twitter feeds.

Our eSTEeM project will involve an analysis of student demographics to explore whether students from a wide range of backgrounds are accessing OJC. Survey data will be used to evaluate student experience of these clubs and any perceived benefits including development of key undergraduate competencies such critical reading, evaluating and communication skills as well as ICT confidence/competence, e.g. use of microphones online.

We anticipate giving delegates a progress update on the OJC journey to date, including a brief tour of our website. We will present preliminary survey data and will outline future directions. We would like to offer delegates the opportunity to reflect on the unique tutor student dynamic within our OJC model and the opportunities for confidence and skill building within the informal setting of the online journal club.

Creating a discipline-based accessibility working group

Anne-Marie Gallen[1], Trevor Collins[1] and Chetz Colwell[2]
STEM Faculty[1], Faculty of WELS[2]

Disciplines define subject-specific areas where students choose to learn and where academics share their knowledge, skills and passion. Disciplines by their nature differ and each brings with it challenges around teaching and learning. So, what do you do if your discipline contains a specific barrier to students, such as a symbolic language? Well, you could form a discipline-based accessibility working group. How? Come along to see how it has been done and what you can learn from it.

In April 2017, two people within the then Department School of Maths and Statistics wrote a letter to their Head of Department asking to set up a 'mathematics accessibility working group'. The subsequent journey led them to create a well formed and highly effective discipline-based working group which helps student overcome specific barriers within the discipline. By looking at the approach taken, and the stakeholders involved, much can be learned about how to identify and overcome disciplinary practices that disadvantage some students.

As part of the HEFCE Catalyst program Addressing Barriers to Student Success, the IncSTEM project team has looked in depth at the Maths and Statistics Accessibility working group as an example of developing inclusive teaching within a discipline. This is an opportunity to learn about this highly successful group, in light of how their approach could inform others seeking to tailor the accessibility of the teaching they provide to the needs of their discipline. A set of resources,

based on the work of this accessibility working group and others, are currently being developed to aid the formation of similar groups in other disciplines and settings.

Leaky pipeline or untapped potential? An investigation into the motivations and aspiration of female engineering students at The Open University

Carol Morris, Sally Organ and Moira Dunworth
STEM Faculty

The shortage of professional engineers in the UK is well documented, as is the disparity between men and women entering the profession, with women accounting for just 12% of those working in an engineering role (Engineering UK, 2018). This situation is further exacerbated by female engineering graduates being less likely to be in engineering-related employment six months after graduation than their male counterparts (Bullough and Taktak, 2015), although the reasons for this are unclear. Nor is it easy for women to return to engineering after a career break with barriers, such as location and mobility, alongside structural and institutional factors reported by Herman (2015) in her study of women returners to STEM. The cumulative effect of these factors is commonly referred to as 'the leaky pipeline' as female representation decreases from those taking STEM GCSEs to becoming and remaining professional engineers. We aimed to discover whether similar factors were influencing mature women's decisions to study engineering and their subsequent ability to enter the engineering profession at the end of their studies and whether the leaky pipeline metaphor applied to them.

We have collected data using the combination of a survey, sent to all female OU engineering undergraduates and a comparable number of male engineering students, alongside one-to-one interviews with a number of volunteers. The interviews were carried out by a single researcher and the responses coded and analysed with the aid of NVivo software.

We report on the outcomes of the completed study aimed at understanding the motivations, aspirations and experiences of mature women studying engineering qualifications at the Open University, and whether they differ significantly from those of their male counterparts. We have developed an understanding of why these women choose to study engineering in their 20s-30s, and what barriers they have had to overcome to be successful, and hope to work with Marketing and Communications to increase the number of mature women studying engineering and subsequently entering the engineering profession.

The presentation will focus on part-time engineering students in a distance-learning context but it will be of interest to anyone who has experienced issues of gender disparity in student recruitment and retention and offers new insight into mature students' backgrounds which could impact on curriculum design and delivery. Participants will be asked to share their insights of the mature student experience across disciplines and explore possibilities for future collaborative activity.

Supporting environmental management MSc students in Kenya

Stephen Burnley, Sinead O'Connor and Richard Campen
STEM Faculty

The OU has secured Commonwealth Scholarship Commission (CSC) funding which allows students in Kenya to study the MSc in Environmental Management. Currently there are about 25 students at various stages of the programme and 5 – 10 students will begin their studies in November 2019. Informal discussions with CSC students indicated they experience challenges that are not faced by their UK-based peers. For example internet access is costly and unavailable in certain areas, some students are studying in their second language and others are adjusting to novel scholarship conventions and norms. This project is attempting to determine the particular needs of CSC students so we can improve the support we give them and to other students in developing countries.

A mixed methods approach is being taken in this project beginning with a quantitative assessment of the progression of three cohorts of students, discussions with the two ALs responsible for the students during their three core modules and discussions with the students themselves. The students' views are being sought through focus groups and one to one interviews which are taking place at the same time as the face to face module tutorials in Nairobi.

Initial findings show that, for the first cohort of 11 students who began their studies in November 2015, two left the programme after two modules, one left after completing the Postgraduate Diploma, one is studying at a lower intensity than their peers and seven are due to submit their final dissertations in February 2019. This represents a possible maximum pass rate of 64% (73% if the Diploma student is included).

Discussions with the ALs showed that academic practice was a problem area for some students with several assignments failing to cite external sources or including excessively-long extracts from other sources. The student focus group highlighted a number of barriers to their studies including; long distances to the face to face tutorials, child care provision, timing of online tutorials, internet access and the strict UK stance on referencing. The students asked for support and coaching on improving their work-life-study balance, help with providing a quiet space for study and student meetings in Nairobi. Students tended to have little engagement with the OU forums preferring to use their own more informal and friendly WhatsApp group. On a positive note, they were very pleased with the AL support and TMA feedback, the way the programme blends theory and practice (although more examples from Africa would be welcome), the fact that they can apply their learning at work and the strong bonds between the students (using WhatsApp and over social media).

Students coming to the end of their studies said that they would like an official way to celebrate graduating with the OU (photographic evidence of them wearing academic dress can be important in establishing their credentials). Students would also like to make visible their experiences of studying online and are keen to share and connect with the wider learning community and be part of initiatives such as the Open Diaries.

Parallel Session J: Short Oral Presentations – *STEM Engagement, Technologies for STEM Learning & Supporting Students*

Using social media to guide teacher participation and development: Cisco MOOC experience

Andrew Smith and Amel Bennaceur
STEM Faculty

The challenge surrounding digital literacy and engagement in schools - is predetermined by the ability (or lack therein) of the teachers to cover an increasing range of computing topics within the national curriculum.

Recognising the skills deficit and anecdotal demand from teachers to cover a range of subjects within the disciplines of network engineering and programming. The Cisco Academy team at the Open University collaborated with Cisco and other volunteers to create a teacher training MOOC in Networking.

We utilised pre-existing learning resources from the Cisco NetAcad platform and integrated the use of Social Media. The Cisco team offered a series of Facebook Live webinars, social media outputs and also planned emails to engage the teachers at scale.

Over a series of three different MOOC presentations, 2500+ teachers were reached and a retention/completion/pass rate of over 20% (and higher) was accomplished on each course. Many schools and therefore teachers are already using both the content and the knowledge acquired in their own teaching practice, which has been evidenced by Cisco using their platform metrics. We were also able to use social media metrics to identify key engagement points and understand how to 'nudge' the participating teacher population during each course.

This project is ongoing with five new courses being offered in the same format via the Institute of Coding. The aim is to extend teacher practice into Cyber Security, Programming, Internet of things and Linux alongside offering advanced networking to enhance those who have already covered the networking principles previously offered. Cisco as well as other vendors are showing interest regarding this project and how it may be replicated into different and diverse technology spaces.

Impact of Gamification on Student Learning Experiences

Chitra Balakrishna
STEM Faculty

There is no specific definition for the term gamification, it can be described as those features in interactive systems that aim to motivate and engage end-users through the use of game elements and mechanisms. Gamification is the application of elements of gaming design and game mechanics in a non-game context. In the past decade, digital gaming has risen significantly and has consequently motivated young users to engage in countless hours of gaming for entertainment.

Education researchers have considered the use of games with great interest, especially interactive ones, as they provide challenges and goals to players, thus involving them in active learning process to master the game mechanisms. Researchers are particularly interested in enhancing student engagement and their learning experiences by incorporating gaming elements into teaching. Most studies on game-based learning have focused on digital games-based learning and its role in enhancing student motivation, participation and learning development as compared to conventional teaching methods. Hence gamification in the classroom is being adopted to make learning more appealing and motivating.

The aim of this study is to investigate the impact of the gamification on students' learning experience and engagement within a classroom setting, while also assessing the impact of game mechanics in motivating students to extend their learning beyond the classroom.

Analytics for tracking student engagement

Christine Gardner, Allan Jones, David Chapman and Helen Jefferis
STEM Faculty

Although there has been much research in the area of data analytics in recent years (e.g. Shum and Ferguson 2012), there are questions regarding which analytic methodologies can be most effective in informing higher education teaching and learning practices (Gibson and de Freitas, 2016).

This study explores the use of specific computer aided learning and teaching (TELT) resources on the module 'Communications Technology' (TM355), using a specific analytics tool Analytics for Action (A4A). A4A can provide detail of how students are engaging with specific online materials, with the aim to highlight the kind of interventions that module teams can make to support students.

The prompt for this particular study was students' relatively poor performance on a particular exam question. Using A4A it could be seen that the associated TELT resource had not been extensively used, either during the module or for revision. A key hypothesis is that those students who engaged with the TELT resources should have performed well on associated assessment questions.

The research questions cover two key areas; the effectiveness of the analytics tools and students' perception of the TELT resources.

Via data analytics we can review:

- When the students engage with the TELT resources and whether this is at predicted times during the module.
- Whether students revisit the TELT resources.

