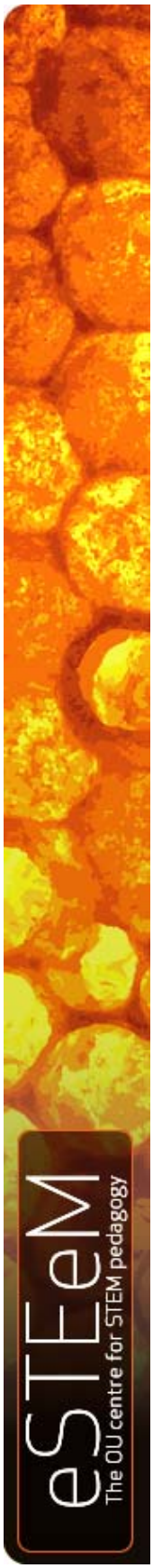

The Open University

The 6th eSTEeM Annual Conference 2017

STEM Futures: Supporting Students to Succeed

Conference Booklet

25-26 April 2017

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Nicola Turner MBE, Head of Skills, HECFE

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PROGRAMME – DAY 1

25 April 2017

Time	Session		Venue
9.00 – 9.30	**Registration and Coffee**		**Bay Reception/ Medlar and Juniper**
9.30 – 9.35	**Welcome and Introduction** Clem Herman and Diane Butler, eSTEeM Directors		**Hub Lecture Theatre**
9.35 – 9.45	**Opening Address** Josie Fraser, Executive Dean, STEM Faculty		**Hub Lecture Theatre**
9.45 – 10.15	**Opening Keynote Presentation** Nicola Turner MBE, Head of Skills, HEFCE **STEM Skills: The Big Picture**		**Hub Lecture Theatre**
10.15 – 10.30	**Coffee-to-go**		**Medlar and Juniper**
10.30 – 11.45	**Parallel Session A: Short Oral Presentations – Supporting Students & Equality and Diversity in STEM**		
Chair: Clem Herman	Janet Haresnape, Fiona Aiken and Nirvana Wynn	ByALS-ForALs: an online AL Staff Development programme in the STEM Faculty.	**Library Seminar Rooms 1-2**
	Rachel Hilliam, Alison Bromley and Carol Calvert	Understanding and supporting the career pathways of Mathematics and Statistics Associate Lecturers.	
	Chris Douce and Sarah Chyriwsky	Understanding online teaching practice: the importance of the observation.	
	Carol Calvert, Rachel Hilliam, Linda Brown and Colin Fulford	Success against the odds and the follow through - the interesting routes student feedback can open up.	
10.30 – 11.45	**Parallel Session B: Short Oral Presentations – Online/Onscreen STEM Practice & Technologies for STEM Learning**		
Chair: Nick Braithwaite	Nicole Lotz, Derek Jones and Georgy Holden	Lurking and Learning: Progression through the Design and Innovation Qualification.	**CMR 15**
	Julie Robson, Julia Cooke, Philip Wheeler, Kadmiel Maseyk and Trevor Collins	Evaluating remote access to fieldwork with interactive livecasts for distance-learning students.	
	Jon Roswell	Remote practical-focused tutorials.	
	Elaine Thomas, Soraya Kouadri Mostéfaoui and Helen Jefferis	Students' Engagement with Programming: A case study of a visual programming environment.	

10.30 – 11.45	**Parallel Session C: Short Oral Presentations – Supporting Students & Pedagogy Evaluation**		
Chair: Diane Butler	John Butcher, Elaine McPherson, Carlton Wood and Anactoria Clarke	Eureka! How well does Y033 prepare students to succeed on Level 1 Science?	**CMR 11**
	Prithvi Shrestha and Claire Kotecki	Academic literacy and communicating assessment to students on L1 Science Modules: student perceptions.	
	David King, Jon G Hall, Lucia Rapanotti, Steven Self and Mark Slaymaker	Developing a framework for measuring qualification effects of a new pedagogy which embeds learning and assessment activities within each student's rich professional context of practice.	
	Martin Reynolds	From competence to capability: learning laboratories in the new world of postgraduate education.	
11.45 – 12.00	**Coffee-to-go**		**Library Seminar Rooms 1-2 and CMRs 11 and 15**
12.00 – 13.15	**Parallel Session D: Workshop/Demonstration – Supporting students**		
	Christine Pearson, Susan Pawley, Nick Chatterton, Elaine Moore, Catherine Halliwell, Louise MacBrayne, Anne-Marie Gallen, Alison Mortiboy and Ellena Benson `	Show and tell: Innovations in 'between module' support for Qualification progression.	**Library Seminar Rooms 1-2**
12.00 – 13.15	**Parallel Session E: Workshop/Demonstration – Supporting Students**		
	Vikki Haley-Mirnar, Diane Butler and Lynda Cook	What drives active student participation in online tutorials?	**CMR 15**
12.00 – 13.15	**Parallel Session F: Structured Discussion/Briefing – Supporting Students**		
	Martin Hlosta, Zdenek Zdrahal, Michal Huptych and Jakub Kuzilek	How can OU Analyse be beneficial for all tutors at STEM and the whole OU?	**CMR 11**
13.15-14.30	**Poster Presentations and Lunch** Delegates are invited to vote for the best poster. The winning poster will be announced during the closing keynote session.		**Hub Lecture Theatre/ Medlar and Juniper**
14.30-16.00	**Parallel Session G: Workshop/Demonstration – Technologies for STEM Learning**		
	Andrew Smith and Amanda Closier	You too can have your fifteen minutes of fame – a workshop on using Facebook Live for student and community engagement.	**CMR 1**
14.30-16.00	**Parallel Session H: Workshop/Demonstration – Supporting Students**		
	Frances Chetwynd, Helen Jefferis and Fiona Aiken	Bridge Over Troubled Waters – Would your students benefit from a bridging course to help them transition to second year?	**CMR 15**
14.30-16.00	**Parallel Session I: Workshop/Demonstration – Technologies for STEM learning**		
	Mark Hirst, Ulrich Kolb, Tim Drysdale, Nick	The OpenSTEM Labs.	**OpenScience On-Campus Teaching Labs, Venables A**

	Braithwaite and James Smith		**Wing**
16.00-16.15	**Afternoon Tea-to-go**		**CMRs 1, 15 and Venables café**
16.15-16.45	**Closing Keynote Presentation** Michael Grove, Reader in STEM Education, University of Birmingham **Is there a role for pedagogy in enhancing the STEM student experience?**		**Hub Lecture Theatre**
16.45	**Close**		

PROGRAMME – DAY 2

26 April 2017

Time	Session	Venue
9.30 – 10.00	**Registration and Coffee**	**Bay Reception/ Medlar and Juniper**
10.00 – 10.10	**Welcome and Introduction** Clem Herman and Diane Butler, eSTEeM Directors	**Hub Lecture Theatre**
10.10 – 11.15	**Inclusivity in Action – Worldwide Case Studies: Part 1** A selection of UK and international case studies demonstrating new approaches to diversity and inclusion in STEM education.	**Hub Lecture Theatre**
	Ann Holmes, Ann Holmes & Associates **Framing inclusion: two Canadian initiatives**	
	Jan Peters MBE, Katalytik **Setting the scene for inclusion in engineering. Day 1**	
	Mary Ayre, University of South Australia **Introducing and revisiting a gender inclusive engineering curriculum. A case study from Australia**	
	Mustafa Ali, The Open University **Decolonizing Computing**	
11.15 – 11.30	**Morning Coffee Break**	**Medlar and Juniper**
11.30 – 12.15	**Inclusivity in Action – Worldwide Case Studies: Part 2** A selection of UK and international case studies demonstrating new approaches to diversity and inclusion in STEM education.	**Hub Lecture Theatre**
	Trevor Collins, Anne-Marie Gallen and Nick Braithwaite, The Open University **Embedding and sustaining inclusive STEM practices**	
	Anita Shervington, Community Perspectives CIC **Science with and for (a diverse) Society?**	
	Claudia Morrell, Morrell Consulting **Closing the Empathy Gap**	
12.15 – 13.00	**Does inclusion just happen? The nature of prejudice and how it can thwart the best of intentions** Jiten Patel, The Open University	**Hub Lecture Theatre**
13.00 – 14.00	**Lunch and Posters**	**Medlar and Juniper**
14.00 – 15.30	**Workshop Activity: What does inclusivity look like? Developing an inclusive framework to inform OU Redesign.** Clem Herman and Diane Butler, The Open University	**Hub Lecture Theatre**
15.30	**Afternoon Tea and Networking**	**Medlar and Juniper**
16.00	**Close**	

WELCOME AND INTRODUCTION

Welcome to the 6th eSTEeM Annual Conference *STEM Futures: Supporting Students to Succeed*.

The aim of this conference is to highlight recent research supported by eSTEeM and reflect on the future of STEM-specific teaching and learning as we aim 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 and the winning poster will be announced at the end of the day on the 25th April 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 tutors, technologies for STEM learning, and online/onscreen STEM practice. The keynote lectures that open and close the day will address the wider STEM educational landscape. 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.

Our second day is a specialist workshop which will continue the theme of supporting the success of all of our students within the context of equality, diversity and inclusion. Following a series of international case studies participants will be developing a framework for Inclusive STEM Education that we hope will help guide the STEM Faculty and the rest of the university. We are delighted to be hosting a number external and international colleagues for this innovative workshop.

We welcome you to our 6th eSTEeM conference and hope you have an informative, stimulating and enjoyable two days.

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

OPENING ADDRESS SPEAKER BIOGRAPHY

Josie joined the Open University in March this year from the University of Bradford where she was Interim Dean of the Faculty of Life Sciences and a member of the Executive Board and Senate.

Since 2006, following an 11 year research-led career, Josie has developed her interest in learning, teaching and academic leadership. She has championed team-based learning as a teaching style on the national and international stage and has helped develop the apprenticeships and internationalisation agendas at her university. Josie has also promoted initiatives to broaden access to and participation in STEM subjects for under-represented groups, as well as working on gender representation in the Faculty of Life Sciences.

OPENING KEYNOTE SPEAKER BIOGRAPHY

As national lead for skills strategy and policy in the higher education sector, Nicola's current priorities include higher level apprenticeships, skills shortages and the contribution of graduate skills to UK productivity.

For 12 years she worked as a senior manager in HE responsible for employability, social mobility, employer engagement and regional growth. Previously the Director of Employability Strategy at Aston University, Nicola increased sandwich placement take up from 59 per cent to 75 per cent and enabled 4000 graduates to find their first job in regional SMEs through Graduate Advantage, a sector-leading internship scheme. Until recently, Nicola was a Board Director on the University Vocational Awards Council.

CLOSING KEYNOTE SPEAKER BIOGRAPHY

Michael is a Reader in STEM Education within the School of Mathematics where he teaches mathematics to undergraduate students and researches issues relating to learning and teaching in higher education. He is a National Teaching Fellow, the UK's highest award for teaching and learning within higher education, a Fellow of the Institute of Mathematics and its Applications, and is currently (2016) Honorary Secretary Education Designate for the IMA.

Since 2006 he has received grant funding totalling over £26million, including £24miillion from the Higher Education Funding Councils for national activities in Science, Technology, Engineering and Mathematics. He has also published numerous academic works including research papers, book chapters, books and articles. He is a former Editor of MSOR Connections, the learning and teaching journal of the higher education mathematics community, and is currently Editor of the University of Birmingham's teaching and learning journal Education in Practice.

TOWARDS A FRAMEWORK FOR INCLUSIVE STEM EDUCATION WORKSHOP EXTERNAL SPEAKERS BIOGRAPHIES

Ann Holmes is the Principal Consultant at Ann Holmes & Associates. She began her professional engagement with gender issues in science, engineering, trades and technology (SETT) at the Ontario Women's Directorate where she worked for two decades. Since 2003, Ann Holmes & Associates has contributed to a variety of regional, national and international projects focused on ways to attract, retain and support women in SETT. Ann is a founding member of the editorial board of The International Journal of Gender, Science and Technology. She served as Advisor to the NSERC/RIM Chair for Women in Science and Engineering – Ontario culminating in co-authoring the publication of Joining WiSE Conversations: Strategies and Successes from CWSE-ON 2003-2011. Ann was commended by the Minister Responsible for Women's Issues for her leadership in promoting the advancement of women in education, training and employment in Ontario.

Ann Holmes & Associates has worked with science-based federal government departments in advancing the Gender-Based Analysis Plus agenda. Most recently Ann was contracted as a Regional Facilitator for the national WinSETT Leadership Program, delivering the first series in Ontario of this program which is tailored to early to mid-career women in SETT.

Jan Peters describes herself as a change agent, initially commercialising technology from research labs in the private sector and then for NERC. She then moved to apply the same approach of evidence based action, developing partnerships for knowledge transfer to address inclusion in STEM. The UK Expert on Women in Science to the EU Commission from 1999 to 2002, she was a founder of the Helsinki Group. Her role as head of the Set for Women unit in DTI saw a shift in the UK approach to addressing the underrepresentation of women in SET and her first freelance role as director of the Greenfield report. Jan has been involved in both commissioning and delivering a range of ground breaking reports on gender and ethnicity in STEM policy and has been working as a consultant in this area for 14 years under Katalytik and continues to work with UCL Engineering as an external consultant. In the recent New Year's Honours list she was awarded and MBE.

Mary has worked in British and Australian universities as an academic and staff developer, including a spell as an OU maths tutor. As well as teaching maths, for the last 30 years she has been active in women-in-engineering education, research and advocacy. She received a national award from the Australian engineers' professional body for her work on gender inclusive curriculum with the Engineering Departments at the University of South Australia, and she co-authored the book Gender Inclusive Engineering Education. Now retired, she has just been awarded her PhD on women engineers in the workplace.

