

Programme of Events
Interdisciplinary Learning and Teaching Conference
15 April 2021
University of Warwick

Please note that this programme is subject to change

09:30	Arrival and Breakout Rooms	
10:00	Opening Statements and Welcome	
10:10	Keynote Address – Dr. Linda de Greef, University of Amsterdam	
11:00	Break Out	<p>Room 1</p> <p>Work-based Interdisciplinarity</p> <p>Human-Centred Workplace Innovation as an Interdisciplinary Experience: What and Why?</p> <p>Creating Learning Opportunities in Human-Centred Workplace Innovation Across Disciplines</p> <p>Transforming Students’ Perceptions of Innovation and of Themselves as Innovators</p> <p>T. Carey, S. McDonald, F. Nobis, M. Stevenson – Monash University, Melbourne (Australia)</p>
		<p>Room 2</p> <p>Student-led Interdisciplinarity</p> <p>Design of Microcontroller Based Interdisciplinary Activity for First-year Students in Engineering at Warwick University – A Pilot Study – S Agbroko, University of Warwick</p> <p>Co-Constructing Sustainability: Online interdisciplinarity and the Sustainable Development Goals – J. O’Brien, University of Manchester</p>

		<p>Communicating co-creativity, innovation and design thinking skills within interdisciplinary education through the creation of a multimedia student magazine – L. Schrock, K. Watts, C. Evans, D. Allcoat, and A. Dixon, University of Warwick</p>
		<p>Room 3</p> <p>Interdisciplinarity and ‘The Student’</p> <p>Valuing interdisciplinary learning: the IB extended essay – R. Julian, Curriculum Manager, International Baccalaureate</p> <p>Interdisciplinary Concepts in a Secondary Context – H. Paddle, International Baccalaureate educator</p> <p>Embracing a constructivist pedagogy of interdisciplinary teaching: an undergraduate’s perspective – A. Dorey, undergraduate student, University of Birmingham</p>
11:50	Break	
12:10	Break Out - Parallel Sessions	<p>Room 1</p> <p>Student-led Interdisciplinarity 2</p> <p>Deliberative Democracy in an Interdisciplinary Department – J. Everest, University of Birmingham</p> <p>Interdisciplinarity and the Lifelong Learner: celebrating individual stories and collective voices – R. Strisino and C. Jones, University of Warwick</p> <p>‘Open Box’ curriculum at the Open University – How we are helping students to make their learning count – G. Curry and L. Robson, The Open University</p>
		<p>Room 2</p> <p>Interdisciplinarity across ‘disciplines’</p> <p>Reflections on the launch of an interdisciplinary STEM qualification – J. Baxter, The Open University</p>

		<p>Teaching and Learning Science with Graduate-Entry Medical Students from Diverse Subject Backgrounds – N. Hopcroft and P. Pollitt, University of Warwick</p> <p>Curriculum Planning for Medicine and Law: A Model for collaborative learning – A. le Roux-Kemp, University of Lincoln</p>
	Workshop	<p>Room 4</p> <p>What are the challenges to interdisciplinary teaching and how can we overcome them? – D. Marais, B. Kelestyn, I. Molinaro, L. Schrock, J. Wale, University of Warwick</p>
13:00	Lunch	
13:30	Break Out - Parallel Sessions	<p>Room 1</p> <p>Interdisciplinary Pedagogy in Practice</p> <p>Our experience developing a university-wide interdisciplinary teaching model at undergraduate level – challenges and recommendations – A. Quintana and P. O’Toole, Universidad del Desarrollo, Chile</p> <p>Pedagogies that can support collaborative teaching and learning: benefits and challenges – L. Mirbahai, University of Warwick and J. Page Utrilla and R. Gómez, Universidad Autónoma de Madrid</p> <p>Universalizing interdisciplinary pedagogy? Matching pedagogy to cognitive structure – D. Roberts, Loughborough University</p>
		<p>Room 2</p> <p>Embedding Interdisciplinarity</p> <p>Navigating Utopia: Module Design for the Co-production of Knowledge – K. Harris, University of Warwick</p> <p>Future-proofing education: Challenges and rewards of interdisciplinary learning and teaching in a capstone module – I. Fischer, University of Sussex</p> <p>From the classroom to the boardroom: radical interdisciplinarity in the</p>

		Regulations – E. Brown, P. Baxter and E. Coonan, Anglia Ruskin University
		<p>Room 3</p> <p>Student-led Interdisciplinarity 3</p> <p>Experiential Learning Impacts for Post-Graduates within Scholar-Led Editorial Practice – G. J. Johnson, University of Warwick</p> <p>Learning From Each Other Through a Community of Practice: Warwick's Interdisciplinary Learning Circle – J. Wale, University of Warwick</p> <p>Practicing interdisciplinarity: Developing Interdisciplinary 'Knowing' and 'Doing' – M. Woodward, Cardiff Metropolitan University</p>
14:20	Break	
14:45	Parallel Sessions - Workshops	<p>Room 5</p> <p>Workshop Meaningful assessment in interdisciplinary education – L. de Greef, J. Rodermans, D. Gerritsen, University of Amsterdam</p>
		<p>Room 6</p> <p>New Forms, New Features; Changing Structures of Interdisciplinary Curricula – R. Hallett and F. Nereo, Keele University</p>
		<p>Room 4</p> <p>Embedding Undergraduate Research as Interdisciplinary Pedagogy – L. Bird, B. Brazeau, K. Harris, G. Schwartz-Leeper, University of Warwick</p>
		<p>Room 7</p> <p>Learning from Each Other through Design Thinking – B. Kelestyn, R. Freeman, L. Netherclift, G. Bottoli, C. Nithila-George, J. Pittgens, University of Warwick</p>
15:50	Plenary – Closing Statements	

Keynote Address

Please come prepared to work in break out rooms and to contribute to the discussion through the online chat.

We'd like this to be interactive.

Sessions 11:00

Work-based Interdisciplinarity

Interdisciplinary, Experiential Learning in Human-Centred Workplace Innovation

Thomas Carey, Sarah McDonald, Felix Nobis, Mat Stephenson – Monash University, Melbourne (Australia)

Increasingly in the Higher Education sector we are under pressure to explicitly connect the learning of our students to the contributions they will make in both current and future working environments. Workplace Innovation is the human, creative and social process of creating lasting value by mobilizing new ideas in the workplace.

Human-centred Workplace Innovation aims to improve organizational performance and the quality of working life. Capability developed to engage effectively with Workplace Innovation will also support graduates' engagement with innovation beyond the workplace, including in their other roles as community members and global citizens.

As part of our 2020-2025 strategic plan, the Faculty of Arts at Monash University is pioneering the development of capability in human-centred workplace innovation as a new area of interdisciplinary study. Two new Monash Arts interdisciplinary course units will be offered for the first time in 2020:

- *ATS2211 Understanding Workplace Innovation: Concepts and Cases*
- *ATS3173 Workplace Innovation Project Studio*

The presentations and discussions in this session will explore three key aspects of our Monash strategy our teaching and learning experiences and results, and our plans for 2021 and beyond.

Human-Centred Workplace Innovation as an Interdisciplinary Experience: What and Why?