Via individual student feedback we can explore:

- What motivates students to engage with TELT resources.
- Whether students understand topic more deeply as a result of using TELT resources.

- If students are deterred if the resources are too complicated/time consuming?

This project focuses on one module within the School of Computing and Communications in the STEM faculty to gain a clearer understanding on why students might, or might not, engage with TELT resources. Preliminary finding show variable usage patterns, so possible reasons for this are being investigated.

The findings should be of interest to module teams across many universities. This project will build on previous work undertaken in this area, e.g. Herodotou et al (2017) and Tempelaar et al (2017), and contribute to the wider body of knowledge in the area of data analytics.

References:
Gibson, D. and de Freitas, S. (2016) 'Exploratory analysis in learning analytics' in Technology, Knowledge and Learning, 21 (1). pp. 5-19.
Herodotou, C., Gilmour, A., Boroowa, A., Rienties, B., Zdrahal, Z. and Hlosta, M. (2017) 'Predictive modelling for addressing students' attrition in Higher Education: The case of OU Analyse' in CALRG Annual Conference 2017, 14-16 Jun 2017, The Open University, Milton Keynes, UK.
Shum, S. B., and Ferguson, R. (2012) ' Social learning analytics' in Educational Technology and Society,15, 3–26
Tempelaar, D., Rienties, B. and Nguyen, Q. (2017) ' Towards actionable learning analytics using dispositions' in IEEE Transactions on Learning Technologies, 10(1) pp. 6–16.

Explaining models for predicting at-risk students

Jakub Kocvara, Martin Hlosta and Zdenek Zdrahal
STEM Faculty

Over the last couple of years, huge improvements in modelling algorithms and computing power brought machine learning to the mainstream. Complex predictive models such as neural networks bring unrivalled levels of accuracy but we are simultaneously losing the insight into the model's inner workings. Such models are often called black-boxes. There is a trade-off between complexity and interpretability. Black-box models have a multitude of different applications, but trusting them blindly often constitutes a practical and even an ethical problem. For example, a predictive model which assists a physician with patient diagnosis is unusable unless it can provide at least some level of reasoning behind its decision. That way a human can make an informed choice about whether a prediction should be used or not.

There can be also legal ramifications if one fails to provide explanations of their predictions. The GDPR regulations contain clauses on automated decision-making, including profiling, which for the first time introduce a right of explanation for all individuals to obtain "meaningful explanations of the logic involved" when automated decision-making takes place.

OU Analyse is a tool for student support which helps the OU tutors by offering predictions of their students' performance. We compute them for over 50 000 students in around 250 modules in 2019B and 2019J. By providing tutors with explanations of every student's predictions, they

decide when and how to intervene more effectively. They can also identify which features most negatively influenced the prediction and motivate students to do better in those areas (i.e. increase forum participation). Lastly, by comparing the importance of features between courses, we can obtain insight into course design and alter it appropriately as of now, tutors are getting explanations from a separate Naive Bayes model that has some intrinsic drawbacks (features cannot be dependent on each other, doesn't have to correlate with more complex models used for predictions). Our goal is to use powerful black-box predictive models and explain them post-hoc without sacrificing any accuracy.

In this session, we are going to talk about different ways of providing explanations of black-box models, the difference between global and local interpretability and the strengths and weakness of these techniques. We are also going to dive more into an algorithm called LIME (local interpretable model-agnostic explanations) and its ongoing integration with OU Analyse.

Parallel Session K: Structured Discussion/Briefing – *Innovations in Teaching Assessment*

When STEM students are offered a blend of digital and non-digital learning materials, what choices do they make, and why? An overview of a study into this, and a chance to discuss the impact of the results on how we design online modules

Laura Alexander and Alexis Lansbury
STEM Faculty

We create online digital resources for our students, and we expect them to be digital natives who can use these resources effectively, but what evidence do we have that this is the case? This session focuses on our recent research, looking at how students actually study, and how this could, or should, influence our teaching practice.

Over 100 distance learning students were surveyed from second year undergraduate OU modules in Physics, Maths and Computing. Each of these modules has study materials supplied in different formats, from entirely online to mostly book-based. The students enrolled on these modules had previously taken first year modules with study materials in a range of formats, both digital and non-digital. The issues that emerged from the questionnaires were further explored in a number of in-depth interviews. Our data analysis revealed some unexpected results which could, or should influence how academics design such study material going forward.

We will give an overview of the research we carried out, setting the context and background. We will present some of our more interesting results and invite you to discuss the possible implications of these, and areas for further research.

Parallel Session L: Workshop/Demonstration – *International Collaboration in Learning, Teaching and Student Support*

Longitudinal impact of visiting scholarships on the professional practice of scholars from China

Mark Endean and Daphne Chang
STEM Faculty

The original aim of this project was to investigate and document a number of longitudinal case histories of Chinese visiting scholars with the explicit objectives of refining, strengthening and promoting the scholarship programme to transform it into an important University asset.

Since the year 2000, in excess of a dozen academics and support staff from Chinese universities worked for a period at the OU as 'visiting scholars'. These scholarships were generally at the request of the visitor, with the visitor's objectives shaped and supported by staff at the OU acting as supervisors. To our knowledge, little effort had been made systematically to establish the extent to which those objectives were met and even less was known about how the scholar's working practices altered or evolved as a direct outcome of their visit.

Over the course of two short visits to China, we successfully contacted and interviewed a total of 14 former scholars from four separate Chinese universities. The interviews were designed to establish, from the scholar's perspective, whether the intended objectives of the scholarship visit were met and also whether the scholar was aware of any other changes in their outlook and working practices as a result of their experience.

Early analysis shows these visits to the OU to have created long-lasting impact on the scholar's career, their peers and their institutions. Impact is also seen to be percolating to the national level in some cases. Since many of our former scholars are still at an early stage in their careers, we can foresee that the impacts from these individuals will continue into the future. Evidence so far collected provides the basis for a strong case for promotion of the existing and similar scholarship programmes for the future benefit of global distance learning communities.

Reflections from the Shanghai Open University Immersion Hub 2018

Sally Crighton and Steve Walker
STEM Faculty

Over the first two weeks of June 2018, colleagues from Shanghai Open University (SOU) hosted nineteen participants from nineteen countries in a series of presentations, discussions and visits to numerous places of academic and cultural interest. Both authors were fortunate enough to be selected to take part in the Immersion Hub (IH) and are grateful both to eSTEeM and to SOU for their generous support.

We will outline the 2018 IH itself, before reflecting on its value, the opportunities that it provides, and the challenges raised.

Firstly, the 2018 IH provided a unique opportunity to reflect on areas of our own open learning practice through discussions with online and distance learning (ODL) scholars from around the world, and in the unique context of Shanghai. It located the work of the Open University as a node in a global network of open and distance learning institutions and practitioners and provided the opportunity to learn from others' experiences and practices. At a time of uncertainty and change in the UK HE landscape, fresh ideas and perspectives are particularly interesting.

Secondly, and more specifically, spending such focussed time with other practitioners has opened the door to potential transnational collaborations. For us, this meant opportunities for collaboration in the development of portfolios, learning analytics and quality processes, both with members of SOU as well as other IH 2018 participants. It also created the space to think about possible longer-term collaborations, for example in curriculum and 'virtual student' exchanges.

There are, of course, challenges in realising opportunities. Even modest pilots of, for example, international student collaborations would require working around institutional constraints. The most immediate issues are the commitment of resources, primarily staff time and travel costs. Such developments would also need to be considered with care if they are to be mainstreamed in the work of the STEM Faculty.

Most of all, the experience has highlighted the benefit, and transformational effect, of setting aside time to work with colleagues in an innovative exciting programme, made possible by the vision of SOU.

Participants are invited to share our reflections of the 2018 IH together with an overview of discussions from scholars from the other seventeen countries.

Closing Keynote Presentation

A model for engaging students to work in partnership with staff in Higher Education

Mick Healey
HE Consultant and Researcher/University of Gloucestershire

Ways of engaging students in higher education as partners in learning and teaching is arguably one of the most important issues facing higher education in the 21st Century. This session will outline a model for investigating four ways in which students may be engaged as partners through:

a) Learning, teaching and assessment;
b) Subject-based research and inquiry;
c) Scholarship of teaching and learning; and
d) Curriculum design and pedagogic advice and consultancy.

The session will introduce the workshop on the next day, which will explore the application of

students working in partnership in the context of The Open University.

Parallel Session M: Short Oral Presentations – *Employability, Supporting Students & Trends in Industry*

Student perceptions of employability skills in level 1 Science: are they on the radar?

Chris Hutton and Fiona Aiken
STEM Faculty

There is strong emphasis on the importance of employability skills in degree level education, with the requirement that they be embedded in courses across the HE sector. How well this is achieved has been reviewed in the Wakeham Report (Wakeham, 2016). Institutional approaches to this vary, though there has been a strong focus on the use of e-portfolios as a means of recording, evidencing and assessing such skills (Peyrefitte and Nurse, 2016; Strivens, 2007; Strivens et al., 2009).

As well as inter-institutional variation, there is also intra-institutional variation. At the Open University (OU), the science curriculum has diverse approaches to assessing employability skills between modules. On S112, Science: concepts and practice, radar diagrams are used for students to self-assess their skills development in a variety of areas, including employability. Each radar diagram relates to a particular skills-based Learning Outcome (LO); students are prompted to periodically self-assess against a number of criteria throughout the module, and reflect on their progress. Students submit these self-assessments and reflections as part of each Tutor Marked Assignment. (A radar diagram itself contains a variable number of "spokes" radiating from a central point, with each spoke relating to a criterion associated with the LO. Students self-assess their competence from 0-10 against each criterion, and this determines the length of the associated spoke. A labelled plot results, showing the length of each spoke, which appears similar to a radar. Changes in the shape of the diagram over time can enable students to see progression.)