Anita Shervington (FRSA) is Director of Community Perspectives CIC, a cultural development agency that aims to create social equity in, and through, STEM. She is the Founder of Black STEAM, an initiative to shines the spotlight on the lives of Black people working in Science, Technology, Engineering and Mathematics (STEM). Her background is in community development spanning health, Women's empowerment, heritage & culture - all of which is visible in her approach to community STEM programming. In 2015 she was awarded a Winston Churchill Travelling Fellowship to explore global approaches to building STEM capital in under-represented/served/resourced communities. She has a particular interest in 'Science with and for Society' which is the essence of her talk.

Ms. Morrell is a senior consultant for global and US-based organizations. She was recently appointed to the UN IFAP working group on Information Literacy. In the U.S., Ms. Morrell is a consultant for the U.S. Department of Education; the Pennsylvania Department of Education; the Allison Group (an evaluation organization); Johns Hopkins University School of Education; and the University Of Pittsburgh (Pitt) Swanson School of Engineering (SSoE); among others. Her decades of work have focused on understanding and enacting efforts to increase access for women and other underrepresented groups to the knowledge society and to quality education leading to lifelong learning.

Ms. Morrell is a both a practitioner and researcher with a B.S. from the University of North Carolina-Chapel Hill, an M.S. from the University of Wisconsin-Madison, and an M.A. from Loyola University Maryland.

CONFERENCE INFORMATION

Registration
Conference registration will take place between 9.00 – 9.30 on Tuesday 25th April and 9.30 – 10.00 on Wednesday 26th April in the Bay Reception. 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 Bay Reception throughout the conference to help you with any queries that you may have.

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 during lunch between 13.15 –14.30 in the Hub Lecture Theatre. Conference delegates are invited to vote for the best poster. The winning poster will be announced at the end of the day on the 25th April 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, mid-morning and afternoon tea, and lunch.

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

STEM Skills: The Big Picture

Nicola Turner MBE
HEFCE

The availability of STEM skills in the labour market will influence the success of major Government policies such as Brexit, the Industrial Strategy and the reform of Apprenticeships and Technical Education. How big is the STEM skills gap and what is the role of Higher Education in closing that gap? If STEM skills are in such high demand why are some subjects suffering from poor graduate outcomes? What strategies can improve outcomes?

Parallel Session A: Short Oral Presentations – *Supporting Students & Equality and Diversity in STEM*

ByALS-ForALs: an online AL Staff Development programme in the STEM Faculty

Janet Haresnape, Fiona Aiken and Nirvana Wynn
STEM Faculty

Staff Development for Associate Lecturers (ALs) should be primarily about developing and sharing good teaching practice, to enable ALs to better support their students; however with so many changes within the OU, Staff Development events in recent years have focused more on 'imparting information' to help ALs keep abreast of changes. This programme of regular OU Live sessions, delivered by ALs for ALs, was introduced as a Staff Development initiative which would give Science ALs the opportunity to share good practice and suggest ways of improving the way they support their students. All Level 3 and many Level 2 modules are now all online, so neither tutors nor students meet face-to-face, so the programme also aims to help nurture a sense of community among Science ALs, providing an opportunity for them to get to know each other, and share their concerns.

Any Science AL can submit a proposal for a suggested contribution to the programme; proposals are reviewed by the Science AL Staff Development working group, and a programme of monthly sessions is put together and published on the SST website. ALs sign up on a wiki if they plan to attend so that the facilitator gets an idea how many participants to expect. Participants are asked to give feedback by email after the session, and the feedback is collated and passed back to the presenter. Facilitators are paid 1 DL (Day Lecturer) day for preparing and delivering their session, with the money coming from the ALSD fund.

The programme has now been running for over a year, and has included sessions on TMA marking tips, supporting international and geographically dispersed student groups, managing student expectations, and applying for HEA recognition, as well as some more informal Q&A sessions.

Attendance at the sessions is recorded on the AL's Staff Development record, so will appear on his/her ALAR (AL Activities Review). The running of the programme has recently been handed over to the AL members of the Science ALSD working group.

We will outline how we have developed and organised the programme, and present data on who has participated in the sessions in it, and summarise the feedback received. We will also invite questions and suggestions on how to widen the scope of the programme, especially now that we are part of a larger STEM Faculty, without jeopardising the feeling of community spirit which is beginning to develop among the participating ALs.

Understanding and supporting the career pathways of Mathematics and Statistics Associate Lecturers

Rachel Hilliam, Alison Bromley and Carol Calvert
STEM Faculty

In the School of Mathematics and Statistics, Associate Lectures (ALs) work across a wide range of modules both at undergraduate and postgraduate level. This study was undertaken before the faculty of Mathematics, Computing and Technology (MCT) merged with the Faculty of Science, at the start of the study roughly 43% of ALs in Mathematics and Statistics were female, compared to 34% in the faculty of MCT.

Associate Lecturers are part of the Mathematics and Statistics academic community and are therefore covered in the School's Athena SWAN action plan. This study aimed to understand why ALs are attracted to the role and what support the institution should be providing to these groups of staff in terms of their career development.

A questionnaire was distributed on 5th May 2016 to 437 mathematics and statistics ALs and closed on 3rd June. It is important to remember that the questionnaire was completed by ALs prior to the October module start date and the implementation of the Group Tuition Policy. There were 189 complete responses (43% response rate) and a further 49 incomplete responses. Issues highlighted in the questionnaire were followed up in three focus groups containing in total 18 ALs. The results have been analysed using a combination of statistical methods and content analysis.

For many students their associate lecturer is their only link to the OU. It is this relationship with their tutor which is of utmost importance when retaining students. It should therefore be a high priority to ensure these staff are provided with appropriate staff development and there is an understanding what attracts people to the role, in order to ensure that we recruit to best possible staff to undertaken this vitally important work.

Career development for this group of staff is relatively problematic. ALs are contracted to each individual module, many holding multiple contracts over a variety of modules and geographical areas. There are opportunities for ALs to apply for additional work, such as moderating forums, monitoring assessment feedback, exam marking, critical reading, membership of university committees, etc., however some of these opportunities are only available to a selection of ALs depending on the module on which they teach, e.g. exam marking for some modules is wholly undertaken by central academic staff. Associate Lecturers receive a CDSA (appraisal) with their line manager every two years where they can discuss these options, however if ALs are using this role as a route to other careers it is important that the correct development is offered to this group of staff to not only enable them to do the best job possible whilst working as an AL, but to also progress with their career paths.

The university is currently re-evaluating the contracts for ALs and this research provides some timely feedback from ALs both in terms of where they are in their career paths, but also which aspects of the current role they would like to be preserved.

Understanding online teaching practice: the importance of the observation

Chris Douce and Sarah Chyriwsky
STEM Faculty

Online tutorials are very important and will grow in significance across the university as tools and technologies develop. One of the important roles of a staff tutor is to carry out tutorial observations. These observations may take place during face to face tutorials, or during online sessions. Since tutors can now record their on-line sessions, observations can take place retrospectively, i.e. after a tutorial.

This presentation summarises an eSTEeM project that aims to understand more about the importance and relevance of tutorial observations, and understand what issues might be specific to observing online tutorials. The project aims are:

1) to identify literature that relates to teaching observation,
2) understand what issues are specific to on-line observations,
3) uncover shared practice regarding observations, and
4) understand the extent to which observations can positive influence STEM teaching practice.

The project has emerged due to the need for guidelines regarding tutorial observations and the increase in the use of online tuition. It is also connected to the practical need to develop good online/onscreen STEM practice amongst a community of tutors. It has the potential to enhance practice and potentially have a positive impact on student experience.

This presentation also summarises results from the first objective: the identification of literature that relates to teaching observations. Those who attend the presentation will also invited to share their experiences of being observed. Views about the importance of observation on teaching and learning performance are also welcome.

Success against the odds and the follow through - the interesting routes student feedback can open up.

Carol Calvert, Rachel Hilliam, Linda Brown and Colin Fulford
STEM Faculty

A small eSTEeM project was funded to identify why some students succeed, although the predictive analytics models in use in the University, would have predicted that they were unlikely to do so. The project was called “Success against the odds”.

The required University process for undertaking student surveys was followed. Additionally, because predicted probabilities were the basis for identifying the students to be contacted, the University ethics committee were also consulted. Students were initially contacted by email and asked if they would be willing to participate in the project. As expected, the response rate for participation was very low and, unexpectedly, the responses were very biased towards men. Two

experienced Associate Lecturers carried out semi- structured interviews with those willing to take part.
Those that did agree were very positive and keen to pass on ideas. Two strong themes were identified:

- getting organised and
- being willing try out different approaches.

We also asked students for three top "tips and tricks" that they would like to pass onto future students. The feedback was acted upon via three distinct routes:

- First a pilot, and then a rollout for 17B to the three entry level Maths and Stats modules, of a very short introduction session in OU live. Billed as containing no mathematics, a chance to try out OU live and most importantly to find out the range of "What is in the electronic box" that the module website give access to. The session heavily used quotes form students in the "Success against the odds" project and their "tips and tricks ". It also heavily focused on using the study planner to help students get organised. The session were run by module team members.

- Secondly, on the theme of getting organised, we supplied a joint study calendar for students starting M140 and MST124 concurrently. Additionally we were partially able to provide tutorials to fit this joint study calendar and to revise the cut off dates for TMAs. Students were asked for their views on this initiative.

- And finally we hope to run a "get ahead" option for M140 students registered for 17J.

Parallel Session B: Short Oral Presentations – *Online/Onscreen STEM Practice & Technologies for STEM Learning*

Lurking and Learning: Progression through the Design and Innovation Qualification

Nicole Lotz, Derek Jones and Georgy Holden
STEM Faculty

This presentation reports on research carried out within the eSTEeM funded project on student progress in OpenDesignStudio across the Design and Innovation qualification (Q61). The work builds on the premise that social learning is key to student success in online learning (Hill et al, 2009). However, it is surprisingly little understood exactly which behaviours and interactions support (or even provide evidence of) learners' success.

Building on our previous work carried out to explore the range of social learning mechanisms present in the OpenDesignStudio (Lotz et al, 2015), this talk will demonstrate that types of behaviour often considered to be passive, and therefore negative or less valuable than obviously active behaviours, can be significant evidence of student learning. Specifically, viewing other

students' work is demonstrated to be a stronger (or equal) correlation of student success compared to any other behaviour measured in the virtual design studios studied.

It is hypothesised that this activity is part of a larger set of social learning behaviours that contribute to a general social press or 'ecology' of studio learning. Viewing others' work builds on a critical mass of activity created by posting work to the OpenStudio. Moreover, this activity seems to support other student pastoral and social needs, an essential part of effective distance learning (Simpson, 2008). This research, however, detected a decreasing use of OpenStudio with increasing level of study in Q61.

Both findings have important implications for the design and implementation of virtual studios (technically and in learning design) across a qualification and these are discussed specifically for the interest and use of learning designers and course teams at the OU using OpenStudio.

References:

Hill, J.R, Song, L. & West, R.E. (2009) 'Social Learning Theory and Web-Based Learning Environments: A Review of Research and Discussion of Implication.' The American Journal of Distance Education, 23, pp. 88–103.

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Evaluating remote access to fieldwork with interactive livecasts for distance-learning students

Julie Robson, Julia Cooke, Philip Wheeler, Kadmiel Maseyk and Trevor Collins
STEM Faculty

Fieldwork is a fundamental part of the curriculum in undergraduate Earth, Ecology and Environmental Sciences, but not all students are able to participate in authentic field exercises. Distance learning students are more likely to find fieldwork problematic for a variety of reasons including their location (e.g. rural, overseas, or in inaccessible environments), the field trip location (e.g. often a considerable distance away), or because of a disability or caring responsibilities. Within second-level Environmental Science modules (i.e. S206 and SXF206) we have sought to make authentic fieldwork accessible to these students, by designing and running an interactive live field trip.

Using the OU's 'Stadium Live' platform, we produced three evening broadcasts over a one week period at the Open University last May examining the ecology of a nearby species rich meadow. The participating students used interactive widgets presented alongside the video to make

observations, generate hypotheses and design their own field investigation, which was carried out by the scientists 'on the ground' and analysed live. Each of the three fieldcasts related to a specific aspect of field work:

1) observations and hypothesis development;
2) sampling strategy and data collection;
3) data analysis and interpretation.

The process was iterative between the online students and onsite lecturers: for example information was provided to the students such as general observations of the site, which enabled the students to develop a hypothesis to investigate. This interaction operated during the fieldcasts, and continued in the forums after and between the livecast events. The trial use of 'fieldcasting' showed how mobile communication and video technologies can be used to increase access to fieldwork for all students and particularly those who might otherwise be excluded from field trips.

The current phase of the project is to survey Environmental Science students this year, in order to evaluate the extent to which the fieldcasts help students achieve the desired learning outcomes, and to compare their fieldcast experience with that of attending a comparable face-to-face field trip led by an OU tutor.

This presentation will introduce the challenges of supporting practical fieldwork within distance education and the use made of the fieldcast approach; it will also explain the design and methodology for this year's evaluation project, and how this approach compares to other forms of fieldwork education used within distance learning to address accessibility requirements. Delegates attending this presentation will gain an understanding of fieldwork pedagogy, an awareness of how technology is being used to enhance fieldwork learning within distance education, and an insight into the practicalities of evaluating comparative forms of learning.

Remote practical-focused tutorials

Jon Rosewell
STEM Faculty

As befits its title, Technologies in practice (TM129) takes a practical focus to learning, with up to 50% of study time having a practical aspect. The tutorial program should support this and in the past some tutors have found innovative ways of bringing practical demonstrations or exercises into their face-to-face sessions, for example demonstrating a robot vacuum cleaner or setting up an ad-hoc network of students' laptops.

Producing online tutorials with an equivalent practical focus is a challenge. The creation of the OpenSTEM Labs provides an opportunity to meet this challenge. Part of the HEFCE and OU funding for the OpenSTEM Labs has provided five large 'Baxter' robots which will be accessible remotely as well as two which will be used at residential school. The lab also provides racked equipment bays for smaller remote access experiments, such as those being developed for the electronics curriculum. For a large population module such as TM129, this infrastructure provides

an opportunity to roll-out practical-focused synchronous tutorial events to all students, provided the activities are well designed and scripted so that they can be delivered by a number of tutors.