In this mini-session we will show how the emerging field of Human-Centred Workplace Innovation can leverage interdisciplinary teaching and learning to enable students as innovators, in employee-driven workplace innovation and in their other roles as community members and global citizens. In addition to the interdisciplinary contributions of our Monash leadership team – from Languages and Literatures, Theatre and Human-Centred Design –

initial pilot projects with partner universities in North America have included academic staff in English, History, Psychology, Media Studies, Management and Engineering.

Practices: We will outline the elements of capability targeted in our initial course units: Skills (know-how), big-picture contextual Knowledge (know-why), Mindsets (know-yourself) and learning Experiences (to develop and demonstrate fluent proficiency). We will also outline how we aim to help learners (including academic staff!) to discern how their disciplinary ways of knowing can bring distinctive perspectives to this area of growing workplace importance.

Impacts: We believe this interdisciplinary area may be of particular importance in revitalizing the value proposition for generalist B.A. (and B.Sc.?) programs, and we will demonstrate some of the distinctive contributions from various disciplines in the Humanities, Arts and Social Sciences – reflecting the nature of Human-Centred Workplace Innovation as an inherently human, creative and social endeavour.

Creating Learning Opportunities in Human-Centred Workplace Innovation Across Disciplines

In this mini-session, we will illustrate how we can use our academic “workplace for learning” to engage academic staff across disciplines as hosts for project experiences in which learners engage with and reflect on innovation in the workplace. In addition to applying disciplinary ways of knowing to understand and develop workplace innovation projects, these experiential learning opportunities can include new practices such as:

- workplace innovation scenarios embedded within other learning activities,
- reflective practice on innovation experiences within our course units, and
- developing, prototyping and evaluating innovations in our academic workplaces.

The examples come from our pilot offering of *Understanding Workplace Innovation* in Term II of 2020.

Transforming Students’ Perceptions of Innovation and of Themselves as Innovators

Our long-term goals for the Monash Arts Innovation Capability initiative include transformative student learning across three interlinked areas:

- Understanding the nature and purpose of innovation as a human, creative and social process
- Self-perception and self-efficacy as innovators
- Recognition of how their disciplinary Ways of Knowing can add distinctive value in innovation.

In this mini-session we will present the evidence of transformative learning on the first two of these goals from our initial offering of *Understanding Workplace Innovation*, including:

- How we used a progression of innovation projects of increasing scope, complexity and team size to engage students with different types of innovation in our own 'workplace for learning'
- How students expressed their personal transformative learning experiences, and how we intend to encourage and assess transformative learning more deliberately in our 2021 offering.

Felix Nobis is a Senior Lecturer in the Centre for Theatre and Performance at Monash University and the director of Work-Integrated Learning and the Workplace Innovation interdisciplinary program for Monash Arts. He holds an MA in Old and Middle English from University College Cork and a PhD in comparative storytelling practices (medieval and modern) from Monash University. Felix is also a professional actor with many roles in stage, TV and film productions in Australia and beyond, as well as an accomplished playwright and translator (Boewulf). His current research is focused on Work-Integrated Learning.

Sarah McDonald is an Associate Professor in the School of Languages, Literatures, Cultures and Linguistics at Monash University in Melbourne, Associate Dean (Education) for the Monash Faculty of Arts and an Honorary Associate Professor in the Institute of Advanced Teaching and Learning. Since 2012, she has collaborated with Warwick colleagues on a suite of undergraduate modules co-taught between Monash and Warwick Universities as part of the Monash- Warwick Alliance initiative.

Mathias Stevenson is a Lecturer (Education Focused) in the Monash University Faculty of Arts, where he coordinates a course unit on Leadership for Social Change and teaches in the Global Studies program. Mat is an associate lecturer in Understanding Workplace Innovation, has a Ph.D. in Italian Studies and is co-author of a recent book on Reggae and Hip Hop in Southern Italy: Politics, Languages and Multiple Marginalities.

Thomas Carey is Executive-in-Residence for Teaching and Learning Innovation in the Faculty of Arts at Monash University . Tom was previously a Professor and senior academic leader at three universities in North America, and currently works internationally as a "connector, coach and catalyst" for strategic innovation in higher education. Tom's other recent projects have been based in Vancouver, Toronto, San Diego, Los Angeles and Brisbane.

Student-led Interdisciplinarity 1

Exposure and Expertise: Vulnerability in Interdisciplinary Teaching

Kim Lockwood

In this paper, I focus on the ways in which designing and delivering interdisciplinary content can make students and teachers mutually vulnerable. I explore how this shared vulnerability can be navigated as both a pedagogical challenge and collaborative learning opportunity within the space of the interdisciplinary seminar.

Drawing on my experiences of teaching Liberal Arts at the University of Nottingham, I explore the fundamental tension of designing and delivering interdisciplinary programmes within the context of Higher Education in the UK, where disciplinary expertise is used to structure and evaluate pedagogical approaches. When institutions market themselves through research-led teaching, and when students therefore expect their teachers to hold disciplinary expertise, how can teachers navigate exposing the limits of their knowledge or their awareness of disciplinary approaches in the course of their interdisciplinary teaching?

Taking the interdisciplinary seminar as a focal example, I explore how these tensions of disciplinary expertise can manifest within the seminar space, with students' expectations of teachers' expertise being frustrated and their teachers, in turn, feeling disempowered. I consider how these affective responses can pose challenges to interdisciplinary engagement, making students and teachers alike reluctant to engage the vulnerability that accompanies such uncertainty. Through this lens of vulnerability, I reflect on some of the strategies employed by myself and colleagues within Liberal Arts to both mitigate and incorporate these affects into the interdisciplinary learning experience and argue for mutual vulnerability to be acknowledged as a valuable component of collaborative learning.

Kim Lockwood is a Teaching Associate in Liberal Arts at the University of Nottingham, where she teaches and leads interdisciplinary modules on time, space and place, objects, and the human body. Alongside her work as reviews editor for Comparative American Studies, she is a published poet and co-editor of the Lung Jazz: Young British Poets for Oxfam anthology (Cinnamon Press, 2012), and editor of the creative-critical feminist writing anthology, Slant (Seam Editions, forthcoming).

Co-Constructing Sustainability: Online interdisciplinary and the Sustainability Development Goals

Jennifer O'Brien

The University of Manchester's College for Interdisciplinary Learning (UCIL), introduces our students to new ways of thinking to tackle the key questions facing society in the 21st Century. UCIL courses are open to all undergraduate students from across the University, thus learning spaces are constructed by medics, mathematicians, anthropologists, social scientists, engineers and so forth. In 2019 a new course, *Creating a Sustainable World*, utilised Education for Sustainable Development (ESD) and drew together over 80 voices from policy, practice and the academy to critically unpack sustainability using the UN's Sustainable Development Goals (SDGs). The course is delivered entirely online, and the flexible learning attracted over 200 interdisciplinary self-selecting students from across the University. Embracing ESD we believe in the potential power of students to identify problems and make change, particularly when drawing on the strengths of interdisciplinary groups. This presentation will critically explain how we adopted a University Living Lab approach to applied teaching and learning in an interdisciplinary setting working with students and contributors at every stage of the design, delivery and evaluation of the course. For their assessment, for example, working with external partners students undertook real research projects to the benefit of the organisation, our students' employability and to

sustainability. The course will grow with our students as they suggest future case study examples, or literature, or critique the current course content from their disciplinary perspective. Students had space to explore sustainability from an interdisciplinary perspective as they undertook assessed discussions in virtual seminars. As an example of interdisciplinary practice this course pushed the pedagogic envelope in its design, delivery and impact and encountered a number of challenges along the way, especially around assessment. This informal presentation will share this journey and welcome discussion.