The focus of this eSTEeM project is to examine a sample of students' self-assessments and reflections on their employability skills through the use of radar diagrams. The two radar diagrams used correspond to the following LOs and criteria: PPS2 (commenting on others' work, contributing to discussions, working in a team, sharing digital content, business/customer awareness) and PPS3 (time management, PDP, reflecting on feedback, reflecting on practice). Through the collection of anonymised student responses to these radar diagrams in their TMAs, we aim to investigate how effectively students self-assess and evaluate their employability skills over the course of the 18J presentation.

Four S112 tutors have been recruited, their role is to collate the responses to the radar diagram questions on the TMAs, anonymise them and input them into the project. This data collection will be followed by student and tutor questionnaires and focus groups, where student perceptions of how their employability skills develop, and the use of radar diagrams as a means of recording this, will be further explored through qualitative and quantitative analysis.

At this session we will report on progress with the data collection so far, any emerging themes and will welcome suggestions which would be worth exploring further through our questionnaires and focus groups.

References:
Peyrefitte, M. and Nurse, A. (2016) e-Portfolios: evaluating and auditing student employability engagement [Online], Higher Education Academy. Available at: https://www.heacademy.ac.uk/knowledge-hub/e-portfolios-evaluating-and-auditing-student-employability-engagement (Accessed Oct 2018).
Strivens, J. (2007) A survey of e-pdp and e-portfolio practice in UK Higher Education [Online], Available at: https://www.heacademy.ac.uk/knowledge-hub/survey-e-pdp-and-e-portfolio-practice-uk-higher-education (Accessed Oct 2018).
Strivens, J., Baume, D., Owen, C., Grant, S., Ward, R., and Nicol, D. (2009) The role of e-portfolios in formative and summative assessment [Online], JISC. Available at: https://webarchive.nationalarchives.gov.uk/20140702154058/http://www.jisc.ac.uk/whatwedo/programmes/elearningcapital/studyontheroleofeportfolios.aspx#downloads (Accessed Oct 2018).
Wakeham, W. (2016) Wakeham review of STEM degree provision and graduate employability [Online],HM UK Government. Available at: https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/518582/ind-16-6-wakeham-review-stem-graduate-employability.pdf (Accessed Aug 2018).

How Can we Better Support OU Degree Apprenticeship Students?

Soraya Kouadri Mostéfaoui and Christine Gardner
STEM Faculty

This presentation summarises our findings investigating the support needed by Degree Apprenticeship (DA) students during their first year of studies. This initial study primarily focussed on the first cohort of English Digital and Technology Solutions students within the School of Computing and Communications. The theory module TMX130 (Computing Technologies) and the work based learning module TXY122 (Career Development and Employability) are the first case studies included at this stage. Results of students' surveys as well as feedback from practice tutors and subject-specific tutors will be presented and contrasted.

We analysed the student performance on the module and the open comments on both surveys. The aim was to explore whether there were any issues both in the learning and in the support that should be addressed in the forthcoming module presentations.

Results from the data analysis suggest that support from subject-specific tutors is very good and students are very motivated. However, some assessment methods are more relevant than others and we should consider how to customise these assessments so they relate more closely to the students' work environments.

In our future works we plan to conduct further research via surveys and interviews, with both students and tutors as the initial cohort of English students was very small.

In the longer term, it is worth considering the inclusion of Scottish and Welsh apprentices, alongside English apprentices in the research, as well as contrasting our findings with apprenticeship initiatives across the UK nations.

Cushions in the workplace? What vocational students need to succeed

Hilary MacQueen and Fiona Aiken
STEM Faculty

The Open University has a history of teaching students in the workplace, for example in nursing qualifications and in foundation degrees. The support needed by such work-based students differs from the traditional model of academic support from Associate Lecturers, and these students require much more work-focussed and pastoral support, for example by a Mentor or a Practice Tutor. This has implications for module costings and staff workload.

In an attempt to identify factors contributing to student success on work-based modules we have undertaken a survey of graduates of the OU's Foundation degree in Paramedic Sciences. This qualification ran successfully for 10 years, but has now been withdrawn. The capstone module was a work-based module (S211 Developing your paramedic practice) during which students were required to achieve academic success, assessed by TMAs, iCMAs and a Project. The students also had to complete more than 150 work-based activities and to attend 4 weeks of placements at various healthcare locations in order to achieve competence in practical skills. The success rate of S211 was high (> 80% overall) but students anecdotally found the module very difficult. Graduates of the qualification were asked to complete a survey that included categorical, semi-quantitative and open-ended questions. Our survey asked them about the factors they found most influential for their success, about the workplace support they received, and for any advice they would give to other work-based students.

The analysis of our results using quantitative and qualitative methods suggest that the most important factor for these students was time management. The Ambulance Trust employers did not allow dedicated study time, and since the students worked shifts and often had to undertake overtime they found it difficult to fit in time for effective study. Other important factors that emerged included the organization of placements, the role of the workplace Mentor, and the sense of belonging to a cohort of peers.

In this session we will share the final results from this research and outline how these findings have influenced the student support incorporated into a Degree Apprenticeship.

What will engineering design practice be like in 2040: insights from a workshop on trends in product development practice to 2040 and implications for engineering teaching

Claudia Eckert
STEM Faculty

While many forecasts exist for technological, environmental and societal changes that we will face in the next 20 years, it is less clear what this will mean for engineering design practice and the skills we need to provide our students with. The presentation reports on a process of employer engagement to understand future trends in work practices and skills. That I carried out while being a visiting professor at Chalmers, the technical university of Gothenburg. The engagement had two stages: open ended interview with 12 experienced engineers in the UK, Germany, Sweden and Ireland, who were asked: what trends do you see? What skills are required to address them? How can academia help? The findings were analysed and shared with participants to a workshop to which experiences engineers from Swedish industry and international academic where invited. The workshop was organized into six themes: societal trends, ways of working, lifelong learning, technology, modelling and simulation and digitalization. Each themes was a station hosted by an academic where groups of five experts discussed the topic. The participants of both studies were recruited from our network of research collaborators working on highly complex engineering products to assure that they felt comfortable sharing their insights and speculations.

The participants highlighted to raising importance of current themes including big data, AI, modelling and simulation and the growing gig economy. While none of this totally new they painted a picture of a highly multidisciplinary and digital work environment for which we need to prepare our students. Taking a long term view of engineering practice is particularly critical for the Open University as we develop courses with long lives in production and have students with long degree. The talk will reflect on the benefits of employer engagement and the challenges of feeding the results to Open University teaching process.

Parallel Session N: Workshop/Demonstration – *Supporting Students*

Inclusive approaches to student communication

Elaine McPherson[1], Kate Lister[2], Anne-Marie Gallen[1], Victoria Pearson[1] and Tim Coughlan[2]
STEM Faculty[1], Faculty of WELS[2]

The Open University has over 25 000 disabled students (Oct 2018), and we are well known in the sector for the excellent support we offer students with additional study needs. However, in order to access that support, we require students to disclose a ‘disability’ (a label many students feel uncomfortable with or reject), go through administrative processes to request ‘reasonable adjustments’, create a ‘disability profile’ that forms part of their Student Home page, and engage with ‘Disabled Students Allowance’ processes. These processes adopt a medical model of disability, focusing on what a student struggles with or is unable to do and requires students to position themselves as supplicants, requesting adjustments that may or may not be granted by the institution. Students have fed back that they feel deeply uncomfortable engaging with these processes and identifying themselves in this way, and anecdotal evidence indicates that in many cases that they have refrained from requesting adjustments after their initial disclosure because of the way the current systems make them feel. This is very concerning in light of sector-wide attainment and completion gaps between disabled and non-disabled students, yet research in this field remains limited.

A participatory research exercise with disabled students in 2016 identified that the language used in the administrative processes and systems was a key area of discomfort for students; students with mental health issues, dyslexia, autism and a wide range of other study needs were simply not comfortable identifying themselves as 'disabled' or using other official language that focused on their weaknesses to describe their study needs. Therefore, we conducted a mixed-methods study to explore the language students felt more comfortable engaging with to discuss disability and study needs, and upon analysis of the results, we explored ways that these findings might be applied to practice. As part of the OfS-funded IncSTEM project, we produced draft guidance on inclusive approaches to language that different stakeholders might adopt.

In this workshop, we will present findings from our study and will facilitate discussion on different ways in which this may impact on practice. We will present new guidance on inclusive approaches to language and will seek critical input from participants. Finally, we will explore ways in which we can be more inclusive in our approaches to language and disability in order to support our students to succeed.

Parallel Session O: Structured Discussion/Briefing – *Supporting Students*

Time to think bigger? Can qualification f2f events succeed where module tutorials fail?

Nicole Lotz and Georgina Holden
STEM Faculty

Over the past years, undoubtedly like many others, the Design and Innovation qualification Q61 has seen large drops in attendance at face-to-face tuition events. The qualification team wanted to investigate alternative approaches to making face-to-face events more attractive and worthwhile to tutors and students. We will report on an eSTEeM project that trials and evaluates alternative face-to-face or blended, cross-level engagement events. The aim of these events is to create an emerging sense of a community of learners across a qualification using action research, and to evaluate the success of this new approach. The literature suggests that such a community of inquiry would facilitate retention and progression. Several events were trialled across England and the Nations (and the successful events were improved on and repeated). Quantitative and qualitative data was collected to evaluate the events, track participants' progression and attempt to characterise the emergent community. What we have learned from this is reported here.

A guided visit to the London Design Museum was the most successful in terms of face-to-face attendance. Even though students needed to pay an entry fee, we had 50 registrants and 31 attendees. The repeat event attracted 23 registrations and 19 attendees with 25 students watching the Facebook live stream. Students commented that they would have not visited the museum on their own, even though it is a must-see for design and innovation students. They liked the general networking and group discussion around the exhibits with peers, relating what they saw to the core design module materials and the interchange between students at different levels of study was seen as valuable.