In this presentation I will review the possible use-cases for remote practical activities, discuss some of the technological and pedagogical challenges, and review progress towards delivering engaging practical activities at a distance.

Students' Engagement with Programming: A case study of a visual programming environment

Elaine Thomas, Soraya Kouadri Mostéfaoui and Helen Jefferis
STEM Faculty

In recent years, the teaching of programming skills in schools has been seen as a solution to the 'skills gap' in the Information Technology (IT) sector. Yet, student cohorts in the Open University are diverse and many students have been out of formal education for a long time. Therefore, there is likely to be a strong need for the teaching of introductory programming at level 1 in the University's Computing and IT degree programme for the immediate future.

Many students find programming and the drop-out rates are high across the HE sector internationally. There are different interpretations as to the reasons for this. For example, Djikstra (1989) argues that learning to program entails 'radical novelty' as novices may not have acquired the necessary prior skills on which to build and progress. Jenkins (2002) argues that the reason behind the difficulties in learning to program is the blend of learning types required: surface learning for remembering features such as syntax and order of precedence, and deep learning in the understanding of concepts and development of true competence. Others (e.g. Scott and Ghinea, 2013) focus on the whole learning environment explaining that 'soft scaffolding' and detailed feedback and motivational practices are most likely to be effective.

The current introductory level one Computing and IT module TU100 My digital life, uses a visual programming environment Sense which is based on MIT's Scratch. While Sense, has its limitations, like any visual programming environment, it is a useful way of introducing programming to novice programmers. Sense allows students to learn fundamental programming skills and concepts and, more importantly, build their confidence to enable them to succeed with other programming languages.

Our project will investigate the impact of using a visual programming environment on student engagement with programming in TU100. The main phase of the project involves the collection and analysis of data on student performance in the TU100 End of Module Assessments (EMAs) to compare their performance in the programming aspects of TU100 EMAs with their performance in the other Computing and IT topics covered in the module. This has entailed the identification of the Sense programming questions in the EMA component in four presentations of TU100. A statistical analysis of data is being carried out to discover:

a) the numbers of students who completed the Sense programming questions,
b) their levels of achievement in the programming,
c) their overall performance on the module, and, also,

d) the overall grades of students who did not complete the Sense programming questions.

There will also be a qualitative analysis of the open comments made by students in SEaM surveys to identify students' views on learning using the Sense programming environment.

In this session, we will present the results of our early investigation into the link between the student engagement with the programming and non-programming aspects in TU100 over four presentations.

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Parallel Session C: Short Oral Presentations – *Supporting Students and Pedagogy Evaluation*

Eureka! How well does Y033 prepare students to succeed on Level 1 Science?

John Butcher[1], Elaine McPherson[2], Carlton Wood[2] and Anactoria Clarke[1]
Learning and Teaching Innovation[1], STEM Faculty[2]

This in-progress research seeks to explore how well the Open University Science, Technology and Maths Access module Y033 prepares students for Level 1 science, particularly the initial module S111 Questions in Science. Whilst we are aware that the Access modules give students confidence and help improve study skills, resulting in Access students being more likely to succeed in their following modules, we are keen to explore exactly what aspects of the module that are of particular benefit to students as they progress through their studies, and to discover if there are any potential areas that Access might target.

So far, we have spoken to students who completed Y033 in the 15J and 16B modules, from a selection provided by the SRPP panel, and we have gauged their feelings and thoughts at the completion of their Access studies. Students have been keen to highlight how the Science, Technology and Maths Access module has improved their confidence and skills in numeracy, and how they have benefitted from the cross-disciplinary science approach, with some students revising their study and career aspirations in light of this. We have also conducted a literature

review, identified key themes, and have interviewed a small selection of S111 tutors who have previous Y033 students in their 16J groups, in order to find out if there are any distinguishing features between these students and the remainder of the cohort.

Between now and the conference, we will be speaking again to the S111 tutors to further explore any disciplinary knowledge differences evident between these students and the cohort, and we will also interview students on S111 16J to ask if they have found themselves adequately prepared for their studies by the Access modules now that they are partway through the module.

We will be presenting our findings so far and our key themes, will recommendations and suggestions of how Y033 might further support students into level 1 Science, and ways in which Access and level 1 modules can work together for a better student experience.

During this session we will have a presentation of our findings, and activities in which we can gain feedback and suggestions from the audience. Intended learning outcomes for the audience include greater awareness of what the Science, Technology and Access module does, how it impacts on students, and how Access and STEM can work together on scholarship to improve curriculum and student support.

Academic literacy and communicating assessment to students on L1 Science Modules: student perceptions

Prithvi Shrestha[1] and Claire Kotecki[2]
Faculty of WELS[1], STEM Faculty[2]

Academic literacy or academic language is widely considered as central to academic knowledge building and success (Snow, 2010). Evidence also indicates that academic language may pose challenges to many students who are at risk of underachievement (Cummins, 2014). Given the disciplinary variation and associated academic language practices (Haneda, 2014), academic literacy in science is distinct from other disciplines. Some studies have shown that students with lower academic literacy skills are unlikely to succeed in science (Kirby & Dempster, 2015), thus affecting overall student retention and progression in STEM subjects. This has implications for how assessment is designed and communicated to students which seems to be under-researched. This paper draws on an ongoing eSTEeM-funded project that investigates Level 1 science students' perceptions and experience of how assessment is communicated to them. In particular, this project focuses on Level 1 science students' perceived understanding of assessment tasks, the wordings used in them, the purposes of these tasks and tutor feedback in distance learning. This study adopted a mixed methods research design (Creswell & Plano Clark, 2007). It consists of a content analysis of Level 1 science assessment, pre- and post-module student surveys and a follow-up student interview. The content analysis focused on the key terms used in assessment tasks, task and expected text types. This analysis informed the design of the student survey. The student survey was conducted with the compulsory science module called S104 Exploring science. The pre-module survey had 94 respondents while the post-module survey had 62. A follow-up telephone interview is planned with 12 participants from the post-module survey.
The preliminary findings suggest that a wide range of instruction terms (process words) have been used in assessment tasks understanding of which is essential to respond to those tasks

successfully. The task type ranged from computer-marked assessment (multiple choice?) to short answer to long answer questions. Students were expected to produce a short paragraph to definitions, explanations, reports and a long answer discussion. Thus, this variety of text type shows the complexity of academic literacy skills required to accomplish them. The pre- and post-module surveys indicated varying levels of students' perceptions of key terms used in assessment, assessment types, clarity of assessment guidance, tutor feedback and assessment processes. This study has implications for both designing assessment and academic literacy support provided to undergraduate science students for their success.

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Developing a framework for measuring qualification effects of a new pedagogy which embeds learning and assessment activities within each student's rich professional context of practice

David King, Jon G Hall, Lucia Rapanotti, Steven Self and Mark Slaymaker
STEM Faculty

We wrote three OU PG Computing modules based on a new pedagogical approach. The approach locates a students' studies in their rich professional context of practice rather than in fictitious case studies. Students can study one, two or three of the modules in their progression towards a PG qualification. Our hypothesis is that the new model improves their understanding of and ability to apply what is taught, as well as developing additional research and employability skills as the students progress through the qualification.

The eSTEeM project aims were to define a framework for evaluating the effectiveness of the approach within the qualification with particular attention to the potential cumulative effects arising from the different pathways students may take, culminating in the capstone research project module, where the additional skills are assumed to be particularly relevant.

Among the challenges were: the complexity of the qualification structure and possible study pathways; the identification and availability of appropriate quantitative and qualitative data sets; the selection and extraction of relevant information from those data sets, particularly from qualitative and unstructured ones; the scalability of the analysis of large data sets.
We have produced a proof-of-concept framework which combines both traditional analysis of quantitative data and semi-automatic Natural Language Processing (NLP) techniques for the classification and extraction of information from unstructured text. Notably, the latter are customizable to different classification schemes.

In this presentation we describe our progress in evaluating how well the approach worked in terms of student outcomes and our future plans both for evaluation of the pedagogic approach and of the framework.

From competence to capability: learning laboratories in the new world of postgraduate education.

Martin Reynolds
STEM Faculty

The paper explores the changing role of Higher Education Institutions (HEIs), and postgraduate education in particular, in developing a capability focus for pedagogic development. Rather than focusing purely on developing skill-sets and levels of competency, an alternative focus on challenges experienced with enacting competencies in the workplace is proposed; challenges of developing 'capability' rather than 'competence'. The paper reports on two strands of development arising from the final report of an 18-month eSTEeM project - Enhancing Systems Thinking in Practice at the Workplace – completed in 2016. The original project aimed to design a learning system for transforming the 'threats' of a gap between postgraduate study experiences and post-study work experiences into 'opportunities' for radical pedagogic adaptation and (re)design. The project built on experiences associated with one such course where the gap is evident - the postgraduate suite of qualifications in Systems Thinking in Practice (STiP) launched at the OU in 2010.

The original eSTEeM project provided a critical lens on the evident success of the STiP programme as measured with conventional key performance indicators (KPIs) associated with, for example, significant overall satisfaction and quality of learning material, alongside increasing levels of registrations and retention. Despite generally positive feedback from students and the growth of a vibrant self-organising alumni group that emerged after the first presentation of the two core modules, STiP alumni have reported frustration at not being able to practice their skills in the workplace. The eSTEeM project reported on constraints of developing capability in practising skills. Core recommendations made through the systemic inquiry include greater and more wider participation of networks associated with STiP Associate Lecturers (ALs), STiP alumni, and employers of potential STiP students, in the process of pedagogic development and presentation of STiP courses. Aside from improving the quality of pedagogy, the new models can develop a demand-pull for STiP expertise thus fulfilling a virtuous pathway between supply and demand. It was argued that such recommendations are relevant to postgraduate pedagogic development beyond the qualification area of STiP to PG qualifications associated with other professional

practices including health and social care, international development, engineering, and management areas more generally.

The two strands of inquiry emerging from the original eSTEeM-STiP study reported on in this paper include (i) the development of a competency framework for STiP that will go some way in creating a demand-pull for STiP skill-sets, and (ii) a wider embedding of the notion of 'learning laboratories' as a vehicle for purposeful action research through systemic inquiry. The paper reports one incidence of a learning lab being developed by the author in partnership colleagues at the OU and United Nations Development Programme for the significant 'capability challenge' of implementing sustainable development goals (SDGs).

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

Show and tell: Innovations in 'between module' support for Qualification progression.

Christine Pearson
STEM Faculty

In our named qualifications there is often the need for students to be prepared for the curriculum that comes next in the qualification. This is an invitation for colleagues to bring along examples of how we support students moving between modules and levels.

This workshop will feature presentations from the following colleagues:

Bridging the study gap: Provision of online support between two level one mathematics modules

Susan Pawley
STEM Faculty

With the Open University's focus shifting to offer coherent qualification-based support rather than module-based support, the requirement to provide continuity between modules is recognised as vital in assisting students to bridge the knowledge gap and become independent learners.

To help fill the period of time between two key level one modules, we have developed a suite of structured, interactive materials, where students can self-identify the areas needed for revision and make use of supported learning environments to fill those gaps.

Support is given in two different ways: the "revise and refresh for MST124" website (https://learn1.open.ac.uk/mod/subpage/view.php?id=12054) and a series of revision "boot-camps".

The revise and refresh for MST124 website focuses on key topics covered in MU123 Discovering mathematics, which are essential preparation for MST124, Essential Mathematics 1. Each topic includes a self-diagnostic quiz, a refresh section: giving a brief topic outline, a revise section:

giving detailed references on where to find the topic in MU123 and lots of question practice. The website is supported by an Associate Lecturer led forum.

In the final 3 weeks before the module started, six on-line revision boot-camps are run, one for each topic identified in the website.

This method of support was initially offered to students starting MST124 in 16J and has been repeated for the 17B presentation.

The material helps to retain and support students during the transition between modules, increasing their academic attachment to other students and to the University. It is hoped that this kind of initiative helps form a cohorts of students who engage with the website, forums and boot-camps in an efficient manner; by bridging the study gap they are able to "hit the ground running" at the start of the presentation having already addressed prerequisite questions and met other students on the module.

Once MST124 16J has finished we will be able to fully evaluate the effectiveness of the materials in relation to retention and pass rates, by comparison with the data from previous presentations. By analysing how the students interact with the material, we gain insight into how students study remotely, which will further our development of qualification-based support.

This presentation will focus on the rational for the bridging support, how it was used and the current progress of the students who used it.

Providing student support through drop-in clinics: a perspective from chemistry.

Nick Chatterton, Elaine Moore, Catherine Halliwell and Louise MacBrayne
STEM Faculty

Bootcamps or clinics are becoming an increasingly prevalent vehicle to support OU students during their studies. The approach used in these projects varies, but what is common is that they act as re-fresher courses prior to start of modules with the aim being improved student satisfaction, performance, retention and progression. This presentation will provide details and analysis of a scheme undertaken by staff in LHCS to support the transition from level 1 to level 2 in the chemistry subject area, prior to start of the 16J presentation of S215.

Drop-in clinics are commonly utilized at brick universities in STEM subjects primarily for support of generic mathematical, writing or computing skills – there are significantly less examples of subject specific support. The format of such clinics is that students meet with staff (or postgraduate students) for one-to-one or small group support and help with content. As such they are an excellent example of student-centred learning.

The approach taken in this eSTEeM funded project was to blend the bootcamp approach pioneered in computer programming, providing structured questions and answers based on material covered in the "Are you ready for…?", along with the drop-in clinic approach described above. The latter was achieved via bookable one-to-one or small group OULive sessions with an

experienced AL or member of central academic staff. In addition, the dedicated VLE page had links to targeted external video resources (such as the Khan Academy) and a monitored forum.

We will discuss what we have learnt from this scheme, provide some guidance on best practice, and discuss analytical data that demonstrates the positive impact of this approach in supporting OU chemistry students.