Jennifer O'Brien is a Senior Lecturer and teaching focused academic in Human Geography and Director of Teaching and Learning in Geography (and Director of Social Responsibility) for the School of Environment, Education and Development, University of Manchester. A Development Geographer by training, Jen's interdisciplinary research focuses on sustainable development, particularly within marginalised communities. Stemming from her research, Jen is particularly interested in the intersection between innovative pedagogy and independent field based or active research and how that can be translated into ethical, empowering teaching. Jen is an inaugural fellow of the University of Manchester's Institute of Teaching and Learning.

Communicating co-creativity, innovation and design thinking skills within interdisciplinary education through the creation of a multimedia student magazine

Lauren Schrock, Chris Evans, Kim Watts, Devon Allcoat and Alex Dixon

Interdisciplinary experiences in the classroom are vital for student's creativity, awareness, and critical thinking. Due to the importance of these experiences in transforming the learning individual, it is significant that they are carried forward so as to shape continued development. Hence, it is necessary to consider how interdisciplinary experiences are communicated beyond the classroom.

In this presentation we share how a magazine was used to communicate interdisciplinary experiences for the module Serious Game Design and Development. This approach contrasts from the use of live documents and blogs as a way to promote reflection and interactivity between students (and with teachers) since a magazine provides an interface for combining tangible and digital artefacts of learning that facilitate both a preparation for and closing of an interdisciplinary experience. In order to prepare students, the magazine is organised in weekly segments including learning objectives and related sources. Resources are presented as both textual interviews and as scan-able codes for accessing digital content such as videos and web links. The 'carry forward' is completed by students who are invited to create a piece of work for each weekly segment of the magazine. This is a 'student spotlight' on a created game in class or a reflection about the seminar that anchor a continued discussion on seminar learning. Hence, unique to the magazine is its function as both a precursor for, and continuity of interdisciplinary learning.

The magazine benefits students as a memorable way in which to engage with interdisciplinary content, whether taken from class or as resources supporting the educational experience. In addition, the students are able to share their finished serious

game (the main assessment component of the module) as a feature within the magazine. This enables students to share their effort and creativity in a celebratory space within a system of education that privatises outputs of assessment. Furthermore, the magazine presents an innovative and motivating approach of introducing students to their learning. As co-creators of the magazine over the 10-week duration of their module, the students, given autonomy, mastery and purpose, are intrinsically invested in the shared outcome of the project as a whole.

The teaching staff also benefit as the magazine augments the virtual learning environment. The magazine is a structured document which introduces students to seminars in an accessible, vibrant and welcoming tone. Hence the magazine revises how a syllabus is delivered. In addition, it personalises staff so to decrease distance between student and teacher in an otherwise distant academic environment. For example, dedicated space in the magazine to introducing staff so as to personalise and individualise the teacher in context.

Lauren Schrock, Chris Evans, Kim Watts, Devon Allcoat, and Alex Dixon are teachers on the IATL undergraduate module Serious Tabletop Game Design and Development (University of Warwick). The aim of this module is to encourage student's creativity and support student's design of educational experiences through the medium of tabletop games.

Interdisciplinarity and 'The Student'

Valuing interdisciplinary learning: the IB extended essay

Robin Julian

International Baccalaureate (IB) Diploma Programme (DP) graduates tend to make a smooth transition to university study and become valued academic and social contributors to campus life. The fact that students all undertake a 4000-word academic research essay, the Extended Essay (EE), as a core component of the DP means that they arrive at universities with a strong grounding in the research and writing skills needed for higher education. Many of these students have taken the interdisciplinary World Studies EE option, integrating knowledge, concepts, theories, perspectives or methods from two chosen DP subjects. Interdisciplinarity is an important and valued approach across each of the IB's learning and teaching programmes, and an interdisciplinary Extended Essay affords students a 'capstone' opportunity to put their skills into practice.

The World Studies Extended Essay gives students the opportunity to undertake an interdisciplinary, issues-based investigation of a contemporary global issue. Students are required to focus on a topic of global significance. This encourages the student to reflect on the contemporary world in relation to issues such as the global food crisis, climate change, terrorism, energy security, migration, global health, technology and cultural exchange. They must also develop a clear rationale for taking an interdisciplinary approach and make sure that they use the conceptual framework and vocabulary of the two Diploma Programme subjects.

To bring the research a more tangible aspect, students are also required to explore how their chosen issue is evident in a local context using specific examples of small scale, local phenomena. In this way they are connecting the local to the global and enhancing their own views of their world through meaningful research.

The process of researching and writing the World Studies EE enhances students' connection with the IB philosophy that spawned it in 1968 in that it helps to develop international-mindedness and specifically the concept of global consciousness, a concept that encompasses three distinct strands:

- global sensitivity - a sensitivity to local phenomena and experiences as expressions of developments on the planet
- global understanding - the capacity to think in flexible and informed ways about issues of global significance
- global self - a developing perception of self as a global actor and member of humanity, capable of making a positive contribution to the world.

Current curriculum review of the Extended Essay is seeking to enhance and broaden interdisciplinary options.

This presentation will address **interdisciplinary Impacts**, including why interdisciplinarity is valuable for teachers and students and how it impacts students, and **interdisciplinary practices**, exploring how teachers and students create a collaborative, student-centred, interdisciplinary learning environment from curriculum development to in-class and/or online delivery, to assessment, to student support.

Robin Julian is Curriculum Manager (global) for the Extended Essay, a core component of the International Baccalaureate Diploma Programme. Qualifications: Master of Applied Anthropology (Macquarie University, Sydney); Master of Asian Studies (University of New England, Armidale); Bachelor of Education (Charles Sturt University).

Interdisciplinary Inquiry and Persuasive Campaigns

Hermione Paddle

Language can be unpredictable and evasive, and familiar words can seemingly take on new meanings in unfamiliar interdisciplinary contexts. In this instance, interdisciplinary learning is understood as learning through integrating, blending and linking ideas between two secondary school subjects. It is the merging of concepts, methods and terminology within two disciplines to allow a broader and more developed understanding of an issue or problem. Interdisciplinarity has often been linked to critical thinking and more conceptual, sophisticated understandings of knowledge, learning and inquiry. Furthermore, interdisciplinary studies often seek to bridge the gap between disciplines, focusing on integrative concepts. Consider the following twelve key concepts: evidence, certainty, truth, interpretation, power, justification, explanation, objectivity, perspective, culture, values and responsibility. These key concepts are powerful, often abstract ideas, that have many

dimensions and definitions. Such terms have important interconnections and overlapping concerns within secondary school areas of knowledge.