An end of year physical and online exhibition of students' work was the most successful event in terms of impact on individual students (those helping to design the exhibition). One student

exhibition designer reported a boost in confidence and employability, which she attributed singly to helping to design the exhibition. With 1700 visits to the parallel online exhibition to date, an even wider impact on alumni, students, and the general public could be achieved.

We will also share our learnings from unsuccessful events and the challenges we faced with the organisational aspects around these events.

The talk will involve the audience in following discussion points:

- Is there value in moving from module-thinking to qualification-thinking?
- What face-to-face or blended formats could work for you to engage students across a qualification?
- How can we generate relevant content for students to engage with at qualification level, or what content can students self-generate to engage the rest of the qualification?
- How can we better integrate face-to-face and online engagement?

Students as Partners Interactive Workshop

Facilitated by Mick Healey
HE Consultant and Researcher/University of Gloucestershire

Ways of engaging students in higher education, as partners in learning and teaching, is arguably one of the most important issues facing higher education in the 21st Century. Partnership is essentially a process for engaging students, though not all engagement involves partnership. It is a way of doing things, rather than an outcome in itself. This interactive session will explore four ways in which students may be engaged as partners through –

- Learning, teaching and assessment
- Subject based research and enquiry
- Scholarship of teaching and learning
- Curriculum design and pedagogical consultancy

The workshop will be facilitated by Prof. Mick Healey, PFHEA, HE Consultant, Emeritus Professor at the University of Gloucestershire and Senior Editor of International Journal for Students as Partners. Mick will draw on mini case studies from a wide range of disciplines (especially STEM), institutions and countries, which will demonstrate the value of the partnership approach and then support us in developing our own ideas and proposals around this theme via a 'Liquid Café' discussion.

POSTER PRESENTATIONS

Confidence-building assessment for Level 1 Computing and IT students

Paul Piwek
STEM Faculty

Same abstract as Parallel Session A: Short Oral Presentations on page 19

See page 53 for poster.

Building and maintaining citizen science learning communities: iSpotnature.org ten years on

Janice Ansine, Mike Dodd, David Robinson, Yoseph Araya, Phil Wheeler and Advaith Siddharthan
STEM Faculty

For over 10 years The Open University (www.open.ac.uk), has successfully extended teaching and learning about biodiversity beyond the parameters of the laboratory or lecture hall through citizen science; expanding possibilities for participation in biological recording and science research. From www.evolutionmegalab.org, an initiative involving European audiences recording species evolutionary trends; www.iSpotnature.org (iSpot), encouraging learning about wildlife, while building species identification skills; to www.Treezilla.org aimed at cataloguing Britain's trees recording ecosystem service values.

This poster presentation will share the successes and challenges of facilitating learning, through these platforms, how active online communities provide multifaceted experiences, incorporating participatory science research with e-learning opportunities. For example, learning was always part of iSpot's design, with innovative educational technology-based tools and features incorporated (Woods et al, 2016) along with activities which encourage public participation and engagement that help to facilitate teaching; creating a unique learning journey.

A five-step framework: explore, identify, contribute, personalise and recognition (Ansine et al 2017); is used to demonstrate how learning engagement takes place creating an understanding of how citizen science can support a process of learning, redefining approaches, and providing structures of learning for new and existing citizen science initiatives.

This is demonstrated by iSpot; firstly, users share participatory learning experiences though exploring the site; current analytics data suggests an average session duration of 8-9 minutes possibly signifying purposeful browsing. Secondly, iSpot helps to identify species through crowdsourcing as participants seek help and share their expertise with each other; while a bespoke multi-dimensional managed reputation system rewards and motivates as they contribute (Silvertown et al, 2014). Individual experiences can also be personalised; filtered through a range of options and demonstrated as projects. The fifth and final stage, with experiential learning, encourages learners as citizen scientists through recognition from integrated quizzes that build and test knowledge as skills increase; and integration within OU courses: e.g. free courses Introduction to Ecosystems, Global biodiversity and citizen science;

undergraduate courses S295 The Biology of Survival (iSpot) and SDT306 Environment: responding to change (Treezilla).

References:
Ansine, J., Dodd, M., Robinson, D., McAndrew, P., (2017) Exploring citizen science and inquiry learning through iSpotnature.org. Chapter 6 in Herodotou, C., Sharples, M., Scanlon, E. (eds) Citizen Inquiry: Synthesising citizen science and inquiry learning. Routledge.
Silvertown, J., Harvey, M., Greenwood, R., Dodd, M., Rosewell, J., Rebelo, T., Ansine, J., & McConway, K. (2015). Crowdsourcing the identification of organisms: A case-study of iSpot. ZooKeys,(480), 125.
Robinson, D; Ash, P., (2014)Developing a pedagogical model for a massive open online course (MOOC), Proceedings of the Frontiers in Mathematics and Science Education Research Conference, 1-3 May 2014, North Cyprus.
Woods, W., McLeod, K., Ansine, J. (2016) Supporting mobile learning and citizen science through iSpot. In H. Crompton & J. Traxler (eds) Mobile Learning and STEM – case studies in practice, Routledge, NY & Oxon.

See page 54 for poster.

Visual Interactive Learning of Engineering Concepts

Rongshan Qin, Richard Moat and Salih Güngör
STEM Faculty

We are developing a three-dimensional visual interactive learning software to help engineering students to understand some fundamental concepts. During years of teaching in engineering discipline we have noticed the significant difficult when student were learning and digesting those concepts. Experimental illustration helps in certain extents but often insufficient due to the restriction of dynamic property measurement. Therefore, we develop a visual interactive learning toolkit to address these problems. The toolkit is being developed using JAVA3D to enable students to simulate the engineering questions, to choose various parameters to affect the system, to record the evolution of properties and to compare the observation with the description in teaching materials.

This proposal is to provide a proof of concept study. The toolkits and user instructions will be available at a website and the links to the webpage will be provided to students who are taking those modules for volunteer trial. Demonstration and practical session will be available at residential school as one of the night activities. Feedback will be collected from the users via questionnaires. Modification will be made according to feedbacks.

The toolkits fit into the online study and will support students understanding engineering courses. Students will use the toolkits for better understanding of the concepts, improving their capability in doing homework and implementing it to work-related applications.

See page 55 for poster

Using Electronic Teaching and Assessment Methods to Close Demographic Gaps in Physics Attainment

Cameron Thomas Crook, Holly Hedgeland, Sally Jordan and Victoria Pearson
STEM Faculty

Physics and related disciplines show consistent and significant gaps in attainment between certain demographic groups. Best documented is the disparity between male and female attainment, with males gaining higher average grades across the board, though similar gaps have been shown between certain ethnic and socioeconomic demographic groups. There are several theories as to why these gaps appear, including social pressures, biological propensities and pedagogical practices, all of which likely play a role. The project outlined in this poster investigates and attempts to rectify these gaps by producing an online, self-directed resource that will train students in complex problem solving in physics.

The leap from rote learning to problem-based learning between compulsory and higher education is a stumbling block for many students. This transition compounds difficulties caused by unfamiliarity with a new environment when starting higher education. This unfamiliarity is exacerbated in some groups, most notably female and BAME students, as they are typically a minority in physics courses. As such, the resource will be targeted at the introductory university level to provide extra support to students at this critical point. Research shows that scaffolding is effective in raising attainment in most students, particularly those achieving in mid-range (Dawkins et al, 2017). However, an important physics skill is the ability to solve open-ended problems. Therefore, teaching students to self-scaffold when problem-solving is an attractive method for closing demographic gaps.

The resource is currently under development and is scheduled to undergo early usability trials in early summer 2019, using mechanics as a test topic.

See page 56 for poster

Embedding employability and supporting students in evidencing their professional skills

Alec Goodyear
STEM Faculty

The engineering programme team at The Open University has long experience of supporting students in professional skills towards employability. Personal development planning (PDP) features throughout the curriculum to support students in application of acquired skills. However, an opportunity to improve student engagement and feedback was recognised, particularly in recognition of the connection between satisfaction and engagement. Over recent years the reconfiguration and redesign of the engineering qualifications in moving from a module to qualification focus has provided a wide range of opportunities to improve student satisfaction, retention, and progression.

Curriculum components have been redesigned to further integrate PDP skills throughout core

engineering modules and qualifications, providing students with greater relevance of professional practice to their chosen field of study. A strong, explicit, engineering context has been embedded throughout PDP and other aspects of the new engineering modules. An innovative and individualised learning log tool that students can use throughout their qualification has been developed to support study and record progress and achievements. The learning log acts as the vehicle for evidencing skills progression, both for study and employability purposes that may include professional recognition.

Our approach to PDP and professional skills teaching is outlined, demonstrating how students are provided with more opportunities for continuous improvement and to enhance their academic and employability skills.

See page 57 for poster

Student online peer mentoring schemes: Does size matter for success?

Julie Robson
STEM Faculty

A pilot student buddies peer mentoring scheme using asynchronous forums on a Level 2 Environmental Science module in 2017-18 was deemed a success by students and staff. Four student buddies worked with a student cohort of ~400 students though not all interact with the Open University VLE forums. For 2018-19 the scheme has been expanded to include an additional three modules in the school across Levels 1-3, with student cohorts ranging in size from 152 – 1390 students. This range in cohort size allows evaluation of whether there is a critical number of students needed to enable successful peer mentoring, and also determine the optimum number of student buddy volunteers required to run the scheme. Between four and eleven volunteer student buddies were recruited in 2018 facilitating workload analysis to be undertaken to determine how many volunteer buddies are needed to ensure a peer mentoring scheme is sustainable. Early results suggest more similarities than differences across the modules in relation to student usage and participation in the peer mentoring schemes, which can work equally well for low and high population modules. These could potentially be applied to any distance learning environment using VLE forums for student support.