Integrating student support across the V10: a model for sharing support within and between modules

Anne-Marie Gallen[1], Alison Mortiboy[2] and Ellena Benson[2]
STEM Faculty[1] and Academic Services[2]

By having additional conversations with their existing students about their next steps, a tutor can build their students' motivation and encourage them to progress. Previous pilots of similar activity have shown that this is particularly important for students who are studying at Level 1. The Progression Contacts by Tutors project is led by the Student Support Centre for Excellence (SSCE) who are working in partnership with module chairs, Student Support Team Leads and Associate Lecturer Services to arrange and achieve these additional conversations for the 16B and 16J presentations.

The project aims to improve module completion rates, pass rates and enrolment rates on the next module and so it aligns with the university strategic objective to achieve "more students qualifying". Tutors are asked to contact their students at specified points in their studies to have conversations with them about their progress and to discuss their future plans.

T192 is a brand new level 1 module that began in October 2016 and caters for around 1000 engineering students through a new approach which includes an integrated offering of engineering, maths and study skills.

When invited to take part in the Progression Contacts by Tutors Project run by the Student Support Centre for Excellence, it was seen as a unique opportunity to marry the needs and requirement of these students at a particularly difficult point of the module with a direct pastoral contact from their tutor.

From week 9-11 of the module the students meet threshold concept that has proven particularly challenging in the past; rearranging equations. The module team had noted this threshold and designed an interactive adaptive quiz to identify students' particular issues. These needs were met through a number of online visual and audio support but needed the interaction of their tutor to tackle deep seated errors in approach. The progression contact would allow tutors to engage with students on a pastoral level but with additional tools at hand to inform the dialogue.

The contact, in the form of a telephone conversation, or email/letter where this is not possible, could be used not only to look forward to next module registration and completion but also to support students based on their performance an interaction on the module to date.

We report on how the project team and T192 module team designed and aligned their approaches and the progress to date.

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

What drives active student participation in online tutorials?

Vikki Haley-Mirnar, Diane Butler and Lynda Cook
STEM Faculty

Formerly OU tutorials were small group, face to face, student centred events where Associate Lecturers facilitated learning based on previously studied material. Events were highly student centred. The move to online, large group, lecture style events have inevitably resulted in a decline of active student participation.

The change to online tutorial provision presents us with a unique dilemma. Online tutorials reduce some barriers to attendance and offer flexibility but by their nature they may be less useful to the student since the opportunity for active participation in learning is different to face to face tutorial provision.

Online methods have seen a transition from small, tutor group tutorials, to medium and large scale events run by teams of tutors through OU Live. This move to online tuition has fundamentally changed the characteristics of OU tuition in several respects. Our heritage student-centred tutorial model based on active student participation in tutorial activities has proved challenging to emulate in the online classroom. Considerable effort and resource has been devoted to developing our Associate Lecturers' online tutoring skills with the aim that students are active participants in tutorials (Jones and Gallen, 2015) but despite best efforts much of our provision is now effectively lecture style.

To investigate the factors affecting student participation in online tutorials, we have developed a prototype method to help us evaluate our tutor's online tutorials to recognise good practice with regard to active student participation. We will also be undertaking focus groups, and tutor and student questionnaires.

Preliminary data of our evaluation tool confirms that tutors generally make very little use of the available tools that encourage participation, and where used, these are not terribly effective. Our students are largely passive recipients of tuition. As we continue our project, we will be seeking further contacts with tutors and students to attempt to more fully understand and mitigate against the potential limitations to active learning in online tutorial contexts.

Reference:

Jones, Mark H. and Gallen, Anne-Marie (2015). Peer observation, feedback and reflection for development of practice in synchronous online teaching. Innovations in Education and Teaching International 53;6, 616-626.

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

How can OU Analyse be beneficial for all tutors at STEM and the whole OU?

Martin Hlosta, Zdenek Zdrahal, Michal Huptych and Jakub Kuzilek
STEM Faculty

OU Analyse project started piloting machine learning models for identification of students at risk of failing in the courses in 2014. The main goal is to use the data from the previous presentations of the modules to predict which students are likely not to succeed in the following assignment. The predictions are available for tutors and module chairs in the dashboard application. Justifications and other student information are also shown to the users, which should help them to decide which students should be targeted for a help.

The project started in 2014 with two courses, carefully gathering the feedback on the weekly basis from the module chairs. Ever since large automation processes and security mechanisms were developed in order to scale up. In 2016 J presentation, the project supported about 900 tutors in 32 modules, with our audacious goal to support almost all OU courses starting from 17B presentations.

However, by going to a large number of courses we have lost the direct contact with the primary users. We would like to use this conference as the opportunity, where any potential users or persons interested in the improvement of the software can meet for one hour and help us to gather the feedback of (a) any issues and ideas about the current version of the dashboard and about our planned improvements, (b) delivery of the predictions -- Participants will be asked, how often is it preferable and beneficial for users to look into the predictive data, how often they do it now, how do they feel about being notified about new predictions and if there should be any other information in the email included? Do they see this as an obstacle?

The session will start with a very short demo and then, depending on the number of participants we will split the people into separate groups discussing each of the topics and then presenting discussion outcomes to the other participants.

Participants, even those who already use OU Analyse, will get a knowledge what the system allows and how it can help them in their work. Moreover, considering the rich experience in teaching, the feedback might improve the system and then consequently their work.

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

You too can have your fifteen minutes of fame - a workshop on using Facebook Live for student and community engagement

Andrew Smith[1] and Amanda Closier[2]
STEM Faculty[1], Library Services[2]

In isolation and apparent morphic resonance the Library and Cisco Networking teaching teams at the Open University have been working on the use of Facebook Live (FBL) in parallel.

Library Services has been using Facebook events to meet our students in a space they are comfortable and familiar with. Since 2014, Library Services has used Facebook chat events to teach library skills, engage with distance learners and help to build communities. We have recently begun experimenting with incorporating live video into our sessions. Facebook enables us to provide tuition and provoke discussion on a whole range of topics. The informality of the sessions allows them to be easily adapted to what students want to know, leading to dynamic and relevant events. The platform is easy to use and the results are even easier to share. Library staff presented on our work with Facebook Live at the ALT Winter Conference 2016 and 2016 Social Media for Learning in Higher Education Conference.

The Cisco Networking teaching team in concert with ongoing work around the domain of Teaching by Twitter and the principle of leaky teaching. Have extended their social media presence using FBL and Periscope (from Twitter) - each act as a medium for micro-teaching. Delivering sessions in under ten minutes - it was established that FBL offered greater impact in respect of community engagement in both live (asynchronous) and post-event recorded (asynchronous) terms (Smith 2016).

Following on from the experiences of the micro-teaching sessions. Supported by Cisco Academy community funding, the Cisco Networking teaching team have employed FBL to reach and teach teachers the principles of network engineering via a series of weekly mass training activities. The key benefit being the zero technological requirement for different teachers in different schools who can access this by any means, including their smartphones.

Collectively, with both the Library and Cisco Networking - the exploration of the affordances of FBL and active use in the field has enabled both teams to independently discover the benefits, technological requirements and con's of this platform. This workshop explores how FBL could be easily employed to enhance teaching and outreach and offer practical guidance on the free software used to successfully deploy livestreamed events.

To facilitate the session - we will create a Facebook Page for the eSTEeM conference which can be used for other conference activities - anyone will be welcome to participate. During our session, we will broadcast from the breakout room demonstrating the technology.

Reference:

Smith, Andrew (2016). Periscope vs Facebook Live – it isn't a grudge match. In: 2016 Social Media for Learning in Higher Education Conference (SocMedHE16), 16th December 2016, Sheffield Hallam University, Sheffield, England.

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

Bridge Over Troubled Waters – Would your students benefit from a bridging course to help them transition to second year?

Frances Chetwynd, Helen Jefferis and Fiona Aiken
STEM Faculty

Does second year have an identity problem? "First year is for settling in, final year is packed with preparation for exams and employment. Second year is the middle child in a three year undergrad curriculum" (Milsom, 2015). Students themselves have reported that the step up to second year leaves them feeling unprepared for aspects such as the workload and more demanding academic content and assessments, a view reinforced by one staff member calling first year "cute and fluffy". In addition, in computer science for example, the change to a different programming language, may add to the difficulties. At the workshop:

- We will start by briefly considering the literature and evidence underpinning the different types of bridging courses currently offered to help bridge this gap. (Koenig et al, 2012).

- Delegates will then be asked to consider which type of bridging course might be most suitable within the OU context and for their qualification.

- A summary of will then be presented of the published work on the benefits and disadvantages of hand-selecting potential candidates for a bridging course, including the type of data that could be used for this.

- Delegates will then discuss what participant selection methods they would use (if any) when offering a bridging course.

- We will start the final section with a brief look at a quantitative analysis of the impact of a bridging course currently being offered to Computing and IT students at the OU prior to starting their Stage 2 programming studies.

- A final plenary session will offer delegates the opportunity to share ideas, across disciplines, about the potential for bridging courses within STEM and other faculties.

At the end of the workshop attendees will have gained a better understanding of the types of bridging courses available and leave with some ideas of how to use a bridging course in their subject area, to help students successfully transition from first year to second year.

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

The OpenSTEM Labs

Mark Hirst, Ulrich Kolb, Tim Drysdale, Nick Braithwaite and James Smith
STEM Faculty

The OpenSTEM Labs will allow students worldwide to be able to set up, and participate in an enhanced suite of remote-controlled experiments using best in breed remote access facilities and industry-standard tools.

As well as enhancing the OU's current STEM offer, the OpenScience Observatories, the OpenEngineering Laboratory and the OpenScience laboratory will support new undergraduate curriculum in electronics, instrumentation and control, and the new postgraduate qualification in space science.

The OpenSTEM lab team will provide an update on progress towards rolling the facilities out.

Demonstrations of key facilities and instruments will be available and you will have a chance to operate a remotely controlled experiment in the OpenSTEM labs.

Closing Keynote Presentation

Is there a role for pedagogy in enhancing the STEM student experience?

Michael Grove,
University of Birmingham

Within the UK there is an increasing focus for higher education institutions to provide evidence of the impact of their efforts to ensure all students have access to a high quality learning experience (through the Teaching Excellence Framework) and in enabling fair access (through the OFFA Access Agreements). At the same time, there are an increasing number of academic staff who are choosing to focus their careers upon a teaching and learning pathway. For such staff there are many advantages, both personal and professional, in developing a scholarly profile, but making this transition can be challenging.

In this presentation I will explore how their disciplinary skills and training may be adapted to enable an enquiry-based approach to teaching and learning innovation and enhancement.

TOWARDS A FRAMEWORK FOR INCLUSIVE STEM EDUCATION WORKSHOP ABSTRACTS

Framing inclusion: two Canadian initiatives

Ann Holmes
Ann Holmes & Associates

The WinSETT Centre's Leadership Program is a series of 5 day-long sessions designed for early to mid-career female engineers, scientists, tradespeople and technologists. The program invites participants to consider how they can lead from whatever point they are in their careers. The skills developed are useful for all women, especially those considering study or work in STEM.

Gender-based Analysis+ is an analytical tool used within the government of Canada to assess the potential impacts of policies, programs, or services on diverse groups of women and men, taking into account gender and other identity factors. Its framework of sustainability can be adapted to any organization's structure and needs.

Reflections on both initiatives will draw out ways to support inclusive STEM education.

Setting the scene for inclusion in engineering. Day 1

Jan Peters MBE
Katalytik

The participation of women in engineering at undergraduate level has changed little for 20 years. Engineering departments are simply not achieving Athena SWAN awards at the same rate as science departments and engineering as a whole has failed to grasp diversity and inclusion. This talk will explore the outputs of the HE STEM project, Set to Lead and how it has helped shape the Integrated Engineering Programme at UCL at helping to address the underrepresentation of women in the STEM workforce, without mentioning women.

The Set to Lead project developed resources and good practice around team working to help students build an inclusive team culture by listening to each other and valuing each other's contributions through the Gallup Strengthsfinder tool. Jan continues to support the IEP through the use of the Gallup Strengths Finder Tool to aid student communication and collaboration. The presentation will highlight the outputs of the Set to Lead project, impacts of using strengths thinking in teams and the development of a new framework for engineers to look at addressing inclusion.

Introducing and revisiting a gender inclusive engineering curriculum. A case study from Australia

Mary Ayre
University of South Australia

Following a brief outline of her experience with a gender inclusive engineering education project in Australia, Mary will suggest some questions which might be considered at this afternoon's workshop.

Decolonizing Computing

Mustafa Ali
STEM Faculty

Does computing need to be decolonised, and if so, how should such decolonisation be effected? Isn't it somewhat of a stretch to describe computing as colonial, especially since colonialism as a phenomenon tied up with imperial structures of domination and settlement is a thing of the past? How can computing be colonial if the 'age of empires' is over and we live in a postcolonial world?

In this talk, I will argue that computing is inherently colonial in some sense because, as a modern phenomenon, it is founded upon, and continues to embody aspects of, colonialism. After presenting some examples of colonial computing, I will offer some suggestions as to how to computing might be decolonized.

Embedding and sustaining inclusive STEM practices

Trevor Collins, Anne-Marie Gallen and Nicholas Braithwaite
STEM Faculty

National student data has shown a range of attainment gaps for specific groups across Higher Education, specifically for: students from low socio-economic groups, students from black and minority ethnic groups, and students with disabilities (HEFCE, 2015). Consequently, the Higher Education Funding Council for England are funding 17 projects under the Catalyst programme to help address these inequalities. Building on prior experience, The Open University is leading a project with colleagues from the University of Leeds and Plymouth University, to evaluate and promote inclusive educational practices within the STEM disciplines.