How might interdisciplinary stem from the transferability of such concepts? This discussion explores how these concepts provide the foundations for interdisciplinary study as they supersede individual disciplines and contribute to our depth of understanding about knowledge in different areas. Research explores the ideas of students in their final two years of schooling, undertaking the International Baccalaureate Diploma Programme's Theory of Knowledge and what these key concepts mean to them. Research will discuss student interpretations of these terms and their experience of using cross-disciplinary lenses, exploring multiple perspectives and meanings and applying these meanings to their understanding of different school subjects.

Hermione is an International Baccalaureate educator who teaches English, humanities and Theory of Knowledge in both the Middle Years and Diploma Programmes. Teaching for ten years in both Germany and Australia, Hermione has international experience with interdisciplinary learners. With a Masters in Education and Literacy, Hermione has an interest in the language and literacy skills developed within interdisciplinary learning.

Embracing a constructivist pedagogy of interdisciplinary teaching: an undergraduate's perspective

Adam Dorey

While taking my first module in the study of interdisciplinarity, I noticed that students have trouble navigating different philosophical dimensions of interdisciplinarity while simultaneously committing to their own understanding of the overall concept of interdisciplinarity, which is a vital epistemological founding for any interdisciplinary research the student intends to do. This is partly because students have difficulty engaging with teaching methods which fail to recognise different philosophical dimensions of interdisciplinarity. When teaching methods are based around 'knowledge transfer' rather than engaging students, this is especially true.

In this presentation, I will make the case for a constructivist pedagogy which embraces multiple philosophical dimensions of interdisciplinarity. By putting the onus on students to come to terms with varied concepts of interdisciplinarity, students can select more appropriate assumptions for their interdisciplinary research, allowing them to more easily tailor their interdisciplinary approaches to research tasks. Student awareness of this pedagogy, access to and involvement with a wider discourse on interdisciplinary study and an authentic attempt to generate and engage with student feedback throughout teaching would help students to better engage with interdisciplinarity.

Adam Dorey is a third year undergraduate Liberal Arts and Natural Sciences student at the University of Birmingham. He majors in Business and is interested in creative entrepreneurship, human development and biotechnology. He has been elected by the student body as the Guild of Students' Campaigns Officer, which involves managing and

facilitating student campaigns promoting mental health, anti-racism and women's safety on campus.

Sessions 12:10

Interdisciplinarity within Disciplines

Interdisciplinarity and the Lifelong Learner: celebrating individual stories and collective voices

Rachel Strisino and Charlotte Jones, University of Warwick

In 2015, The United Nations 2030 Agenda for Sustainable Development included the goal of ensuring commitment to inclusive education at all levels, so that all people, especially those in particularly vulnerable situations could access lifelong learning opportunities. At the heart of the Centre for Lifelong Learning (CLL), University of Warwick, lies the focus on widening participation which is in alignment with the University's Four Strategic priorities, specifically the aspiration to remove barriers to participation in study and to create a community for staff and students. Within the Centre for Lifelong Learning sits the Early Childhood Degree programme that attracts applicants often in full-time employment, those wishing to pursue a career change and/or parents/carers of young children. Students come from a range of professional backgrounds, including; social services, early childhood education settings, including special educational needs contexts, pupil referral units and children's services as well as children's homes, with many such services operating through integrated, interdisciplinary teams. Since the Labour Government of 1997, there has been a significant drive for policy developments relating to child welfare and increased interdisciplinary working, increased responsiveness, accountability and efficiency of services. Hence, these services sit within a context where the experiences of children, childhood and children's rights is understood as a holistic, interdisciplinary area of study.

With this in mind, across the Early Childhood programme at CLL, taught sessions are based upon real-world contexts, as the lifelong learners enter and participate as characters in their own individual stories, then become storytellers as they share narratives from experience in their different contexts of practice and as characters in the wider early childhood student community story here at CLL. This inevitably creates a melting pot of individual stories and collective voices being drawn from and spanning across different discipline areas, with lecturers too, having their own unique and diverse discipline expertise. As such, this is reflected in the unique design of the course, as an interdisciplinary study of the early phase of the human lifespan (birth to eight years), whereby playful, nurturing and authentic spaces are created for the students. With the emphasis on playfulness, academic risk-taking and critical creativity, inspiration for module content, delivery and assessment is fluid and flexible, as drawn from different kinds of disciplinary knowledge including sociological, psychological, child developmental psychology, historical and cultural contexts. Due to the multi-faceted professional roles of the students, the interdisciplinary impacts of the programme reach beyond the students and staff themselves, directly through to the children, parents/carers and community at the heart of their day-to-day work. In order to celebrate the existing

interdisciplinary approach of our programme, a project between staff and students has been created in order to celebrate and share how the Early Childhood programme at CLL fosters an interdisciplinary and collaborative learning and teaching experience for staff and students alike. The overarching aim of this is to create a model of critical reflective practice that can illustrate the impact of the programme upon the lives of students, children, families and the wider community.

Rachel Strisino is a Senior Teaching Fellow on the Early Childhood programme at the Centre for Lifelong Learning, a Fellow of the Higher Education Academy and External Examiner. Rachel started working in Nurseries in the late 1990s which inspired her to embark on her BA (Hons) degree in Early Childhood Studies here at Warwick. Upon graduation, Rachel started to lecture at a local Further Education College where she worked with members of the local community at the Women's Multi-refuge centre and Sure Start, supporting mainly women back into education.

In 2008, Rachel became the programme lead at a CLL partnership college for the Early Childhood Foundation degree here at Warwick, and for many years taught across both sites. Rachel has also continued her own educational journey with Warwick by completing her teacher training and Masters in Childhood in Society. Whilst working on her MA, Rachel investigated the perceptions and interpretations of early years' practitioners when working with the Early Years Foundation Stage framework and the concept of 'what is a child in the 21st Century'. As a Senior Teaching Fellow, Rachel leads on a core modules across the Early Childhood Foundation and BA (Hons) degree. She is a dissertation supervisor for students Early Childhood investigations and personal tutor across all four year groups.

Dr Charlotte Jones is the Interim Director of Early Childhood programmes at the Centre for Lifelong Learning and a Fellow of Advance HE. Charlotte's experience of working with children under the age of five years inspired her to complete a BA (Hons) degree in Early Childhood Studies here at the University of Warwick. Charlotte then pursued her PhD in Education focusing on policy-to-practice contexts relating to gender within early childhood work and associated notions of practitioner identity. Charlotte is particularly passionate about arts-based research and therefore draws upon her own practices as an artist in order to explore early childhood. Charlotte's most recent project illuminates the identities of the child, learner and artist as drawn from her own auto-ethnographic narrative research with local Warwickshire artists. Charlotte is currently on the Editorial Board for the International Journal of Play and she is a reviewer for a number of international and national journals, including the International Journal of Early Childhood, Journal of Artistic and Creative Education, The International Journal of Art in Early Childhood, Journal of Contemporary Issues in Early Childhood, Journal of Research in Drama Education and The Journal of Early Childhood Education.

Deliberative Democracy in an Interdisciplinary Department

James Everest

One of the things that an interdisciplinary education should do is empower a student to take control of their own learning. At its most basic level, this can mean a student choosing their modules from across traditional disciplinary boundaries. More fundamentally, this experience of choice should encourage a student to think about what they want from their education.