See page 58 for poster

Online remote experiments in chemistry- analysis of delivery, assessment, tracking and student perception

Nicholas Power, Simon Collinson, Eleanor Crabb and Rob Janes
STEM Faculty

The laboratory component for any science programme is considered to be an essential experience for learning in science. The use of online remote access laboratory experiments to facilitate this experiential learning is a developing interest in educational research, and in

particular here at The Open University. The study relates to a number of online remote access experiments in the module S315 (Chemistry: further concepts and applications). The data and feedback collected is evaluated and discussed in the context of student engagement, and their perceptions and experience in performing these experiments. It also considers whether the experiments support their understanding of underlying theory. We intend that this study informs a better design of future and existing online experiments for improved student engagement and learning.

See page 59 for poster

The impact of live streaming module-wide events in student engagement and motivation

Maria Velasco, Linda Thomson and Kate Bradshaw
STEM Faculty

S111 "Questions in science" is the new online only introductory interdisciplinary module in science, with the aim of preparing students new to higher education to become independent and successful learners in science. As part of S111 tuition strategy, a series of interactive labcasts (one per subject discipline) are delivered by the central module team.

The aims of these tutorials are:

- To help build a science community early on in the students' studies
- To improve retention and progression by helping students with their subject choices
- To provide opportunities for students to engage with current research and topical issues
- To improve connectedness between students and central academics.

There are associated forums opening for few days after the labcasts and these module-wide events are also recorded and made available to students.

This eSTEeM project evaluates the value and success of these labcasts by analysing students' feedback from widgets on Stadium during the live events and responses to a questionnaire sent out to a selection of S111 students. Follow up interviews were conducted to a small sample of students who also responded to the questionnaire.

This poster will provide further details on student engagement with live streaming technology and the main factors that drive participation. How students use these events to support their learning will also be discussed.

See page 60 for poster

Deferral; assessment banking

Linda Robson
STEM Faculty

This research investigates the experiences of students at The Open University who take a mid-module study break through deferral. Developing a greater understanding of the experiences that these students have when they defer and subsequently either return or stop studying, will assist in the development of student advice and institutional policy around deferral and study breaks.

The initial study has focused on three students who had deferred their studies, returned to their module on the following presentation and successfully completed. Through semi-structured interviews, the students shared their experiences of deciding to take a break, being on a break and subsequently returning to complete their studies. Interview transcripts were analysed using a thematic analysis approach.

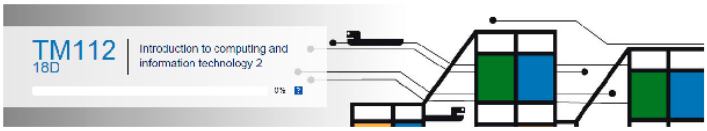
The findings indicate that all three of these students took a deferral due to personal situations in which they felt unable to continue, but they all maintained a high level of commitment to return throughout their study break. The students all had and continue to demonstrate a strong desire to engage in learning opportunities and highly value the experience of learning, in addition to the benefits of knowledge and skills development and completion of a qualification.
This initial study has provided the foundation for a larger study looking at the use of deferral in managing studies within The Open University.

See page 61 for poster

Confidence-building assessment for L1 Computing and IT students

Paul Piwek

Context



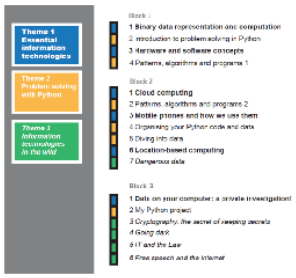
Credits:
30
Presentation pattern:
D and J, 21 weeks
Approx. 2500 students per year

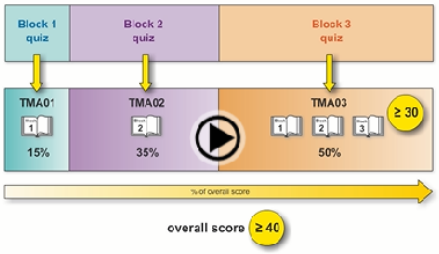
Problem

Learning a complicated skill such as programming is a slow and gradual process. Different students will learn at different paces. Students often start a programming course with the preconception that programming is difficult, which has a negative effect on their motivation and can be reinforced if they are subjected to summative assessment too early.

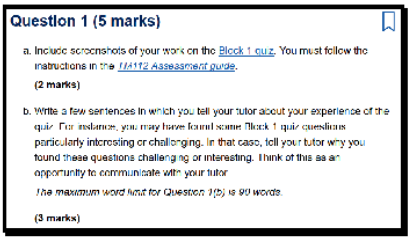
Approach

(a) Interleaving of themes and single component assessment allow students to build confidence by starting with low-stakes TMAs, repeated rehearsal of skills (e.g. problem-solving and programming) and learning from one TMA to the next through tutor feedback.





(b) Use of genuinely formative quizzes (*instead of* summative or thresholded iCMAs) to encourage students to practise skills and understanding and permit discussion of questions and answers with peers on the module forums. Engagement with (*irrespective of performance*) and reflection on the quiz content are encouraged with a small reward (5 marks out 100 marks) on associated TMA questions (one question per TMA for each of three block quizzes).



Evaluation (18J, with similar figures for 18D)

Mean scores from one to the next TMA increase: from 75 for TMA 01 and 77 for TMA 02 to 82 for TMA 03, suggesting that students are developing their skills and understanding. Mean scores on the Quiz engagement/reflection Question 1 (see above) is high for each of the TMAs: 90 for TMA 01, 89 for TMA 02 and 91 for TMA 03. Most students engage with the quizzes: on all three TMAs, only 5% of scores (for Question 1) are <40. Feedback from students and tutors has been positive: students like the practice opportunity and discussion with peers on the forums.

Further work

The TM112 approach to formative quizzes has been adopted successfully in TM254 and is considered for further computing and IT modules. An ongoing Institute of Coding project is analysing the TM112 module forum discussions and a new eSTEeM project will investigate student co-design of further formative quiz questions (both projects with Simon Savage).

Acknowledgements The work reported in this poster benefitted from discussions with the TM112 module team members, TM112 tutors, staff tutors and TM111 colleagues. I would like to specifically thank Sharon Dawes, Marina Carter and Karen Kear for their feedback and suggestions. Thanks also to Maria Kantirou for support with the learning design workshop, Paul Johnson for help with interpreting quiz statistics and Matthew Nelson for discussion of the experience in TM254 with the TM112 approach to formative quizzes.

Developing citizen science learning communities: *iSpotnature.org ten years on*

Janice Ansine*, Yoseph Araya,* Michael Dodd*, David Robinson*, Advaith Siddharthan^, Philip Wheeler*

*School of Environment Earth and Ecosystem Science (EEES), ^Knowledge Media Institute (KMi), Faculty of STEM

Introduction

For over 10 years The Open University (OU) has successfully extended engagement, teaching and learning about the natural world beyond the parameters of the laboratory or lecture hall through citizen science:

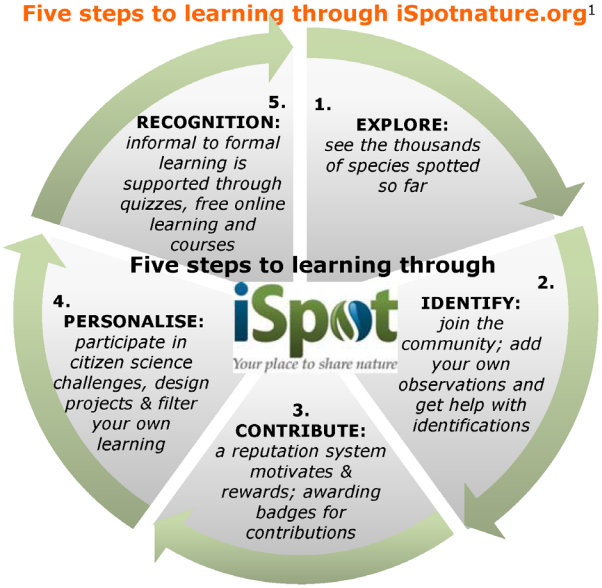
Evolution MegaLab	**Species evolution trends: snails**
iSpot	**Your place to share nature: species ID skills**
The OpenScience Laboratory	Practical science, online experiments etc.
nQuire-it Missions	Create scientific investigations: store and share information
SITU8	Share geo-located data
treezilla	**The monster map of trees: ecosystem services, tree health**
Asteries	Astronomy research observatories: linking astronomy, astrophysics and particle astrophysics communities

2009 → 2012 → 2013 → 2016

With active online communities these platforms provide multifaceted engagement experiences expanding possibilities for learning about science and participating in scientific research particularly about biodiversity:

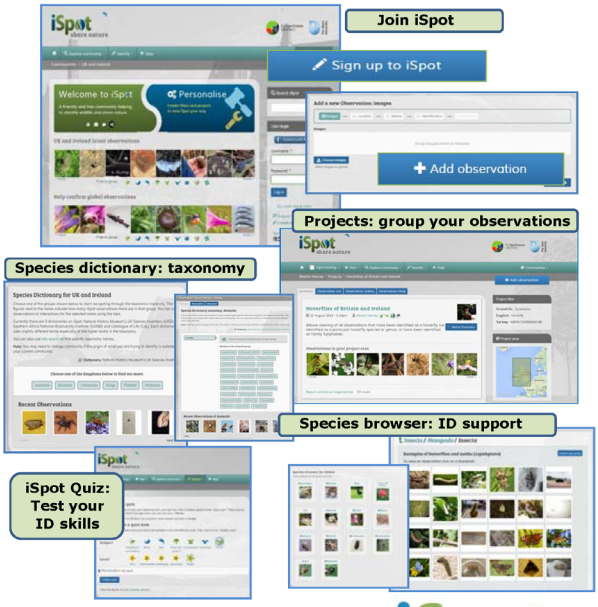
- www.evolutionmegalab.org - an initiative involving European audiences recording species evolutionary trends;
- www.iSpotnature.org (iSpot) - encouraging learning about wildlife, while building species identification skills;
- www.Treezilla.org - aimed at cataloguing Britain's trees recording ecosystem service values.