Integrating accessibility within teaching and learning requires universities to embed and sustain module design and delivery practices that consider the diverse needs of all students. As more of our teaching and learning is being mediated through technologies, this brings opportunities as well as potential pitfalls, when it comes to inclusive education. Digital access to learning resources introduces opportunities for the use of assistive technologies and alternate formats that enhance the accessibility of learning resources for students with disabilities, but care needs to be taken to ensure the pace of innovation and interaction matches that of accessibility and inclusion.

Across the STEM disciplines there are particular challenges associated with fieldwork, labwork and notations. However, with changes to the Disabled Students Allowance Scheme, universities are increasingly responsible to ensure that the education they provide is accessible and inclusive. Within this presentation we'll consider the role of eSTEeM in inclusive education at the OU; we'll describe some of the processes and approaches used in OU modules, and we'll discuss how case studies and recommendations on inclusive practices might be produced and shared across the STEM disciplines.

Science with and for (a diverse) Society?

Anita Shervington
Community Perspectives CIC

The underpinning principles of public engagement with science and the breadth of approaches out there are fantastic. However, in our attempts to build an engaged citizenry, we have failed to serve key groups of people and have unintentionally widened the gap between those that engage with science and those that don't. If we were to 'map the gaps' depicting the distribution of informal science activity outside of the classroom, we would see deserts, and hot-spots across the country, confirming what we already know – science isn't accessible to everyone.

My idea is to expand the science engagement sector to include a diverse, inclusive and asset based, leadership model, with the mission to fill those gaps across the country. We must ensure that equity, culture and social justice play a bigger role in the whole process – in particular when granting access to funding, developing leaders and deciding on locations for community-driven engagement.

We must keep asking ourselves who is missing? What are their needs, aspirations and ideas, and how can the STEM agenda be creatively utilised to respond and contribute to their priorities? Inclusivity isn't just about who turns up, or who delivers. It's also about the content and context.

There are already a huge number of committed people leading community STEM initiatives designed around specific audiences, but sadly these initiatives typically receive little, to no, support from the STEM funding sector – this is what needs to change.

Reaching new audiences doesn't require reinvention, but it does require focus on the re-distribution, re-design and resourcing of what we have now, to make it applicable to all communities, so that we can achieve our ambitious goal of science with and for (a diverse) society.

Closing the Empathy Gap

Claudia Morrell
Morrell Consulting

Ms. Morrell has spent the last three years developing a new educator professional development program entitled, "Closing the Empathy Gap." Launched in 2017, this research-based program

highlights the increasing levels of local, national, and international distrust and alienation spreading among diverse groups and the role technology and the information society play in both creating and addressing cultural apathy, disinterest, and discord.

Concurrently, technology and social media are also expanding individual engagement and empowerment leading to the emergence of new voices, the amplification of calls for social justice, and an increased energy to solve shared global challenges.

POSTER PRESENTATIONS

Gendered motivations and choices in computing higher education

Helen Donelan, Clem Herman, Janet Hughes and Elaine Thomas
STEM Faculty

This poster will present a new project that is investigating gendered enrolment patterns on the Computing & IT degree at the Open University. Recent data collected through the preparation of the Computing and Communications Athena SWAN submission show that the number of women studying Computing and IT is still falling. Figures at undergraduate levels 2 and 3 indicate that the problem is not one of retention but more likely to do with recruitment. The data also shows that a much lower proportion of women enrol on the single honours Computing & IT degree programme compared to the joint honours or open degree programmes, where students choose to study some computing modules but supplement this with other subjects. This suggests that women are making different choices about computing degrees than male students.

This project is exploring the motivations of female and male students to understand if there are differences, and if so, how these effect the choices made. We will share our methodology and the initial data collected. The work will be relevant to anyone interested in strategies of inclusion for enrolment on computing courses, and STEM subjects more generally where similar patterns are being seen. The findings will also contribute to the existing body of research on gendered motivation and choice and women's participation in STEM higher education.

See page 53 for poster

Women in Engineering at the Open University – motivations and aspirations

Carol Morris and Sally Organ
STEM Faculty

The number of women registering on the Open University's (OU) undergraduate engineering qualifications has remained fairly constant since the introduction of loans for part-time distance learning students in 2012. Although there has been a small growth in overall numbers, women currently make up about 9% of the engineering student population.

There is some anecdotal evidence from conversations with women students at engineering residential schools and the 2016 National Women in Engineering Day conference held at the OU that they choose engineering qualifications as a result of working in an engineering environment, but that they do not necessarily have a job role which could be described as engineering at the start of their studies.

We wish to understand the motivations of women studying engineering qualifications as a first step in helping to increase the number of women on such qualifications. We also seek to understand their career aspirations which can inform curriculum strategy.

Only 9% of the engineering workforce is female (Skills & Demands from Industry - 2015 Survey, IET) and only 6% of registered engineers and technicians are female (Engineering UK 2015: The State of Engineering). There have been many initiatives over the past 30 years to increase the number of girls entering HE to study engineering, but little work exists about understanding the motivations of more mature women to study engineering.

By gaining an understanding of female students' motivations we can recommend strategies for increasing the registrations of women students on engineering qualifications at the OU.

We hope to be able to report on the first phase of work and on some initial focus group outcomes.

See page 54 for poster.

Leading the way as a hydro nation in Scotland – supporting student transitions within a strategic partnership between Glasgow Clyde College, The Open University in Scotland and Heriot-Watt University

Sally Crighton, Felicity Bryers, Laura Howe and Andrew Potter
STEM Faculty

The Open University in Scotland is involved in a strategic partnership with Glasgow Clyde College, Heriot Watt University and Scottish Water, www.openuniversity.co.uk/sw. The qualifications involved in the partnership are an HNC in Water Operations from Glasgow Clyde College, BA/BSc Open (Honours) degree with the OU and an MSc in Water and Environmental Management with Heriot Watt University. Scottish Water believes strongly that a "more qualified industry" will make for "better performance" and to this end, they are sponsoring their employees through their OU studies. Students begin their OU studies with modules in mathematics, required for progression to the MSc, and can then choose one of five different pathways to complete their honours degree.

This poster will depict our experience of setting up and working within the partnership and share some lessons learnt following the first cohort of students through their OU studies. Participants should gain an understanding of this example of employer engagement in Scotland and how students are supported within this structure.

See page 55 for poster.

When do students go to our lab? Profiling Open Science Laboratory visits on SXHL288

Mark Hirst and Anisha Dave
STEM Faculty

For many Science modules, the Open Science Laboratory (OSL) serves as the gateway to the students' practical activities. For some modules, including SXHL288, students spend a

considerable amount of their study time using applications housed within OSL to collect authentic datasets. Future developments in the OSL through the OpenSTEM labs project include live-streamed experimentation ('lab-casts') that hope to drive student engagement through live demonstrations that work most effectively as synchronised events, and remote-accessed instrumentation. Both of these developments, as well as module teams and tutors would benefit from a deeper understanding of student study profiles to the OSL, and such profiles may also serve as a proxy to how and when our students study online. Despite these increases in students' activity in the OSL, few studies have been performed on how and when students carry out their work in the OSL.

We present a study of student engagement with SXHL288 OSL activities using access data collected from the OSL. The profile of student activity generated includes a temporal map of activity in the OSL (day of week/time of day etc.) and a breakdown of study hours and the relationship of these with the module Study Planner timetable and with student workload calculations. As well as informing module redesign through insights into 'true' activity workload, these activity profiles can be used to inform how we schedule module-wide events (e.g. lab-casts and tutorials), use the study planner to stage and synchronise activities and how we schedule live-instrumentation booking slots in future presentations.

See page 56 for poster.

The OpenSTEM Labs

Mark Hirst
STEM Faculty

Same abstract as Parallel Session I: Workshop/Demonstration on page 39.

See page 57 for poster.

Personalised Study Recommender at the OU Analyse

Michal Huptych, Zdenek Zdrahal, Martin Hlosta
Knowledge Media Institute

The main aim of this contribution is to introduce a personalised study recommender, which has been developed within the OU Analyse project. The recommender analyses VLE interactions of students with materials of study plan of the past and current presentations of the module. These interactions are represented by two measures: Relevance and Effort. The Relevance is created from two parts. The first part reflects average values of the number of clicks of highly successful students to study materials in the individual weeks of the previous presentation. The second part represents the number of students who engaged with study materials in the week. Effort characterises the activity of individual students in the current presentation. These measures are calculated for each week of the current study plan. The final recommendation is given by the

comparison of the Relevance and Effort for weeks from the start of the presentation up to (including) the current week.

Let's show the basic idea of the recommendation in the following example. Let's consider study material M designed for the 4th week in the study plan both for current and previous presentation. This activity on this material increased in week 3 and 4, but the number of students that engaged with the material in week 3 was low. Consequently, the Relevance will be high only in week 4. Now let's have a student in week 4 of the current presentation, who hasn't engaged with the material M yet. This material will be recommended for the first time in week 4 because of its high Relevance and student's non-engagement (zero Effort measure). If there are multiple materials recommended for the student and time, they are prioritised by their Relevance and Effort of the student.

So far, we have evaluated the approach to the design of personalised study recommender based on the correlation of the study material Relevance and the Effort of two groups: (a) highly successful students, and (b) students, who passed with a lower score together with unsuccessful students. The Relevance of study materials is strongly correlated with the Effort for highly successful students. On the other hand, the Effort of students who passed with lower score together with unsuccessful students is not significantly correlated with the Relevance of study materials.

See page 58 for poster.

The impact of scaffolding on learning physics: is there a gender difference?

Hillary Dawkins, Holly Hedgeland, Pam Budd, Jimena Gorfinkiel, Victoria Pearson and Sally Jordan
STEM Faculty

Demographic differences by gender in participation in undergraduate physics courses are well known, but there are also issues around differences in performance. The reasons for these differences remain incompletely understood, despite their potential to create an underclass of students who are consistently underperforming. An eSTEeM project "Gender Differences in completion and credit obtained in Level 2 study in Physical Sciences", P. Budd et al., has gathered together a large quantity of data on the comparative performance of women across all the assessment components in the Level 2 physics modules S207/S217 and the Level 2 astronomy module S282, revealing differences which have prompted a number of initiatives in student support.

Recent and ongoing work studying a parallel difference in performance in the first year physics course of the multi-disciplinary natural sciences degree at the University of Cambridge has highlighted the impact of question scaffolding upon gender differences in performance [Eur. J. Phys. 36 (2015) 045014].

Although there are systemic differences between this cohort and our own, the study presents an interesting phenomenon that is potentially of great relevance to Open University students and more widely. In this work, we re-evaluate our data on performance in the Level 2 physics and

astronomy modules in the light of the hypothesis that differences in performance are reduced in questions with a higher degree of scaffolding. We also seek to understand whether female students typically have a lower level of experience in less-scaffolded questions from their previous studies when entering the Level 2 modules.

See page 59 for poster.

Students' study of online Science modules

Elaine Moore, Tom Argles, Vicky Taylor, Andrew Norton, Catherine Halliwell, Vikki Haley-Mirnar and Kadmiel Maseyk
STEM Faculty

Five new Open University level 2 Science modules delivered entirely online have provided an opportunity to study how students engage with this type of content in an on-screen format. We used reflective questions in a virtual learning environment (VLE) and data on the number of students registered for and accessing the website of each module. Findings so far include:

- Despite many commenting that they wanted books the majority studied mainly online. A combination of on-screen and paper-based study was also a popular option.
- The preferred method of note-taking was pen and paper
- Aspects of on-line learning that were liked were quizzes, on-screen exercises and integrated videos.
- Negative aspects of online study related to problems with software, changes to browser functionality and general accessibility.
- We have so far found no evidence for a drop in retention or achievement directly attributable to onscreen delivery.
- Student satisfaction dipped for the first presentation but has slightly improved.

See page 60 for poster.

SDK100 – what aspects of this online only module are the students engaging with?

Vikki Haley-Mirnar and Carol Midgley
STEM Faculty

SDK100 is a high population, Level 1 entry module which is delivered entirely online. Embedded within the text are numerous interactive components, including a variety of multimedia, home and virtual investigations, skills- and content-based activities, and use of external websites for data gathering. A previous eSTEeM project investigating the impact of online only delivery of science modules identified that students don't appear to be fully engaging with the interactive aspects of the online modules.

To further understand what aspects of the online modules students are fully engaging with, what they value, and to identify the barriers preventing students from undertaking certain aspects of the module we invited all students on SDK100 16J to complete a questionnaire. Combined with learning analytics data, and in-depth focus sessions this will enable us to evaluate the effectiveness of online module delivery to inform the development of SDK100 as well as future science modules.

Additionally, based on data showing that student satisfaction is linked to the provision of a tutorial programme, irrespective of whether students actually attend, this project also investigated how the tutorial programme is perceived by students, with a particular focus on the difference between cluster-group skills-based tutorials and tutor-led academic tutorials, and the potential barriers to students attending the tutorials.

See page 61 for poster.

Supporting student's learning journey through the transition between levels in mathematics and statistics

Rachel Hilliam, Alison Bromley, Chris Hughes, Sue Pawley, Alison Bromley and Carol Calvert

Mathematics and Statistics are linear subjects where success at higher levels depends on firm foundations, it is likened to a carpenter who is only capable of making a beautiful piece of furniture once they understand how a hammer and nail work. It is also the case that students succeed by regularly practicing mathematics, as it is not a spectator sport! Currently the transition between modules and levels involves periods where students have no mathematical study and in some cases the foundations have been studied several years previously and are now no longer at a student's fingertips. There is a need for students to continue to practice techniques in a supported environment during the gap between modules and have appropriate advice on areas where they need to refresh previously established knowledge in order to have the best chance of success.

The School already provides a revise and refresh for MST124 website which focuses on key topics. Each topic includes a self-diagnostic quiz, a refresh section: giving a brief topic outline, a revise section: giving detailed references and lots of practice questions. The website is supported by an Associate Lecturer led forum and in the final 3 weeks before module start, six on-line revision boot-camps are provided.