The question that this paper will address is the following: if an interdisciplinary student's experience of their learning should be empowering, should their experience of their learning environment also be empowering? In other words, what use is it if a student feels like he or she gains control over the content of their education, without also gaining control over the departmental processes that structure that education?

In the academic year 2019-20, we introduced some aspects of deliberative democracy to the Liberal Arts and Natural Sciences (LANS) degree programme at Birmingham.

In the autumn term, we ran a series of deliberative workshops looking at aspects of protest, ranging from theoretical discussion to practical interrogation of local Extinction Rebellion activists. Why do we protest? Should we protest? Does it work?

This term (the spring term) we will host the first ever 'LANS Assembly', a gathering that will bring together the entire LANS community – staff and students – as equals, to carry out some deliberative democracy in action: we will address a question of relevance to us all, with a commitment as a Department to implement the outcomes of the Assembly.

This presentation will report our results.

James Everest holds teaching fellowships in Arts and Sciences at UCL and in Liberal Arts and Natural Sciences at Birmingham. He has an undergraduate degree in languages, an MRes in English and a PhD in the History of Science.

'Open Box' curriculum at the Open University – How we are helping students to make their learning count.

George Curry and Linda Robson

Making you Learning Count (YXM130) is an online, innovative 30-credit undergraduate module at the Open University, UK. It enables students to plan, curate and undertake their own personalised curriculum. They do this through selecting a range of learning resources, for example OERs, across as many discipline areas as is appropriate for them. The module is designed around a series of assessment tasks and associated skills-based material. Students are required to take what they have learned from their curated suite of OERs (or other courses) and use it to complete the assessment tasks. These tasks include creating a poster, a blog post and a video as well as opportunities to reflect on their choices and study or career aims.

The 'open box' module is designed to allow interdisciplinary and multidisciplinary study which supports students in developing cross-disciplinary thinking and approaches, as well as

giving an opportunity to experience a range of discipline areas prior to committing to a specific degree pathway. This innovative module design allows every student to have an individualised learning experience tailored very precisely to their specific motivation and goals.

This presentation delivers a case study of the module team's experiences of the first three presentations of the module to specific cohorts of students including young students in Scotland, corporate students sponsored by their employer and 'standard' students. The presentation will include reflections on what has worked, and what challenges are presented with this type of module.

George Curry is Senior Manager responsible for the production and presentation of the Access curriculum at the Open University. Her recent scholarship includes an evaluation of the changes to the OU Access Programme, including a new conceptualisation of the importance of structure and voice in programmes aimed at Access students. George is also a Co-Chair of the innovative 'Making your learning count' OU module which enables students to tailor their own curriculum to allow personalised interdisciplinary study.

Linda Robson is a Senior Lecturer in the School of Engineering and Innovation at The Open University. She is co-chair of YXM130: Making your Learning Count and T198: Engineering at Work, alongside managing a team of Associate Lecturers delivering modules within undergraduate and postgraduate engineering programmes. Linda's research interests focus on accessibility and student retention, student led curriculum and supporting distributed students and staff.

Interdisciplinarity across 'disciplines'

Reflections on the launch of an interdisciplinary STEM qualification.

John Baxter

The Open University offers open education in two senses. Firstly, it offers open education in the traditional sense, in that the OU has no entry requirements. A student can enrol in a BSc in Physics, or a BA in Classical Studies, regardless of previous educational attainment.

A supplementary type of openness is found in the university's "Open Qualifications". Until recently these consisted of our BA (Hons) and BSc (Hons) Open Degrees, and lower level diplomas and certificates nested within them. For many years these Open degrees have allowed students to design a personalised qualification to suit their own needs: for example, combining Criminology and Computing or Business Studies and a Language.

The OU operates across the four nations of the UK and has to work within their different funding regimes. Changes to the funding in England meant that students were more likely to rec in Seive loans for a second degree if it is in Science Technology Engineering and Maths (STEM) subjects. As a result of this change the funding environment, the OU launched an

additional Open qualification, the BSc (Hons) in Combined STEM. This new degree specifies that two thirds of the modules a student studies have to be within STEM subject areas.

Whilst only a small number of students have graduated with the new Combined STEM degree, it's an appropriate time to make some preliminary reflections on the first few years of the Combined STEM degree and its relationship to the older BA/BSc Open degree:

- To what extent are Combined STEM students driven by funding?
- Is take up of the Combined STEM Open degree significantly different in other parts of the UK?
- Do students welcome having a more narrowly defined interdisciplinary qualification?
- Is the Combined STEM degree providing an interdisciplinary home for students who would have otherwise studied the broader BA/BSc Open degrees?
- Conversely, is it providing an interdisciplinary "escape route" for students who would struggle with the strictures of a tightly defined named degree in a STEM subject.
- Do we fully understand why both the BA BSc Open and the Combined STEM degree attract a higher proportion of widening participation students (for example students in secure environments and disabled students)?
- The University generates a great deal of data which relate to students on a module: perhaps this modular data is appropriate when the modules are from a narrow range of subject areas, but are we using the appropriate analytics for interdisciplinary students?

Considering these questions can lead to challenges for institutions trying to develop appropriate governance structures. The Combined STEM degree relies on assessment and teaching materials developed largely (but not exclusively) within a single faculty, but the experience of supporting interdisciplinary students to a large extent sits outside of faculties. These challenges and tensions are not new, but the experience of launching the Combined STEM degree, in the context of the current climate in higher education, has led to the University revisiting these questions of governance.

John Baxter is Qualification Director BA/BSC Open Degree and Senior Lecturer in Life, Health and Chemical Sciences. At the Open University I have developed teaching materials related to the social impact of science, most recently focusing on areas where an understanding of ethical issues and justice theory can enrich scientists's engagement with the public. For fun I publish a blog on the social history of British Music Hall and its relationship to folk music.

Teaching and Learning Science with Graduate-Entry Medical Students from Diverse Subject Backgrounds

Nicholas Hopcroft and Philippa Pollitt

Accelerated graduate-entry medical degrees have been introduced in the UK since 2000, with the aim of diversifying the intake to the medical profession. These 4-year courses can particularly provide an opportunity to those who did not consider a

medical career as a school leaver, possibly having not studied the appropriate science subjects at A-Level. The University of Warwick runs an entirely graduate-entry medical degree, which is one of very few in the UK that does not require an undergraduate science degree or science A-Levels for entry onto the course. The student intake is therefore highly diverse in terms of previous disciplinary background and educational experience.

The course utilises a case-based learning approach where students collaborate in small groups to solve authentic clinical problems. The cases are holistic, encompassing biological, psychological, social and ethical aspects and encouraging an integrated, interdisciplinary approach to clinical problem solving. The case-based learning groups act as multidisciplinary teams, with students drawing on their diverse disciplinary backgrounds to co-construct knowledge and apply it to the case. However, feedback has shown that the level of prior scientific knowledge is a major factor in how well students feel they are progressing, as well as how much anxiety they report, during the early stages of the course.

This presentation will outline the benefits of a multidisciplinary intake onto a graduate-entry medical degree and how these can be optimised through a case-based curriculum. It will also consider the potential disadvantages for students and staff, focussing on the challenges posed by a wide range of prior scientific knowledge within the cohort, before discussing how these can be addressed through the learning experiences and support provided. The presentation will draw upon a qualitative study of graduate-entry medical student experiences and their relationship to prior disciplinary background, highlighting issues around student identity, participation and support through transition.