Five steps to learning through iSpotnature.org[1]



A five-step framework: explore, identify, contribute, personalise and recognition (Ansine et al 2017) demonstrates how citizen science can support a process of teaching and learning, iSpot for example, supports informal, non-formal and formal learning and this five-step framework demonstrates how, authentic inquiry facilitates learning leading from exploration of nature through to recognised learning actions.[1]

Learning species identification with iSpot



Teaching and learning with citizen science

iSpot in OU Courses / Modules : (2- 30 study hours)
Neighbourhood Nature *(short course)*
S295 Biology of Survival *(2nd year UG)*
H880 Technology-Enhanced Learning: foundations & futures
E209 Developing subject knowledge for the primary years
MOOC Introduction to Ecosystems *(FutureLearn)*
OpenScience Lab practical citizen science activities
Various OpenLearn activities:
BOC Citizen Science and Global Biodiversity *(coming soon!)*

A European online 'learning' community

Evolution Megalab.org:
OU courses: S170 Darwin and evolution and S317: Biological Science.
Participants: Data collected by over 6,500, including European collaborators - museums, scientific and natural history societies, science centres and schools as well as universities.

Building a UK- wide monster map of trees

Treezilla.org:
OU Courses: BA Environmental Studies
Student activity: collect data on trees in a location near them; identify questions relevant to tree management i.e..: how do ecosystem services values of trees Inform potential management decisions?

Since September 2018 >5000 trees added by ~200 OU students.

Contact Janice Ansine (janice.ansine@open.ac.uk) Senior Project Manager – Citizen Science
Faculty of STEM, The Open University, Walton Hall, Milton Keynes, MK7 6AA

Reference [1] Ansine, J., Dodd, M., Robinson, D., McAndrew, P., (2017) ***Exploring citizen science and inquiry learning through iSpotnature.org***. Chapter 6 in Herodotou, C., Sharples, M., Scanlon, E. (eds) **Citizen Inquiry: Synthesising citizen science and inquiry learning.** Routledge. (https://www.routledge.com/Citizen-Inquiry-Synthesising-Science-and-Inquiry-Learning/Herodotou-Sharples-Scanlon/p/book/9781138208698)

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@iSpotnature
@Treezilla_org

Visual Interactive Learning of Engineering Concepts

Rongshan Qin, Richard Moat and Salih Güngör

Email: rq282@open.ac.uk

Introduction

Many students withdrew their interests in further study of engineering subjects because of the learning obstacles. Some fundamental concepts are not easy to understand under the traditional teaching method. However, the significant progresses in modelling and computational researches provide many possibilities to enable the students to observe the phenomena in a virtual environment and to build up in-depth feeling and knowledge. The proposal aims to develop three-dimensional visual interactive learning software to help engineering students. The learning toolkit will enable students to simulate the engineering environments, to choose various parameters to affect the system, to record the evolution of properties and to compare the observation with the theoretical descriptions.

Methodology

The toolkits are formed of three core parts: Graphics User Interface, Engineering Computation, and Interactive 3D Visual Analysis. The Engineering Computation makes use of the state-of-the-art computational method to do quick calculation of the defined system and to provide datasets for visualization.

- **Graphical User Interface (GUI)**

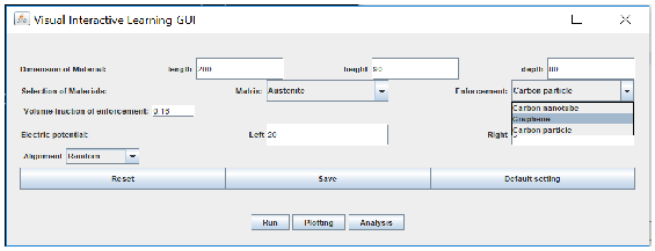


Figure 1. A graphical user interface for setting up the system

- **Interactive 3D Visual Analysis**

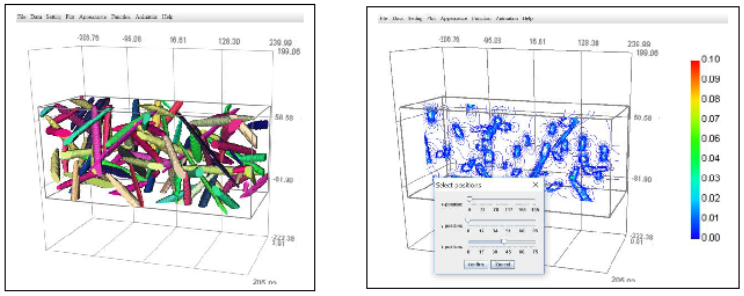


Figure 2. Visual interactive analysis of temperature distribution in a composite due to Ohm heat

Expectation

The project is developing the toolkits to help OU students to enjoy the low-stages courses, excite their further learning interests and go through the high stage courses toward a degree. This will contribute to the improvement of learning experience and successful rate of our students registered for engineering discipline degrees.

Using Electronic Teaching and Assessment to Close Demographic Gaps in Physics Attainment

Cameron T Crook, Sally Jordan, Victoria Pearson, Holly Hedgeland

Motivating a New Tool to Develop Problem Solving Skills in Physics

Physics and related disciplines show consistent and significant gaps in attainment between certain demographic groups. Best documented is the disparity between male and female attainment, with males gaining higher average grades across the board, though similar gaps have been shown between certain ethnic and socioeconomic demographic groups. There are several theories as to why these gaps appear, including social pressures, biological propensities and pedagogical practices, some of which are outlined below. We aim to produce an electronic resource that rectifies these demographic gaps by training students to 'self-scaffold' problems in physics.

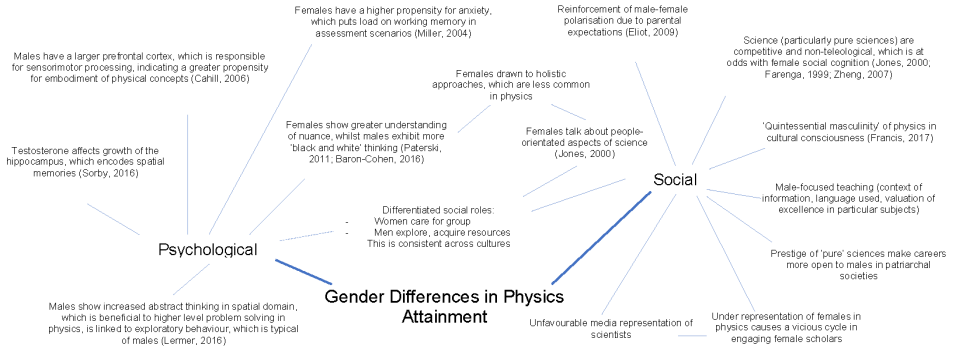


Figure 1: Concept map of factors which have been proposed to contribute to the attainment gap between males and females in physics.

Adaptive Scaffolding to Support Skills Development

Scaffolding, which consists of providing students with intermediary information between a problem and its answer, in order to ease the process of its solution, has been shown to help students by both guiding them through the problem with helpful hints, and by reducing anxiety (Vygotsky, 1976). This is particularly beneficial to students achieving in the mid-range, which female students typically populate (Dawkins, 2017). The resource we will produce scaffolds problems through providing a series of helpful questions to guide users to a solution. As users' performance improves, scaffolding is gradually removed, training students to provide their own scaffolding. A prototype of this is shown to the right.

Scaffolded Problem

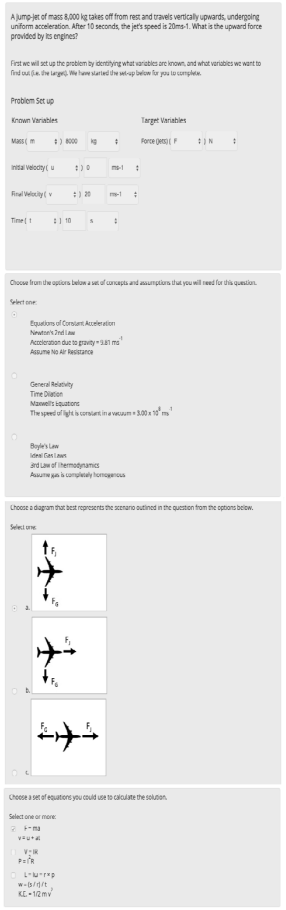
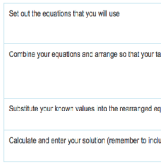
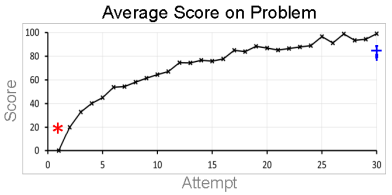


Figure 2: Sample of a highly scaffolded problem in mechanics. Quiz is based in a modified Moodle.

High Scaffolding*





Low Scaffolding†

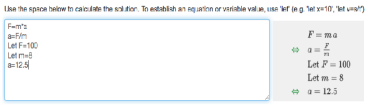


Figure 3: Variants of scaffolding questions at high and low scaffolding levels. Which variant is delivered depends on users' previous score.

What's Next?