The material helps to retain and support students during the transition between modules, increasing their academic attachment to other students and the University. This initiative helps form cohorts of students who engage with the website, forums and boot-camps in an efficient manner and are able to "hit the ground running" at the start of the presentation having addressed prerequisite questions and met other students on the module.

The ultimate goal would be to build a suite of websites where students can self-identify areas they need to revise in a supported learning environment.

See page 62 for poster.

Computer marking of open-ended responses with open source tools

Tim Hunt
Information Technology

Computer-marking of students' work can be a powerful educational tool. The feedback may be given to the student immediately, while they are still thinking about the task they performed. If the student did not successfully complete the task, they may be given a chance to re-submit an improved response, giving them an opportunity to act on the feedback received.

Where computer-marked assessment has sometimes struggled is in the authenticity of the tasks that the student can be set. Much automated assessment comprises selected response questions (for example mulitle choice) but as Veloski et al (1999) said in the context of medical education, "Patients do not present with five choices".

One can do better. One UK University, now has a computer-marked assessment system which brings together the ability to grade any of Mathematical expressions (STACK - Sangwin, 2013), Computer code (CodeRunner - Lobb & Harlow, 2016), and free text responses of up to a sentence in length (Pattern-match - Jordan & Butcher 2013), along with other more traditional question types. Furthermore, all this software is open source, making it available for anyone to use.

This poster will exhibit examples of all these types of question; it will show how the computer-marked questions fit into the overall teaching and assessment strategy of the module; and it will give some of the data about the impact this has on students' learning.

See page 63 for poster.

Fieldscapes: Virtual world field trips to support field teaching and more

Tom Argles[1], Phil Wheeler[1] and David Burden[2]
STEM Faculty[1], Daden Ltd[2]

Delivering effective field teaching faces multiple challenges at all levels – for schools as well as for OU undergraduates. OU geoscience modules over the last 25 years have featured virtual field trips (VFTs), exploiting a range of formats, typically delivered via CD-ROM, DVD or web browser. 2013 saw a dramatic reboot with the launch of Virtual Skiddaw, a field exercise framed in a multi-user virtual environment that was created using 3D gaming software (Unity 3D).

Virtual world field trips (VWFTs) potentially offer numerous new opportunities for online field learning. Rather than merely trying to replicate an outdoor field trip, the VWFT can also go 'beyond fieldwork': users can access aerial perspectives; drape the digital landscape with different imagery (e.g. maps); teleport and fly to save time; call up subsurface cross-sections; even fade other avatars out if they are obscuring the view! The multi-user capability enables collaborative work, even among groups that are widely dispersed, as OU students are. Judicious pre-trip and/or post-trip deployment of VWFTs frees up time in the field, allowing educators to re-focus field teaching and students to get the most out of the limited field time.

We report on the Fieldscapes system (http://www.daden.co.uk/conc/trainingscapes/fieldscapes), a platform for creating and hosting VWFTs from multiple sources and locations, for use in schools and universities or more widely. Trials of the system with schools have guided development, including prompting the incorporation of a flexible authoring tool that allows any educator to customise a virtual landscape with their own lessons and activities. We also present analysis of feedback from OU students, schools and HE practitioners on this new generation of virtual field trips, as well as offering insights into the widening appeal of Fieldscapes to different disciplines across STEM and beyond.

See page 64 for poster.

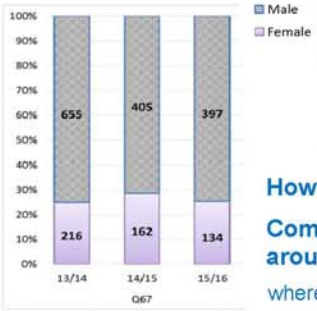
Gendered motivations and choices in computing higher education

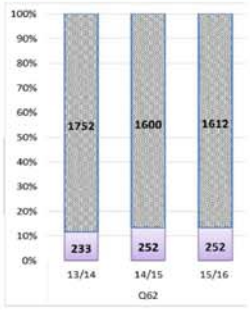
Clem Herman, Helen Donelan
Elaine Thomas, Janet Hughes

The Open University

Computing & IT at the OU:
Only 14% of students are women ..... but this is a widespread, well-known problem.

Recent Athena SWAN data shows that the number of women studying a Computing and IT degree at the OU is low and not improving.



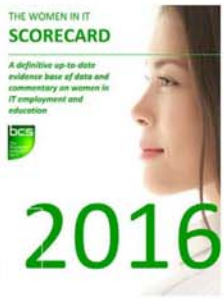


However....

Computing & IT *joint honours*: around 25% are women

where students study some computing modules but with other subjects.

Of all sectors, Computing & IT has the lowest proportion of female applications to HE courses.
(e.g. Education 80%; Law 67%; Business 46% ; Physical sciences 42%; Engineering 18%; Computer sciences 15%)[1]



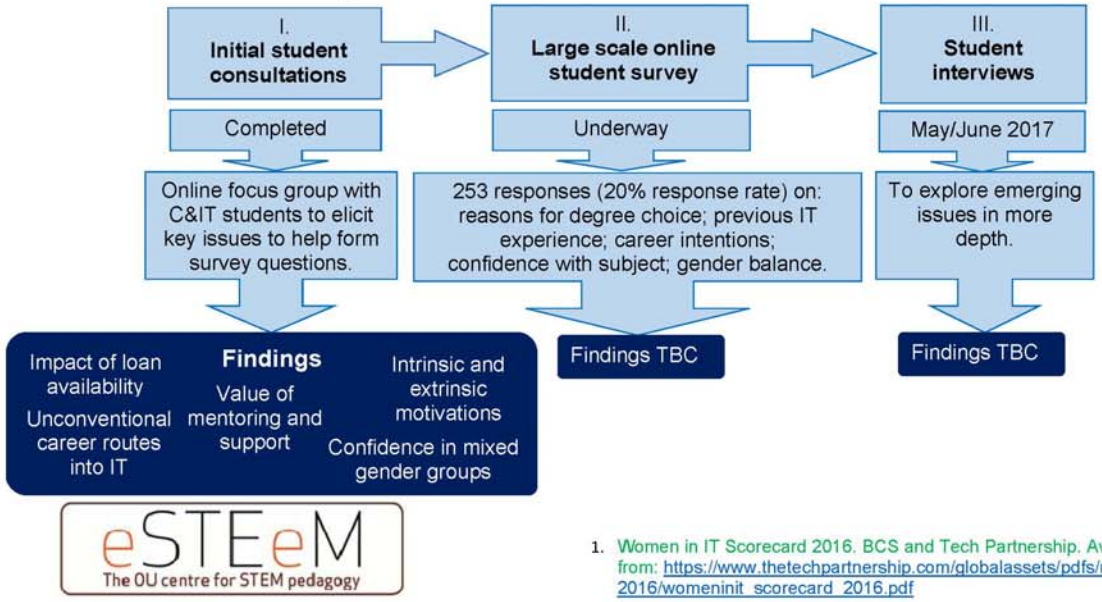
This is despite:

- numerous initiatives to elevate the status of IT as an academic/ career choice for women;
- the IT sector out-performing other sectors;
- remuneration/ benefits making IT a desirable career option.

Existing research focuses on young women entering higher education for the first time.
Our research focuses on mature students seeking to improve/change careers.

- Why is there a much higher proportion of female students on the joint vs. single hons Computing & IT degree?
- Do female and male students have different motivations for studying our modules?
- Do female and male students have different levels of confidence in studying our modules?
- Can we make our degree qualification more attractive to women?

Methods and initial findings



eSTEeM
The OU centre for STEM pedagogy

1. Women in IT Scorecard 2016. BCS and Tech Partnership. Available from: https://www.thetechpartnership.com/globalassets/pdfs/research-2016/womeninit_scorecard_2016.pdf

Women in Engineering at the Open University - Motivations & Aspirations

Carol Morris and Sally Organ
School of Engineering & Innovation

Introduction

Women account for only 10.5% of the OU undergraduate engineering student population, with an annual intake of about 100 female students. 75% of these women are aged between 25 and 39 years, with only 2% aged under 21.

There is some anecdotal evidence that these women choose engineering qualifications as a result of already working in an engineering environment, but that they do not necessarily have a job role which could be described as engineering at the start of their studies. We know that 76% of these students are in full-time employment with another 10% in part-time work.

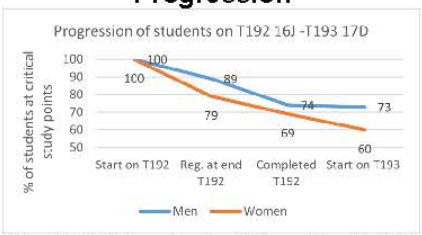
There have been many initiatives over the past 30 years to increase the number of girls entering higher education institutions (HEIs) to study engineering, but we are aware of no substantial work on understanding the motivations of mature women to study engineering.

eSTEeM
The OU centre for STEM pedagogy

Aspirations

The percentage of women studying increases with the level of the qualification, from ~5% on the FD/DipHE to 13.1% on the MEng. There are fewer women, but they are aiming higher.

Progression



T192 and T193 form the first 60 credits of all OU engineering qualifications so provide a good measure of student progression. Early results suggest lower retention and progression rates for female students.

Project scope

We aim to gain an understanding of OU female engineering students' motivations and experiences so that we can recommend strategies for increasing the registrations of women students on engineering qualifications and provide better advice and guidance at the pre-registration stage.

Phase 1 – literature review of existing strategies and interventions from UK HEIs encouraging women into engineering.
Phase 2 - focus groups and interviews with current OU women engineering students. We plan to have 6 focus groups enabling students to choose a time to suit them and up to 10 individual in-depth interviews.
Phase 3 – online survey (informed by focus group and in-depth interview outputs) for all actively studying women engineering students. Our aim is to understand the demographic of our female students alongside their motivation and career aspirations.

Supporting student transitions within a strategic partnership in Scotland.

Felicity Bryers, Sally Crighton, Laura Howe, Andrew Potter

The Open University

Background

In an exciting strategic partnership Scottish Water employees can count their HNC from Glasgow Clyde College towards an Open Degree with the Open University and onwards to an MSc at Heriot Watt University. www.openuniversity.co.uk/sw

Our project

With the generous support of eSTEeM we are investigating how we can better support students within this partnership.

Methodology

Semi-structured interviews by OU tutors with the first cohort of students in the partnership are in progress, with a major aim being to understand how better to support our students in the transition from HNC to degree level study.

Next steps

* Thematic analysis of interview transcripts.
* Refresh advice to students on the pathway.
* Refine models of employer engagement.
* Smooth the transitions.

Tutors' reflections

I am impressed by the determination of these students to fit studying into busy and demanding working lives, and by their willingness to help improve the experience for future students. Felicity

Talking to students about their experiences is always illuminating. We have an idea of what we expect to hear, but there are often things that take us by surprise. I am very grateful to the students who have allowed us a glimpse into their unique and challenging world. Laura

What students are saying so far...

Support from the OU

Support from Scottish Water

"I just didn't fully comprehend how much maths there was going to be..."

"I have a very good job and am getting paid well. It's a huge chance, very grateful, very appreciative of this."

"More and more employers are looking for more qualifications ... I should really have done it years ago but life got in the way then."

"I've been trying to learn a new job, doing professional exams and studying at university."

eSTEeM The OU centre for STEM pedagogy | Scottish Water Trusted to serve Scotland | GLASGOW CLYDE COLLEGE | HERIOT WATT UNIVERSITY

When do students go to the lab?
Profiling Open Science Laboratory visits

Anisha Dave and Mark Hirst (Mark.hirst@open.ac.uk)

The Open University

Introduction and context

For many modules studying Science modules, the Open Science Laboratory (OSL) serves as the gateway to students' practical activities. For some modules, including SXHL288, students spend a considerable amount of their study time using applications housed within OSL to collect authentic datasets. Despite these increases in students' activity in the OSL, few studies have been performed on how and when students carry out their work in the OSL.

Future developments in the OSL through the OpenSTEM labs project include live-streamed experimentation ('lab-casts') that hope to drive student engagement through live demonstrations that work most effectively as synchronous events as well as team-based synchronous access to remote-accessed instrumentation.

Both of these developments, as well as module teams and tutors would benefit from a deeper understanding of student study profiles to the OSL, especially if these profiles serve as a proxy to *how* and *when* our students study online. As well as informing the module redesign through insights into activity workload, these activity profiles will inform how we schedule module-wide events (e.g. lab-casts and tutorials) and offer live-instrumentation booking slots in future presentations.

Results from 6359 visits to OSL

There are no apparent preferences across the cohort for particular days of the week

- A typical summary of visits and total student-hours in the Topic 1 app across the week is shown in **Figure 2**
- Similar profile see for Topics 2 and 3 apps (not shown)

Students work in OSL apps throughout the day

- A typical plot of students visits to OSL against hours is shown in **Figure 3**
- Same profile seen for Topics 1 and 2 apps and for the supporting forum (not shown)

Implications

If OSL activity reflects genuine preferred students' study time these data suggest that single fixed-time synchronous events are unlikely to achieve high 'live' attendance.