Nick Hopcroft is an Associate Professor at Warwick Medical School, where he is Academic Lead for Cell and Tissue Biomedicine and lead for the first 5-week block of the medical degree. He has a BSc in Biochemistry and a PhD in Chemistry and teaches medical students across a wide range of biomedical subject areas. Prior to teaching graduate-entry medicine, he conducted research on the structures of biological molecules, taught undergraduate science and medical students and worked in university funding. He is the current Chair of the Medical Education Research Community at Warwick Medical School.

Philippa Pollitt is a final year student on the graduate-entry medical degree at Warwick Medical School, with previous BA and MA in Classics. As a second-year medical student, she was a member of the organising committee for delivering near-peer teaching to first year students from non-biological science backgrounds and taught a variety of topics to students, including physiology, pharmacology and cell and tissue biomedicine. In 2019 she conducted a research project exploring the experiences of graduate-entry medical students without an undergraduate degree in the biological sciences.

Curriculum Planning for Medicine and Law: A model for collaborative learning

Andra le Roux-Kemp

Both the practice of medicine and of law are distinct from other occupations by the distinguishing feature of professionalism. A profession, in contrast to other occupations

entails, inter alia, a particularly specialised body of knowledge requiring extensive education and training, it is subject to strict regulation by oversight and governmental institutions, requires high ethical standards of its members, and is generally associated with altruism and service to the community. Yet, despite these common features and also the many interfaces where law and medicine meet in everyday life and practice, real and thorough-going collaboration between these two professions remain scant. This is also true with regard to the formal education and training of medical and legal professionals. Building on the common features shared by the medical and legal professions, this paper will consider the benefits and potential of a collaborative model in legal and medical education/training. It will be argued that tailored collaboration in terms of curriculum development for medical and legal education and training hold advantages that will extend far beyond the imparting of knowledge in a classroom setting and the assessment of common competencies. A collaborative model in medical and legal education can, for example, enhance the clinical, institutional, and public effectiveness of medical and law students and encourage the development of skills and changing attitudes that result in original and creative responses to specific and shared ethical and professional dilemmas. In addition to considering how such a collaborative model can fit in the curriculum development of medical and legal education, the paper will also impart an ideological vision of the shared interests of medical and legal professionals in promoting health and health rights.

Dr. Andra le Roux-Kemp is an Associate Professor at the Lincoln Law School, University of Lincoln. She completed her education and training in a number of disciplines (law, medical anthropology, applied ethics, and musicology) in South Africa and Germany, and is currently enrolled for a DBA in Higher Education Management at the University of Bath (UK). Her academic career has been equally varied; with affiliations to universities in South Africa, Germany, and Hong Kong. While her primary research focus is in Medical- and Health Law, as well as Criminal Justice, she also writes on professional (higher) education, specifically legal education.

WORKSHOP – What are the challenges to interdisciplinary teaching and how can we overcome them?

Debbie Marais, Bo Kelestyn, Ines Molinaro, Lauren Schrock and Jo Wale

This workshop, aims to discuss the challenges and possible solutions to the barriers to interdisciplinary teaching. Participants will be asked to share their thoughts using a world café methodology. The session will start (5 min) with setting the context by sharing the findings from a recent institutional review of Interdisciplinarity conducted at the University of Warwick across 17 Departments. This review captured a snapshot of departmental reflections on their ethos, definitions, teaching and learning practices as well as challenges and barriers to engaging with interdisciplinarity. The main challenges and barriers found will be shared and form the basis of the active discussion for the rest of the workshop. Thereafter, 2 rounds (starter and main) of discussion will be initiated in small groups using break out virtual rooms and the 'tablecloth' for notes – in this virtual world, it will be a slide that can be shared for the next round. After each 10-min discussion round/meal, one person will stay 'at the table' – in the breakout room, to summarise what was discussed and the

others will move to a different table/room. Each round/meal will build on the previous round/meal to elucidate possible solutions to the challenges, adding to the notes on the 'tablecloth'. The starter will address the challenge of inconsistent language/terminology relating to interdisciplinarity, leading on to the main course of variation across institutional/structural governance/policy and support/accountability. The session will end with a larger group discussion (10 min) on what the 'take out' messages would be to improve engagement with interdisciplinarity across the sector. This final discussion along with conversations captured at individual tables will be written up, summarised, and shared with workshop attendees after the Conference. Participants will be asked to share their contact details with workshop leads, if they would like to receive a copy of the summary and contact details will be used for this purpose only.

Interdisciplinary Pedagogy in Practice

Introducing interdisciplinarity at undergraduate level in Chile

Alejandra Quintana and Paul O'Toole

Universidad del Desarrollo is a private university in Santiago, Chile, founded in 1989 as one of a new wave of higher education institutions. UDD has always strived to be a highly innovative and fast paced university which is reflected in the fact that, in only 30 years, it has managed to position itself as one of Chile's leading private universities.

iCubo is UDD's Innovation and Interdisciplinarity Institute which was set up by 3 Faculties; Engineering, Business and Design. Over the last 2 years, iCubo has been developing a university-wide strategy to roll out interdisciplinarity across all faculties and disciplines which will come on stream from 2021 onwards and is currently being piloted.

This strategy consists of developing different levels of interdisciplinarity, beginning with first year students and through to graduation (in Chile undergraduate degrees last 5 years). In parallel with the overall strategy, iCubo is developing new teaching methodologies, teacher training materials and new evaluation formats, as well as "evangelizing" faculty and staff around the concept of interdisciplinarity and its relevance within the university and Chilean society, as a whole.

Part of this process includes benchmarking best practice globally as well as sharing our own experience in developing interdisciplinarity at undergraduate level in Chile. In this context we were invited to present a paper at the Conference of the Association for Interdisciplinary Studies, hosted by University of Amsterdam in Amsterdam (October 24-26, 2019). The theme of the conference was "Interdisciplinarity in Global Contexts".

UDD is the first Chilean university to develop a core strategy around interdisciplinary teaching and we strongly believe it will allow us to prepare our students for the challenges of the modern workplace which will require not just new skills, but also the ability to work across different disciplines and areas of knowledge.

Paul O'Toole has been involved in entrepreneurship and innovation for most of his career and has developed a 360-degree perspective on business having been CEO, Founder, Non-Executive Director and mentor to a number of companies in multiple sectors including digital, retail, manufacturing and the services sector. Paul is currently Managing Director of iCubo, the Innovation and Interdisciplinarity Institute at Universidad del Desarrollo (UDD) in Santiago, Chile which develops multiple programmes, courses and workshops centered around teaching innovation and promoting interdisciplinarity. These are offered at undergraduate, postgraduate and in-company level. iCubo also manages UDD's long standing relationship with Stanford University through the Stanford Technology Ventures Program. Previously, at the same university, Paul set up and managed a stand-alone incubator/accelerator, UDD Ventures, which now focuses on health and digital start-ups. Paul has worked in Chile for Endeavor, a US headquartered non-profit which helps to accelerate high growth scale up companies.