Over the coming months, a bank of problems with multiple scaffolding variants is being produced, and the adaptive quiz structure is being coded. The resource will be tested on students in the autumn of 2019.

eSTEeM
The OU centre for STEM pedagogy

Embedding employability and supporting students in evidencing their professional skills

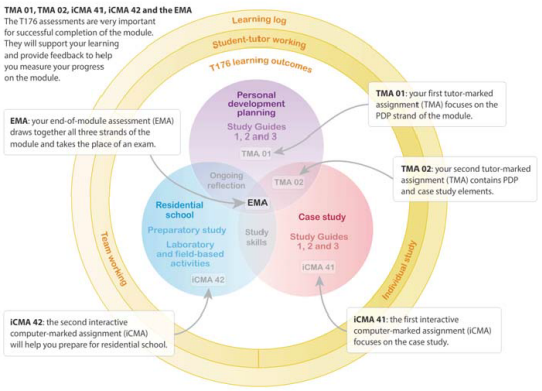
Alec Goodyear – School of Engineering and Innovation

Introduction

The engineering programme team has long experience of supporting students in professional skills towards employability. Personal development planning (PDP) features throughout the curriculum to support students in application of acquired skills.

Over recent years the reconfiguration and redesign of the engineering qualifications in moving from a module to qualification focus has provided a wide range of opportunities for students to improve academic and employability outcomes.

In the module T176 *Engineering: professions, practice and skills 1* PDP is combined with an engineering case study and practical engineering laboratory skills. T276 *Engineering: professions, practice and skills 2* follows a very similar structure but with data analysis integrated with PDP and practical work.

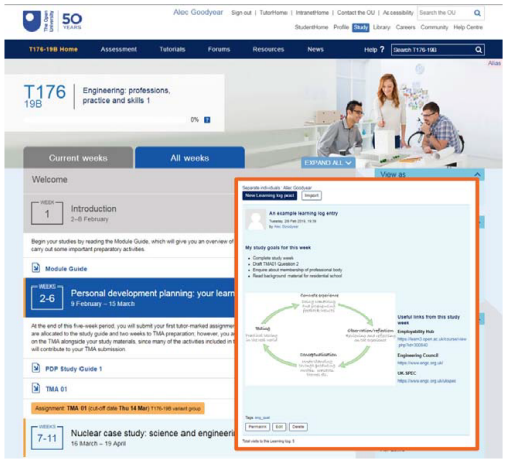


Innovations

A range of innovations have each contributed to improved student satisfaction, completion, and pass rates:

1. A strong, explicit, subject context has been embedded throughout PDP and all other aspects of the new engineering modules
2. An innovative and individualised learning log tool that students can use throughout their qualification has been developed
3. Even distribution of student workload by pacing learning through activities and assessments
4. Student self-assessment of learning outcomes
5. Practical engineering and employability at the core of the qualification design

Learning Log



Student achievements

Following the first presentation of T176 marked improvements in student experience and satisfaction were achieved across all measured survey categories. Completiom and pass rates for T176 and T276 have consistently exceeded faculty level averages.

Module completion and pass rates (faculty level averages in parentheses)

	T176		T276	
	Completion / %	Pass / %	Completion / %	Pass / %
2014	85.5 (62)	82.6 (58)	-	-
2015	86.7 (65)	84.2 (61)	96.9 (71)	96.9 (66)
2016	82.3 (65)	79.8 (60)	91.1 (75)	89.9 (72)
2017	78.7 (65)	74.0 (61)	93.9 (79)	89.0 (70)

Question	Improvement in student satisfaction (percentage point increase)
Overall I am satisfied with the quality of this module	+ 19.2 %
Overall I am satisfied with my study experience	+ 19.0 %
The module provided good value for money.	+ 23.5 %
Overall, I was satisfied with the teaching materials provided.	+ 9.6 %
Overall, I was able to keep up with the workload on this module.	+ 9.4 %
The learning outcomes of the module were clearly stated.	+ 34.8 %
I would recommend this module to other students.	+ 25.9 %
The module met my expectations.	+ 20.2 %
I enjoyed studying this module.	+ 20.9 %
I was satisfied with the support provided by my tutor.	+ 4.9 %

Our approach to PDP and professional skills teaching demonstrates how students are provided with more opportunities for continuous improvement and to enhance their academic and employability skills with improved satisfaction, retention, and progression.

Acknowledgement: With thanks to the T176 and T276 module production teams

eSTEeM
The OU centre for STEM pedagogy

Student online peer mentoring schemes: Does size matter for success?

Julie Robson

Summary

The question investigated is whether student cohort size, and buddy: student ratio matters for successful peer mentoring via VLE forums at the OU. A group of volunteer Student Buddies works with ~150 – 1500 students on a module (Fig.1), though not all students interact with the buddy forums. This range in cohort size allows investigation of whether there is a critical number of students needed to enable successful peer mentoring, together with determining the optimum number of student buddy volunteers for a module. The data also facilitates workload analysis to be undertaken to ensure enough volunteer buddies are recruited to facilitate a sustainable peer mentoring scheme.

The Student Buddy Scheme

Figure 1 Summary of operating details for student buddy schemes in EEES.

The scheme fits around the module tuition strategy, so buddies operate in various forums from student Cafés to dedicated student buddy forums. Both S112 and S390 are multidisciplinary modules whereas S206 and S209 are discipline specific. For multidisciplinary modules it is important that the student buddies represent as many disciplines as possible. Current student buddies are representative of those who applied, but only 30% are male and none represent BAME groups, though the roles were widely advertised.

Forum usage

The number and pattern of forum postings highlights similarities and differences between forums across modules and Stages (Fig. 2)

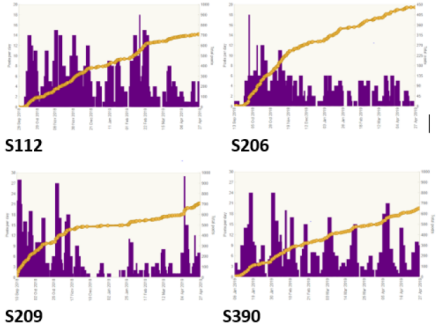


Figure 2 Daily (purple) and cumulative (gold line) buddy forum posts October 2018 – April 2019

All forums show sustained usage through the year. The spike in April for S209 reflects reassuring discussion and moral support prior to a TMA.

Table 1 Student: buddy ratios and forum posts in Figure 2.

Module	Buddy: Student ratio	No. Posts in forum
S112	1:189	710
S206	1:92	438
S209	1:53	705
S*390	1:53	652

Table 1 shows proportionally lower forum usage by Stage 1 students than those at Stages 2 and 3. S209 has the smallest student cohort but apparently greater engagement with the forum.

Preliminary Conclusions

- 87 – 100% of recruited student buddies were active on the forums
- Buddy: student ratio is not important for engagement
- Workload is variable within buddy cohorts with each group often having 1-2 very active volunteers
- Early results suggest more similarities than differences across the modules
- Peer mentoring schemes can work equally well for low and high population modules.
- Mapping buddy availability through the year is important to allow equal opportunity for participation and forum coverage.

eSTEeM
The OU centre for STEM pedagogy

Online and remote experiments in chemistry – analysis of delivery, assessment, tracking and student perception

Simon Collinson, Eleanor Crabb, Rob Janes and Nicholas Power

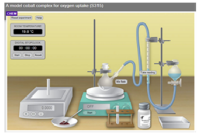
Introduction: The laboratory component is an essential experience for learning in science. At the OU this is delivered primarily through the use of online laboratory investigations. In recent years this portfolio has extended to include remote access experiments. The aim of this project is to understand how students perceive and value these experiments.
This study relates to three online experiments in the module S315 (Chemistry: further concepts and applications), each supported with either a labcast or video recording:

- a live remote access autotitrator for an acid-base titration,
- a simulation of oxygen uptake with a cobalt complex, and
- a group investigation on drug-drug interactions using a simulated instrument

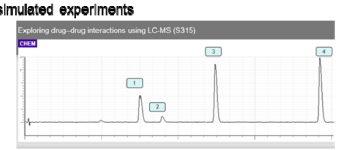
Remote access live experiment

Experiment 1: Remote autotitrator for an acid-base titration.

Remote access simulated experiments



Experiment 2: Simulation of oxygen uptake with a cobalt complex based on real data.



Experiment 3: Analysis of drug-drug interactions using a simulated Liquid Chromatography–Mass Spectrometer based on real data.

Figure 1

Study: Students were surveyed online after each experiment and the feedback evaluated initially in the context of their engagement and experience as well as their perception of their understanding of underlying theory.

14 Looking to the design of future experiments, please indicate which features of the experiments you would consider should be included if possible. Please rate the following on a scale from 1 to 6 where 6 is the highest in terms of importance..

Responses	Average Rank
Remote use of instrumentation rather than a simulated instrument	5.2
Associated live labcast covering the technique	5.1
Associated recorded video covering the technique	4.9
The opportunity to work with other students during the experiment	3.7
The opportunity to include elements of experimental design in the experiment itself	4.8

Initial analysis of student feedback:

- Students found all the experiments to be useful in supporting their understanding of the underlying theory and also how to perform the investigation itself. The majority stated that they would be fairly or highly confident in carrying out the investigation in a conventional laboratory afterwards. This scored most highly for the remote investigation.
- When asked about the authenticity of the experiments, students rated this to be important, with remote operation of real apparatus and webcam scoring particularly highly. For the simulated experiments the inclusion of real data and scenario were considered important.
- The features that students rated most highly in terms of design for future experiments were the
  - use of remote instrumentation rather than a simulated instrument
  - inclusion of a live labcast or video recording.
- For the labcast, live demonstrations were perceived to be of particular value.
- There is some ambivalence in regards to working with other students as a team – despite this, the group investigation was rated the highest in terms of both engagement and in supporting the theory.

Future work

Further analysis of the current questionnaires with potential follow-up via focus groups or further surveys is planned. An optional pilot of a new remote investigation will be run over the summer having taken some of this initial feedback into account.

Student quotes: '*..these remote experiments are essential despite their simplicity. As I am struggling with motivation, this experiment has helped immensely.*'
'I thought the project was excellent and it really motivated me to improve my understanding and experimental skills.'
'I also found the Labcast really useful. It was a nice change to be able to actually see the lecturers and what they were doing rather than the usual Adobe Connect tutorials. I think more tutorials styled in this manner would be beneficial.'