This has implications about how we use and schedule such events in SXHL288:

- Live tutorials
- Lab-casts of experiments from the OpenSTEM lab
- Team-based synchronous meetings as part of the EMA

SXHL288 Module

- Module is entirely online and on 16J 300 students started the module
- Students study 3 practical topics (see **figure 1**) with 6 individual investigations ahead of one individual EMA project
- Each topic has visits to OSL-based applications, with practical studies ranging from short visits (5-10 mins) to over 10 hours
  - Topic 1: 1 app requiring data recording over 7 days (short visits)
  - Topic 2: 1 app housing 5 activity areas requiring activities ranging from 1-10 hours
  - Topic 3: 3 apps requiring data collection activities ranging from 2-4 hours
- Module topics have 2 collaborative investigations ahead of a collaborative study in small teams (4-5 members) for the EMA project
- 40% of module EMA is a reflective 'Skills Portfolio' of evidence from investigational work

Figure 1: Visits to the OSL based apps across the three practical topics for 16J presentation

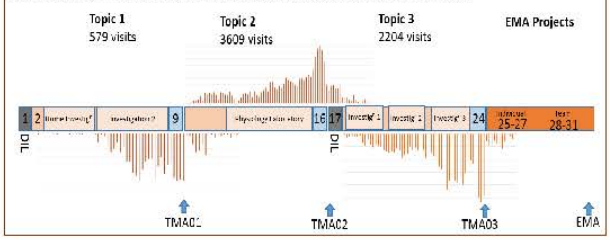


Figure 2: Visits to the Investigation 1 OSL app

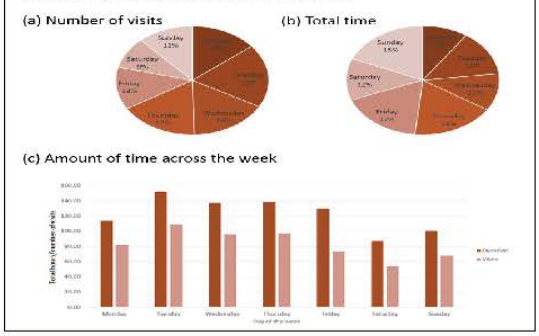
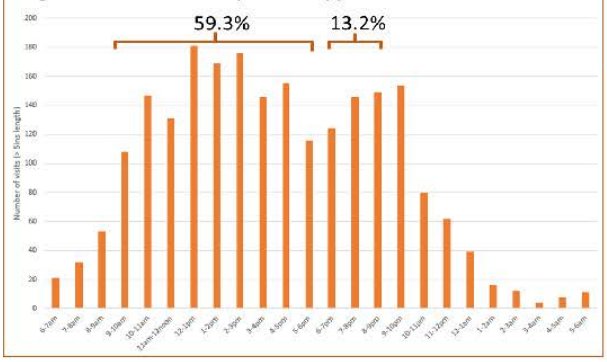


Figure 3: Visits to the 3 Topic 3 OSL apps



Future Work

- Data on student time working in each app will be used to check workload allocations
- Identify study patterns in groups of students where non-engagement with practical activities is problematic
  - 'Late arrivals' 'Collaborative work absentees'
- Study engagement and educational attainment
  - Summative module components
  - Reflective portfolio

Dissemination

Incorporate findings into 17J module briefing

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Methods

- Data was initially anonymised for user ID, then OSL accession time, day and length of visits were examined having excluded visits < 5 minutes. A total of 6392 visits were mapped.

The OpenSTEM labs

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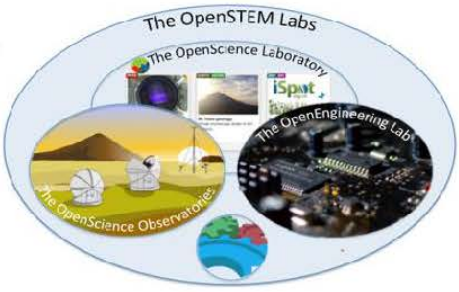
Aims

- Authentic online practical work in labs and observatories
- Access to the tools of professional science and engineerin
- Collaborative learning environments
- Prepare students for working in STEM
  - Equipment remote operated
  - Computer controlled
- Presence in 20 STEM modules in next 2 years



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THE WOLFSON FOUNDATION

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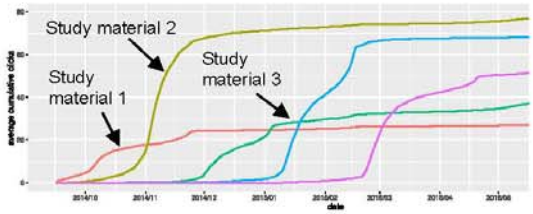
Personalised Study Recommender at the OU Analyse

Michal Huptych (michal.huptych@open.ac.uk)
Zdenek Zdrahal

The Open University

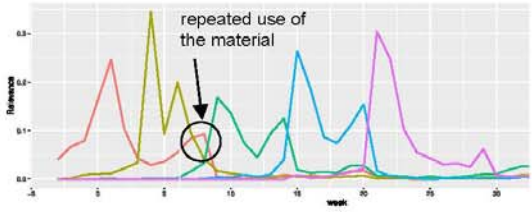
Primary data – VLE activity

- Clicks of learners to particular study materials are the input for our analyse.
- Cumulative VLE activity for particular study materials has different absolute value, the speed of increasing and the number of increasing epochs.
- A reason can also be in several forms of the study materials which the student can use (online, downloaded, printed).



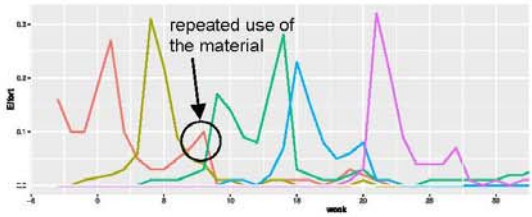
Relevance

- is defined based on a cohort of excellent students (≥ 75 % of summarised TMA scores);
- describes aggregate information about students' activities in the past.



Effort

- is intended for individual students;
- describes student's activity in the current presentation.



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Recommendation

A student needs to balance the study material relevance by her/his effort.

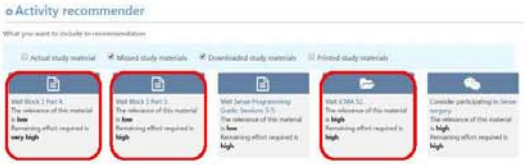
Examples of the recommendation

- Following examples are potential recommendations for students of the 15J presentation based on the 14J presentation of the same module.

Recommendation of the most relevant study material up to 5 weeks before TMA cut-off week:

Recommendation based on "remaining effort" for excellent student one week after TMA cutoff:

Recommendation based on "remaining effort" for pass student one week after TMA cutoff:



Recommendation based on "remaining effort" for fail student one week after TMA cutoff:

The impact of scaffolding on learning physics: is there a gender difference?

Hillary Dawkins, Holly Hedgeland, Pam Budd, Jimena Gorfinkiel, Victoria Pearson, and Sally Jordan

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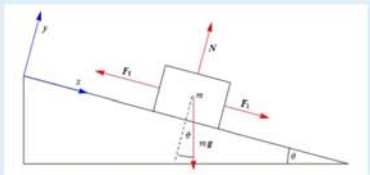
Goals:

1. Identify elements of question structure which may be disadvantaging female students
2. Test the use of scaffolding as a potential solution

Identifying bias:

What do these questions have in common?

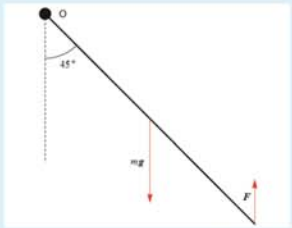
The diagram shows a block of mass $m = 4.50\,\text{kg}$ resting on a plane inclined at an angle of $\theta = 30^\circ$ to the horizontal. The coefficient of static friction between the block and the plane is $\mu_{\text{static}} = 0.635$, and the block is stationary but just on the point of sliding down the slope.



The diagram shows the four forces acting on the block: an applied force F_1 acting down the slope, the block's weight mg, the normal reaction force N and the force of static friction, F_2. In this case, the force of static friction acts up the slope, opposing the tendency of the block to move down the slope.

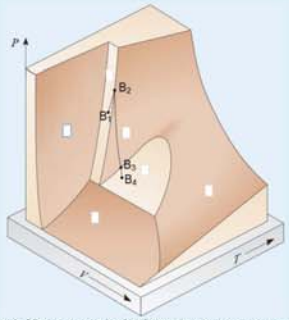
Find the the maximum magnitude of the applied force F_1 that can be exerted if the block is to remain stationary. Specify your answer by entering a number into the empty box below.

A uniform rod has mass m and length L. One end of the rod is attached to a fixed point O by a hinge and an additional force F is applied to the other end of the rod in the vertical direction shown.



Given that the rod is in mechanical equilibrium, what is the magnitude of the applied force F, expressed as a numerical multiple of mg, where g is the magnitude of the acceleration due to gravity? Express your answer by entering a decimal number, specified to 3 significant figures, into the empty box below.

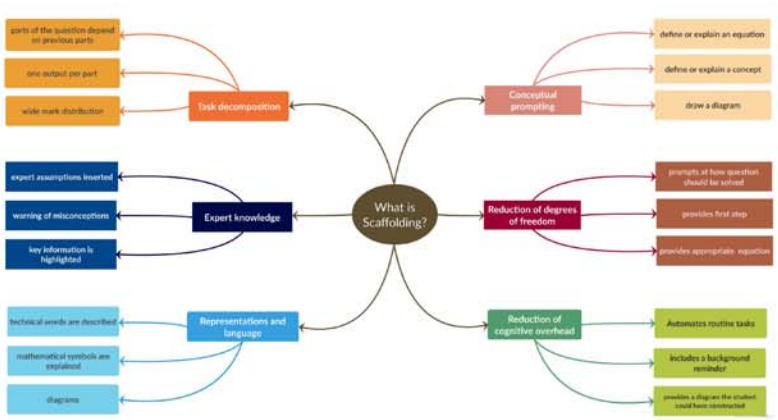
The figure below shows a generic PVT surface – drag and drop the ✓ below to show the three areas on the diagram where the substance is totally or partially in the liquid phase. (Note that you will need to fill 3 boxes on the diagram and leave the remaining boxes empty in this part of the question.)



Complete the following statement describing features shown on the generic PVT surface in the figure by dragging each word from the list and dropping it into the most appropriate space. Each word in the list may be used once, more than once and some words may not be used at all.

Each point on a generic PVT surface corresponds to a combination of the pressure, volume and temperature values that can be achieved for a fixed amount of the substance in _____. The path $B_1 \rightarrow B_4$ lies on the generic PVT surface and hence consists of a series of _____ processes. At B_1 the substance is a mixture of _____ and _____ in equilibrium. Although _____ is increasing substantially along the line $B_1 \rightarrow B_2$ both _____ and _____ also increase so that at B_2 the mixture is entirely _____, _____ decreases quite substantially along the line $B_2 \rightarrow B_3$ and at B_3 the liquid begins to _____. So from B_3 to B_4 there is a mixture of _____ and _____ in equilibrium with _____ and _____ reducing and _____ increasing.

solid	liquid	temperature	volume	pressure	melt
gas	evaporate	condense	quasistatic	equilibrium	



Addressing bias:

Can scaffolding play a role?

Q1 Scaffolding level: LOW

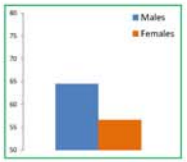
An astronaut playing golf on the Moon hits a ball so that it is initially moving with a speed of $u = 8.00\,\text{m s}^{-1}$ at an angle of $\theta = 30^\circ$ to the horizontal. In the following, the magnitude of the acceleration due to gravity at the Moon's surface, g_M, is approximately $1.62\,\text{m s}^{-2}$.

(a) Make sketches of the vertical components of displacement, s_y, and velocity, v_y, versus time, t. Label the sketches with appropriate equations for s_y and v_y.

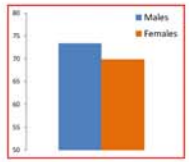
(6 marks)

(b) Assuming the surface of the Moon is flat in the vicinity of the astronaut, calculate how far the ball travels.

(4 marks)



A significant difference
$p = .013$



Not a significant difference
$p = .46$

Q2 Scaffolding level: HIGH

An athlete competing in the hammer throw event swings a heavy metal ball on a wire around in a circle. The radius of the circle that the ball travels is $1.5\,\text{m}$ and the ball takes $0.55\,\text{s}$ to complete one revolution.

(a) Calculate the magnitude of the instantaneous velocity of the ball and state the direction of the velocity at any instant, relative to the circle.

(2 marks)

At the instant when the velocity of the ball is in a direction at 50° to the horizontal, moving upwards, the ball is released. At this instant, the ball is $2.0\,\text{m}$ above the ground, as shown in Figure 2.

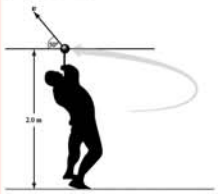


Figure 2 For use with Q20

(b) What are the horizontal (x) and vertical (y) components of the ball's velocity at the instant when it is released?

(3 marks)

(c) What is the maximum height above the ground attained by the ball during its flight?

(5 marks)

(You may assume that the magnitude of the acceleration due to gravity is $9.8\,\text{m s}^{-2}$ and you may ignore air resistance.)

STUDENTS' STUDY OF ONLINE SCIENCE MODULES

Elaine A. Moore, Tom Argles, Vicky Taylor, Andrew Norton, Kadmiel Maseyk, Catherine Halliwell, Vikki Haley-Mirnar

The Open University

Background: The Science Faculty introduced level 2 modules delivered entirely online (via the module webpage) across all disciplines in its B.Sc. Natural Science from October 2014 (chemistry (S215), biology (S295), earth science (S209), environmental science (S206/SXF206)) and October 2015 (physics (S217)). This project aimed to look at how students tackled the modules, modify or add to the material to improve the student experience and provide guidance for future online modules.

HOW DID STUDENTS STUDY?

The majority of students studied using the web version. The questionnaire responses on this were supported by the observation of an increase of student visits to the VLE of > 1 hour. Students were allowed to select more than one answer and it was clear that many were using both the web and pdf versions. Other versions – e-book, interactive e-book, kindle were less popular. Figures 1 and 2 show the preferred study method of students answering questionnaires inserted in modules starting October 2014 and October 2015. S217 was not presented in October 2014. Only 22 replies were obtained from S209 2014.

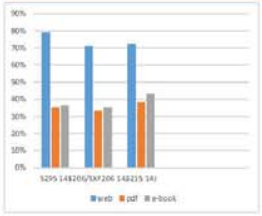


Figure 1 Student responses to What is your main method of study? 14/15

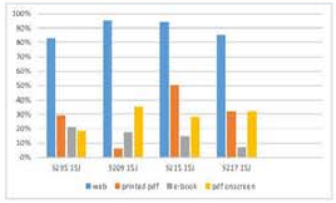


Figure 2 Student responses to What is your main method of study? 15/16

WHICH ONLINE ELEMENTS DID THEY LIKE?