Alejandra Quintana is the Deputy Director of Interdisciplinary Education at Universidad del Desarrollo (UDD) in Santiago, Chile. She coordinates the delivery of undergraduate inter-faculty programmes, supporting the design, monitoring and evaluation of curriculum content according to the strategic plan of UDD for interdisciplinary education. She previously worked in research and consultancy projects in higher education in Chile. Alejandra holds a Masters degree in Education and a Bachelor's degree in Education from Universidad de Santiago de Chile.

Pedagogies that can support collaborative teaching and learning: benefits and challenges

Leda Mirbahai, Jesús Page Utrilla and Rocío Gómez

Collaborative case-based learning is a learner-centred pedagogy whereby learners apply their knowledge to real-life scenarios, developing higher order thinking skills. Furthermore, it has been explored as an approach for delivering interdisciplinary learning opportunities. A part of a project funded by the innovation in teaching grant by Spanish government, case-based learning pedagogy was shared with colleagues at Departments of Biology, University of Autonomous in Madrid and introduced as a trial version to one of their programmes. This approach enabled us to jointly develop a case material that drew on the range of expertise available and to deliver a collaborative teaching and learning session where students (n=34) were required to learn in enquiry-based format as a team. The project enabled us to evaluate and reflect on the value of case-based learning and developing case material in promoting collaborative teaching, sharing expertise and knowledge. Furthermore, it also highlighted some of the challenges associated with introducing new pedagogies, including differences in learning environment setup, expectation and perception of students of a teaching session, which was reflected in the student and staff feedback. Overall, case-based learning has the potential to provide staff with a platform to deliver collaborative teaching by not only integrating different subjects and disciplines but also by generating resources that can be shared across different universities and promote national and international collaborative teaching approach.

Leda Mirbahai is a Senior Teaching Fellow at Warwick Medical School (WMS) and acts as the Education Lead for the Division of Biomedical Sciences at WMS as well as the Medical Sciences Theme Lead for the innovative interdisciplinary course of BSc (Hons) Health and Medical Sciences. Leda is actively working towards personalising the learning and education experience and to transfer the multidisciplinary and international nature of research to teaching and learning. She is involved in the design of innovative interdisciplinary curricula and assessments, and contributes to several research and education groups.

Rocío Gómez is a senior lecturer at the Universidad Autonoma de Madrid. Her research interests are focused in the study mammalian male meiosis. She has been involved in Cell Biology and Histology modules since 2003, and was nominated as International Coordinator for Biology in 2011. Since then, she has been supervising international student's exchanges and establishing new bilateral agreements which includes the University of Warwick for the BSc Health and Medical Sciences. She is currently the coordinator of the Cell Biology module within the Boston University-UAM International Program, where the data for this conference has been obtained.

Dr. Jesus Page is Associate Professor of Cell Biology at Universidad Autonoma de Madrid, where he leads a research group focused on the study of meiosis and evolution in a variety of biological systems, mainly mammals. He has taught undergraduate and graduate courses in cell biology and evolution since 2003. During the last eight years he has coordinated the BSc in Biology at Universidad Autonoma de Madrid and has directed or participated in several teaching innovation projects, focused, among others, on the development of new materials and methodologies, the assessment of learning and the training of students in transversal competences.

Universalizing interdisciplinary pedagogy? Matching pedagogy to cognitive structure

David Roberts

It has been claimed that interdisciplinarity diversity in HE necessarily requires a multitude of educative approaches, based on the notion that different disciplines require different approaches to pedagogy. But this assumption of diversity and difference perhaps cloaks an underlying commonality often ignored in pedagogic thinking across disciplines.

All sighted students, regardless of discipline and interdisciplinarity, learn visually: according to [MIT](#), about half the brain is given over to processing the exterior world visually. Briefly reduced, the theoretical scholarship on visuality and cognitive comprehension proposes that we learn better from a combination of text and images, than from text alone (Azzarito and Kirk, 2013). This is because all sighted humans are dual processors of their external worlds, ingesting external stimuli across both audio-visual, and textual, channels. They will therefore, it is argued, experience higher cognitive engagement for longer (Mayer, 2014). Furthermore, given that this is a neurobiological position, not specific to any one discipline, culture, condition or identity (since all sighted people are shown to learn this way), we may ask ourselves whether such an approach might serve to unite pedagogies between, among and

across the disciplines in, dare I say it, a universalising approach transcending disciplinary demands?

The theory is largely beyond reproach, in the sense that no-one legitimately argues human beings do not possess dual processing capacity. However, it lacks conceptual expansion to date regarding distinctions between the various forms of student engagement that are now well-understood (Gibbs, 2014), and it fails adequately to interrogate and test the claims in 'real-world' conditions.

Such real-world testing has been conducted across 9 disciplines at institutions in the UK. The resulting data show that, when the MML method was longitudinally applied across disciplines and across universities over a three-year period in a control group scenario, reaction was broadly uniform, with improvements in cognitive engagement with academic content in the range of 40% to 80%. No statistically-significant variation appeared as a result of physical location or disciplinary identity: higher levels of engagement for students exposed to text and images, than to text, were consistent across and among the disciplines.

In conclusion, I must say that I'm sceptical of anything involving a silver bullet and I think this data needs greater exposure and review. I'd like to share these findings and the research methods used to gather them with my peers and prompt a debate about the possible of pan-disciplinary pedagogy based on neurobiological commonality of our students. But I'd also like to see if we can expand the research to more universities and more disciplines, especially in the scientific communities, and to offer to provide the digital research tools to achieve this with maximised, student participation in both design and dissemination of the research approach.

After 25 years of research-informed teaching deriving from fieldwork in Southeast Asia and Sub-Saharan Africa, David has turned his attention to teaching-informed research in multimedia learning and visual pedagogies. He was appointed Senior Fellow of the Higher Education Academy in 2017 on the back of his development of multimedia learning research and methods in the lecture theatre, and now, in addition to working for Loughborough University, he runs a consultancy that supports peers in pedagogical practices and runs a consultancy that supports multimedia learning development and training in universities in the UK, Europe and US.

[The wider picture of Interdisciplinarity](#)

Navigating Utopia: Module Design for the Co-production of Knowledge

Kirsten Harris

This paper explores interdisciplinary practices and experiences by focusing on the design and execution of an honours-level inter/transdisciplinary module on utopias and utopianism, "Utopia: Text, Theory, Practice" (which will run for the third time in January). At a time when the threat of ecological breakdown is very much at the centre of public discourse, utopianism offers a powerful framework to envision alternative ways of living and to drive social change.

With the potential to focus on any aspect of social and political organisation and experience, and drawing on scholarship from disciplines as varied as architecture and town planning, education, sociology, technology, film, literature, sustainability, economics, politics and philosophy, utopian studies offers a rich landscape for interdisciplinary learning. When designing the module, I saw a strong alignment with the goals of the Warwick Liberal Arts degree in utopianism's focus on problems embedded in social structures, practices, values and relationships, its complex and critical questioning of ideas around citizenship, and its future-facing outlook. By interrogating the circulation of ideas through different forms of creative/cultural expression and lived practice/activism, I hoped to introduce a socially-engaged cohort to new ways of integrating ideas from creative sources in interdisciplinary social research.