The impact of live streaming module-wide events in student engagement and motivation

K.R. Bradshaw, L. A. Thomson and M. Velasco

Introduction

S111 "Questions in science" is an online-only, introductory, interdisciplinary module. It has a series of labcasts (one hour per subject discipline), delivered by the central module team. The aims of these events are to help build a science community, provide opportunities to engage with central academics and their research, as well as helping with subject choices.
This eSTEeM project evaluates the 17j and 18b labcasts by analysing students' feedback from the widgets on StadiumLive as well as their responses to a post-labcast questionnaire.

What is a Labcast?

A labcast is a live, evening web-broadcast that integrates video streaming, widgets and instant messaging to enable an interactive experience for participants across multiple locations.

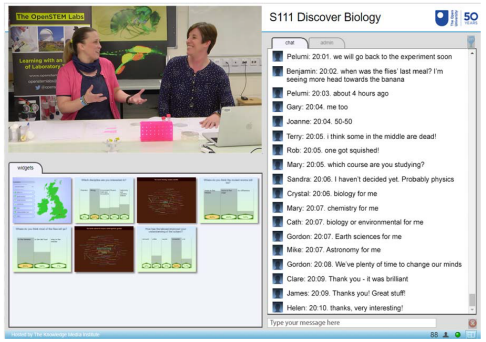


Figure 1: An example of StadiumLive screen for S111 Biology labcast.
Note: names have been changed.

Evaluation of S111 labcasts

> *"I think that attending a live session gives you the opportunity to actively participate in the experiments and the discussions."*

On average 7.6% of our student cohort engaged with each live event and 9.2% of students watched the recorded labcasts.
During live events students interacted with widgets and a chat-box an average of 9-10 times. Chat conversations covered science, maths, module choice and social themes. Responses to a word cloud widget are shown in Figure 2.

Figure 2: Student descriptions of labcasts from widgets responses.

Student engagement:

Over two thirds of the respondents stated that their main reasons for attending or watching were:

- *"to learn more about subject areas"*
- *"because labcast descriptions sounded interesting"*

Half of respondents were looking for help with subject choice while a third wanted to feel part of the student community and to engage with researchers and general module team staff.
Live experiments and scientific content were felt to be particularly relevant, useful and well enjoyed.

> *"…well worth seeing and hearing (and smelling) the experiments for real"*

Impacts of labcasting on learning:

- 66% of respondents felt that the events increased their sense of being part of an OU science community.
- At least 58% reported being more, or *much* more, motivated after watching a labcast.
- Figure 3 shows what students did as a result of watching the labcasts.

Figure 3: Student responses about actions taken after events.

Conclusions

This project shows that students who watch labcasts feel deeper engagement with the wider OU science community. These events encourage greater understanding of module science content and influences students' future study pathways.

Student experiences of deferral – an initial study

Linda Robson

Study summary

Oct 2014 & Oct 2015 module presentations, around 5,500 students deferred with assessment banking. Fewer than two thirds reregistered and less than half of those passed the module (Taylor 2017). This project seeks to find out why students assessment bank, what happens during that deferral period and what influences whether they return. In this initial study, three students who had assessment banked, and subsequently returned to complete their modules, were interviewed. It is planned to interview a further 20 students in the main study, including some who did not return to study.

Participant demographics	
Gender	2 female, 1 male
Ethnicity	1 identified as minority ethnic
Disability	1 identified as disabled
First generation HE	2 first generation HE
Previous HE experience	2 held HE qualifications, 1 drop-out
Employment	1 full-time, 1 part-time, 1 self-employed

What did students tell me?

	How do students decide to assessment bank?	What circumstances support returning to study?	Is deferral useful in managing studies?
Themes	• Difficult and reluctant decision • Assessment bank to extend the break	• Feeling of belonging and OU identity • Study habit	• Reflection on motivation • Will the situation change
Student quotes	Louise: "It was a really difficult decision and there was a lot of guilt there, there was a lot of upset" Patrick: "I felt like I was giving up, I don't like giving up. It's like DNF [did not finish] in a marathon or something like that, you know, you know you are injured, you know that if you keep going you are gonna make it worse […] That was kind of how I felt." Jane: "I thought no I just defer with assessment banking and be done with it, I can put that element of it to bed at least." Patrick: "if you assessment bank two of six TMA's then that does cut a big chunk out of the actual workload you got to do, and the pressure you're under is lessened significantly"	Louise: "I'm sitting here in my OU sweatshirt again, it's worn half to death!" Patrick: "you stop being an OU student. You stop being part of the club at that point and that can be quite difficult to recover." Jane: "you know, it's one of those things whereby if you stop doing something and you have a break from it […] I find it difficult to go back or to restart." Louise: "There's that bit of time where you enjoy having your evenings, watching the telly, and going to do what you want […] I did worry about getting back into it." Patrick: "if you're in the habit of studying it's easier to keep studying and if you stop then you potentially break that habit and you replace it with something else and it's quite hard to switch back on again."	Patrick: "I think if you go through a deferral process it makes you think, makes you question your motivation for doing it in the first place." Jane: "The reading never really materialised in the way that I'd intended, and of course, because I wasn't doing assignments, I wasn't driven to read the material at any particular point." Patrick: "deferring had a very positive impact on me in terms of how I view both the institution and how it works but also kind of helping me know that, there's you know, there's not just a you either do the course this year and pass or fail is kind of broader than that." Louise: "I was not in the right place to be able to study and I definitely would have done the same thing if that happened again."

Reference
Taylor, P., 2017. *Assessment banking: interventions to improve student success rates*. Open University Internal report.

NOTES

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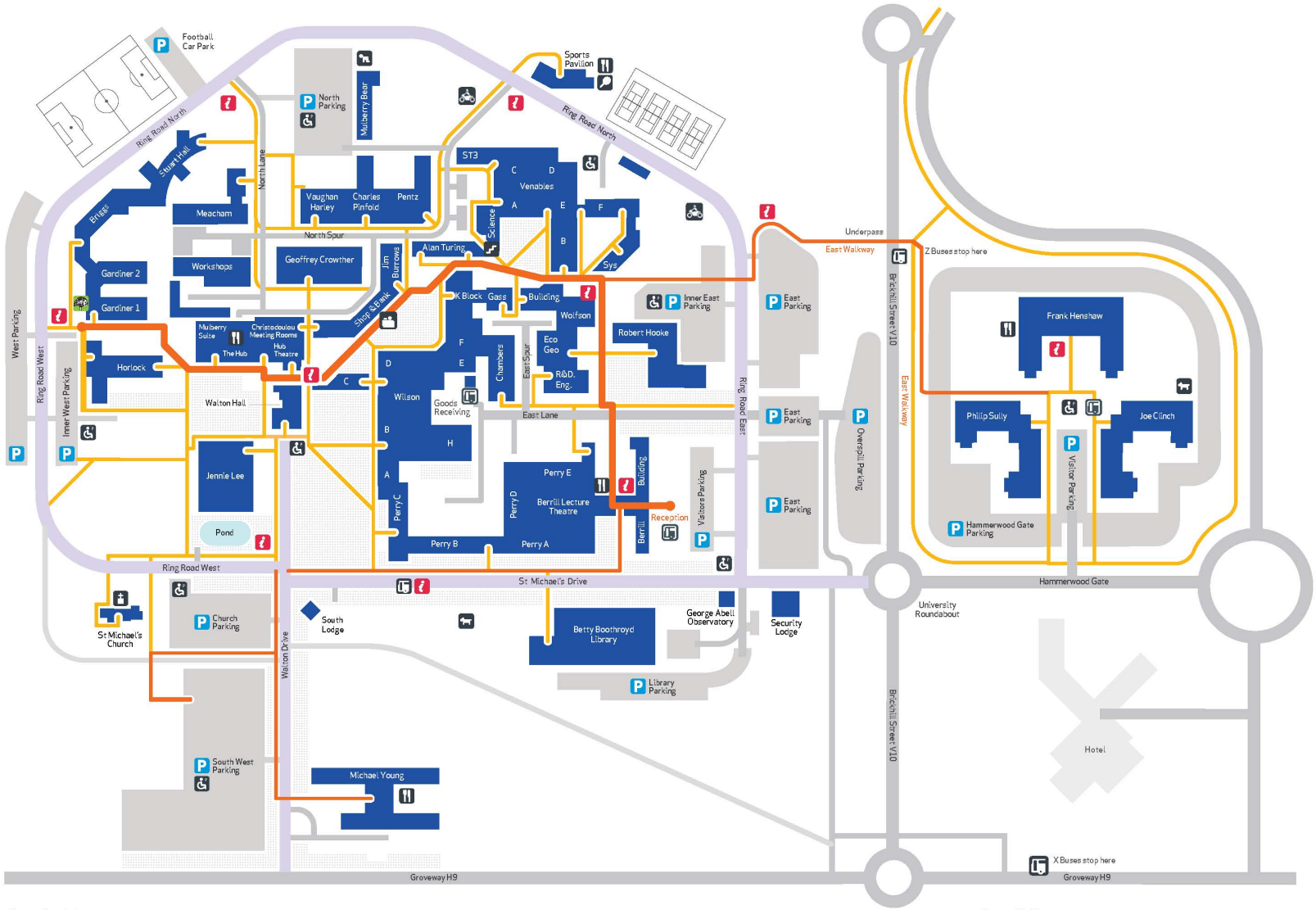
OU CAMPUS MAP



Key to Symbols

- Car Parking
- Car Parking for Disabled
- Bicycle Parking
- Bus Stop
- Childrens Centre
- Church
- Dog Run
- Information Points
- Legacy Garden
- Refectory
- Sports Pavilion
- Shop & Bank
- Stairs
- Motorcycle Parking
- Shuttle Bus - Free Service - Main Reception/Berrill Building, East Lane and East Campus

Key to Walkways

- Footpath
- Central Walkway