Students were asked whether they found items useful and enjoyable. Results from 15J.

	S295	S215	S209	S217
VIDEO	91%	81%	89%	65%
ACTIVITIES	N/A	85%	65%	70%
DIAGRAMS	N/A	55%	48%	69%
QUIZZES		74%	47%	59%
MICROSCOPE	73%	N/A	60%	N/A
LAB/FIELD TRIP	61%	56%	26%	69%

Taking Notes

Students were used to annotating and highlighting their OU books. The online OUannotate did not prove popular and questionnaire results suggested the majority of students were making notes on paper.
Percentages of responders who took notes on paper for some 15J modules: S206 68%, S215 88%, S217 79%.

PASS RATES COMPARED TO PREVIOUS MODULES

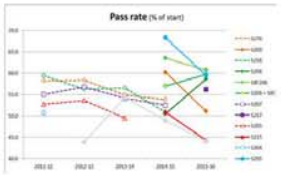


Figure 3. Trends in pass rates, as percentages of students who started the module. S294 is a current non-online module in biology. Dotted lines refer to predecessor modules. Note that these figures cover a period when the fee structure was changing leading to a demographic change.

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SDK100 – what aspects of this online only module are the students engaging with?

Vikki Haley-Mirnar, Carol Midgley.

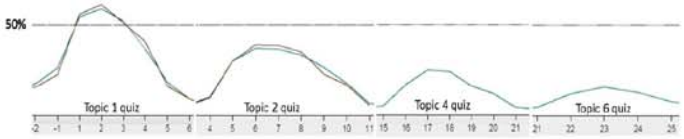
The Open University

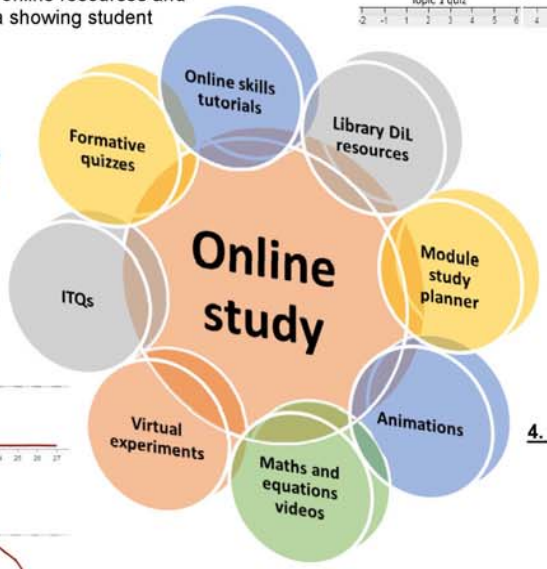
1. Background

SDK100 is a level 1, 60 credit, entry module in the Q71 Health Sciences, Q96 Healthcare and Health Sciences, and Q84 Psychology and Counselling pathways with ~1800 students across two presentations. The module is delivered entirely online, with many interactive components and scientific investigations. Using learning analytics, a module-wide student questionnaire and focussed interviews our eSTEeM project will investigate whether students engage with, and how much they value, different types of online resources and activities in SDK100 *Science and Health*. Preliminary data showing student engagement with online tools are shown here.

'I found that the online experiments and virtual equipment such as the spirometer and digital microscope allowed the feeling of actually doing the experiment or research investigation physically in a laboratory.'

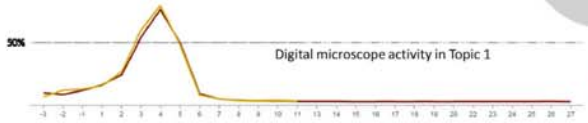
2. Percentage of 16J and 17B students visiting formative topic Moodle quizzes (not formally assessed)

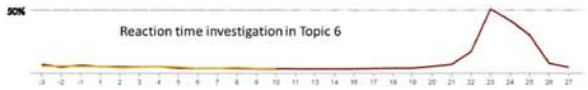




'I had thought I may struggle with the module all being on line but it was really beneficial. The whole module was easy to follow and gave you lost of assistance on time-scales and ensuring you remained with these. The style of the assessments made it easy and enjoyable and the learning activities work well to endorse what we had learnt. A very interesting and well organised module.'

3. Percentage of 16J and 17B students visiting group wikis for virtual experiment activities in topics 1 and 6.





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4. Summary

- Student satisfaction surveys suggest that the majority of students like the online delivery and interactive components (but ask for printed materials as well).
- Students appear to engage well with the virtual experiments included in TMAs.
- Engagement with non-assessed formative Topic quizzes tails off in later topics.
- A big issue for retention is study time - we hope to identify which components students feel have the most value and which are felt to be less valuable.

Supporting student's learning journey through the transition between levels in mathematics and statistics

Alison Bromley, Rachel Hilliam, Chris Hughes and Sue Pawley

The Open University

What?

- Resources that allow students to self-identify and address gaps in their mathematical and statistical skills.
- A qualification-based set of bridging materials, focused on *Revising* and *refreshing* students' knowledge of pre-requisite material, delivered to students in the time ***between*** MST124 & MST224 and between levels 2 and 3.

Why?

- Mathematics and Statistics are linear subjects where success at higher levels depends on firm foundations, it is likened to a carpenter who is only capable of making a beautiful piece of furniture once they understand how a hammer and nail work.
- Regular practice in a supported environment in the gap between modules gives best chance of success at the next level of study.

How?

- Identify the areas where lack of preparation commonly leads to students underperforming in certain modules.
- Build on existing materials and develop new resources to address those topics.
- Tutor support will be provided, delivering online tutorials, moderated forums, and iCMA-style quizzes and activities.

Students?

- Work sits within the University strategy for more students qualifying.
- Many students who complete level 1 do not progress to level 2 or withdraw from level 2 modules, or have difficulties progressing from level 2 to level 3.
- Show the University's commitment to supporting students throughout their learning journey at a qualification level by giving more support between modules and levels.

Evaluation?

- AL feedback via questionnaires.
- Student evaluation of usefulness of material. For example, using telephone interviews both prior to starting their chosen module and when study of the module is completed.
- Analysis of data on retention at fee liability points, TMA submission rates, TMA scores on assessment areas thought to suffer from lack of preparation, pass rates and return to study further modules.

The future?

- Share outcomes within School of Mathematics and Statistics to inform module teams' curriculum planning.
- Further adaptation of materials based on the evaluation.
- Publicise material and encourage more students to make use of it.
- Disseminate evaluation via eSTEeM conferences, scholarship site and external conferences such as HEA.

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The OU centre for STEM pedagogy

References

[1] van Ameijde, J, Weller, M, Cross S (2016) Designing for Student Retention: The ICEBURG model and key design tips http://article.iet.open.ac.uk/Q/QE%20report%20series/2016-QE-student-retention.pdf

[2] Matthews J, Croft T, Lawson D, Waller D (2012) Evaluation of mathematics support centres http://www.sigma-network.ac.uk/wp-content/uploads/2012/11/Evaluation-of-MSC-final.pdf

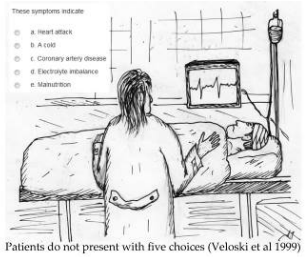
Tim Hunt
Senior Developer
Information Technology
The Open University

Computer-marking of open-ended questions

All the question types in this poster are freely available as plugins for the Moodle quiz. Scan the QR codes for downloads, demos and further information.

The Open University

The student chooses an answer from a limited set of possibilities
- True/false
- Multiple choice
- Matching
- Drag-drop



Patients do not present with five choices (Veloski et al 1999)

Automatically marked questions may be categorised as
Selected response or **Constructed response**

The student must derive or recall (construct) the answer themselves. This likely to be a more authentic assessment task.

It is sometimes easier to verify possible answers than find them
Can you solve $x^2 + 3x + 2 = 0$?
Can you check if $x = 1$ works? $x = -2$?

Do you know the capital of Mongolia?
Are you more likely to remember if it is one of Thimphu, Ulaanbaatar, Astana or Bishkek?

Can computers mark open-ended questions?

The computer is not marking the students work itself. It is applying judgement, and giving feedback, that the teacher has set up

Key consideration: how to capture the teacher's judgement?

Appropriate approach depends on the question type

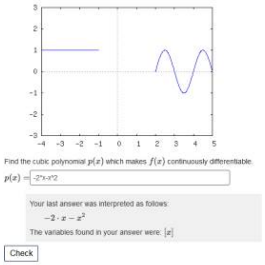
It is important that the teacher has a way to validate their grading rules

Expect to revise each question to improve the grading the first few times it is used

Mathematics STACK question type

(Sangwin 2004, 2006, 2013)

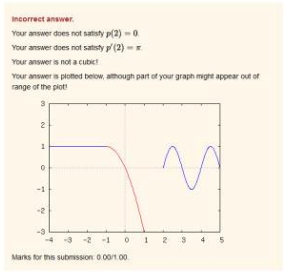
Example question



Question set-up

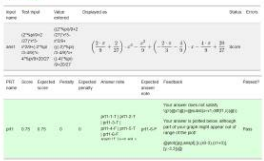
Teacher specifies tests of mathematical properties of the student's response. Each test outcome controls:
- the mark awarded
- the feedback
- the next test run

STACK also has powerful options for randomly generating questions.



Validating the grading

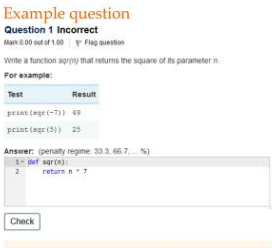
Teacher gives example responses, and what mark and feedback should be given for each.



Programming CodeRunner question type

(Lobb & Harlow 2016)

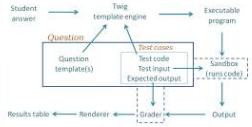
Example question



Question set-up

Simply snippets of test code and the corresponding output they should give.

A simple scheme but flexible enough to test many things.



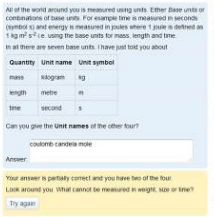
Validating the grading

This simple scheme might not need it, but a system like STACK's is provided.

Short text Pattern-match question type

(Butcher & Jordan 2010, 2013; Jordan 2008, 2012)

Example questions can be more or less ambitious



Question set-up

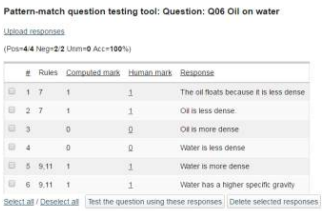
Uses fairly simple word-matching rules. For example:

```
match_o (ampere candela kelvin mole)        "Correct"

match_mow (ampere|candela|kelvin|mole       "That's three
           ampere|candela|kelvin|mole        out of four"
           ampere|candela|kelvin|mole)
```

Validating the grading (Willis 2015)

Teacher uploads sample responses that are hand-marked. The system compares the computed and human mark. Matching rules can adjusted as necessary.



FIELDSCAPES: Virtual world field trips…
…to support field teaching and more

Tom Argles, Phil Wheeler, David Burden and Steve Tilling

The Open University

Background: With the launch of the OpenScience Laboratory's *Virtual Skiddaw* in 2013, a new breed of virtual field trip (VFT) was born: an immersive, interactive experience based in a multi-user, 3D virtual landscape. Creation of the VFT in gaming software (Unity 3D) allowed our collaborative team to not only replicate outdoor fieldwork, but exploit the affordances of virtuality to go 'beyond fieldwork' – providing aerial perspectives; draping the digital landscape with different imagery and maps; teleporting and flying to save time; even fading other avatars out if they obscured the view! The *Fieldscapes* concept evolved to scale up this pioneering VFT into a library of diverse virtual landscapes and exercises.

Fieldscapes

Experience. Explore. Educate.

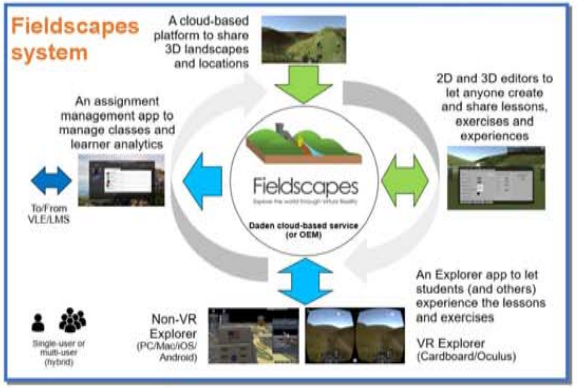
A cloud-based platform for creating and hosting virtual world field trips (VWFTs) of multiple locations, for schools, universities and beyond.

AIMS

- Bring field experiences to those unable to access the outdoors
- Support outdoor trips – before, during and after the fieldwork
- Enrich and extend field teaching, including teaching field skills

FEATURES

- Ever-widening range of virtual landscapes
- Educators can create their own exercises and lessons, in-world
- Also available as a VR application (using a VR headset)



Evaluation & trials

We engaged with around 220 school students and 21 teachers from 11 schools, as well as students and staff at 9 universities.

Results from 1 school trial (Northampton) are shown

Q12: How would you prefer to study fieldwork in the future?

Trialling methods

Field trips	Talk-through tasks
Demo carousels	Remote evaluations
Demo with discussion	Semi-structured interviews

eSTEeM

The OU centre for STEM pedagogy

Positive

Negative

Reflections

- Making the inaccessible accessible
- Appetite for virtual experiences...
- …tempered by high expectations
- An alternative, but NOT a replacement
- Introducing, preparing, enriching, supporting, extending, revising and reinvigorating physical field trips

For more information/interaction:

https://www.fieldscapesvr.com/

https://www.facebook.com/fieldscapesvr/

YouTube: search for 'Fieldscapes'

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OU CAMPUS MAP