Specifically, this paper will explore the theme of "learning from each other" by reflecting on the module's design and pedagogy, which centre students as collaborative co-producers of knowledge. This is achieved in various ways. The weekly schedule is devised in consultation with each cohort of students and so changes from year to year. Second, students are supported each week to undertake required additional independent research on an aspect of a set weekly problem that interests them. In class, students work in groups to produce a response to the problem, drawing on their individual research to build a collaborative argument. Through their peers' research, students are introduced to different methodologies and scholarship from different disciplines. Seminars are thus organized on the principle that when the whole class engages in robust, active research, the cumulative output supersedes what could be learned individually through traditional, directed-learning methods. The focus on group-work and collaboration develops essential academic and professional skills, but more conceptually it aligns with utopianism's co-operative focus. Not only does student ownership enhance engagement, it helps to address issues around access and inclusion by allowing all students to focus on ideas, people, movements that they're motivated to learn about; the curriculum is not limited by my own personal knowledge, and students are encouraged to pursue their particular academic interests and areas of expertise. Each year, students bring case studies, ideas and scholarship to class that I hadn't previously encountered, which makes for a vibrant, diverse and decolonized learning experience.

Dr Kirsten Harris is faculty staff in the Department of Liberal Arts at the University of Warwick where she teaches transdisciplinary modules in Consumption and Utopianism, and an introductory module to qualitative research methodologies in the arts, humanities and social sciences. With a background in literature, her major research interests include the relationship between art and radical political and social movements, and utopianism as creative expression and praxis. She is a fellow of the HEA and hold a Postgraduate Certificate in Higher Education (Nottingham).

Future-proofing education: Challenges and rewards of interdisciplinary learning and teaching in a capstone module at the University of Sussex

Isabel Fischer

We will discuss my experience of interdisciplinary teaching and learning as part of a capstone module for third year undergraduate business students at the University of Sussex. I will explain how an in-class cognitive maps exercise was used to evaluate interdisciplinarity and how for my teaching, the students' cognitive maps demonstrated a lack of interdisciplinary thinking. I will then outline how teaching the interdisciplinary content of the capstone module led to the development and teaching of a teaching case study, available here: <https://journals.sagepub.com/doi/10.1177/2043886920961782>

I will end my presentation with a reflection on impacts as well as challenges at module, course and institutional level.

As part of my teaching I cover four themes to future-proof students' education:

- (1) A move from technologies as a support tool to using technologies for value creation.
- (2) A move towards integration and connections to create synergies.
- (3) An emphasis on key transferable skills, such as complex problem-solving skills and communication skills
- (4) A focus on raising awareness on trying to limit the impact on Climate Change

Tackling climate change and climate change related inequalities is particularly important because on the one hand 'time is running out' and on the other, the vice-chancellors at Warwick and at Sussex both declared last academic year a climate change emergency. Tackling climate change, similar to other complex 'wicked' problems, requires interdisciplinary and paradoxical thinking. One of the key differentiators of the current student cohorts of generation Z, compared to previous generations, is that the current students are the first generation of digital natives and are more technology savvy than previous generations. Yet, my educational research from across six UK universities shows that many students currently do not see technology as an enabling influence to their academic and employment success. As part of the presentation I will finish by touching on my recently published teaching case study as well as challenges of interdisciplinary teaching and learning.

Dr. Isabel Fischer is Associate Professor of Information Systems Management at Warwick Business School. Isabel's teaching and research focus is on how innovative technologies address issues of environmental and social sustainability. Isabel holds a doctorate in education and joined WBS from the University of Sussex. Prior to academia Isabel worked in senior positions for Visa and American Express.

From the classroom to the boardroom: radical interdisciplinarity in the Regulations

Elaine Brown, Paul Baxter and Emma Coonan

Anglia Ruskin University is developing an ambitious set of breadth modules that will be mandatory for all Level 5 students. 'Ruskin Modules' will prepare students with skills for a

rapidly changing world and workplace by fostering critical reflection, intellectual flexibility, openness to new and diverse perspectives, and an appreciation of ambiguity.

For interdisciplinary teaching and learning to become firmly and sustainably rooted in course curricula, it must be underpinned by a recognition of interdisciplinarity's radical and unsettling consequences – not just pedagogically but also institutionally. Yet academic institutions are classic “role cultures” (Handy, 1976), whose complex organisational structures, long decision-making chains, and bureaucratic processes both rely on and continually reinscribe rigid hierarchical relationships. In stark contrast, interdisciplinarity is characterised by overflow. It spills over discipline boundaries, producing radical instability and creative upheaval, eschewing a single ‘right way’ or ‘right answer’ and instead foregrounding a plurality of perspectives and positions. Such open and pluralist thinking is crucial in order to tackle wicked problems; but what is the impact on university administrative structures such as timetabling, assessment procedures, degree outcome calculation, and regulations? Can a committee ever embrace interdisciplinarity?

This paper describes a collaboration between an academic staff member and the Academic Registrar to develop top-level institutional regulations and procedures to enable interdisciplinary breadth modules. As the collaboration developed, it became itself an interdisciplinary encounter: modelling a radical learning process as each colleague began to question, reframe and co-construct the process of creating the conditions for interdisciplinarity as a complex problem to which there is no one answer.

The collaboration has created a real understanding of interdisciplinary teaching and learning as a revolutionary, transformative pedagogy, and an institutional recognition of the need for flexibility and openness in creating the space in which the conditions for interdisciplinary pedagogy are developed. This open and flexible thinking exploded in the unexpected and unprecedented character of creative dialogue between colleagues to define these interdisciplinary modules and approve their curriculum through administrative processes more typically perceived as restraining.

There is a risk that without institutional understanding of the radical and plural nature of interdisciplinarity - and the real and unsettling impacts this has on established processes, systems and ways of thinking – interdisciplinary initiatives will fail to take root and their transformative potential for learners will be lost. This collaboration highlights the crucial importance of learning from each other's diverse perspectives, contexts and lived experiences not only in the classroom, but in every institutional encounter.

Reference: Handy, C. (1976). *Understanding organisations*. Harmondsworth: Penguin.

Elaine Brown is the Institutional Lead for Personal Development Tutoring and Ruskin Modules in the University's academic development service at Anglia Ruskin University, Elaine is passionate about the potential of diverse perspectives through interdisciplinary collaboration. Her research explores the application of user experience design philosophies and techniques from Computer Science to the design of learning in Higher Education. Previously acting Deputy Dean (Student Experience) in the Faculty of Science and

Engineering, Elaine currently leads two projects to support colleagues to enable students to realise their potential.

Emma Coonan has been an academic librarian for ten years, where her background is in supporting and researching academic, digital and information literacies in higher education. Her teaching experience ranges from research consultations and workshops to MOOC-style courses in reflective learning and professional workshops in writing, peer reviewing, and scholarly publishing. With a keen interest in academic writing and scholarly communications practices, Emma was Editor-in-Chief of the [Journal of Information Literacy](#), from 2015 to 2020, as well as Associate Editor of the [Journal of University Teaching and Learning Practice](#) for two years.

From 2018 to 2020 Emma was Research Fellow at the Centre for Innovation in Higher Education in Anglia Ruskin University, collaboratively developing an educational laboratory model to enhance pedagogic research and drive research-informed innovation in teaching, learning and assessment across the institution. Now an independent scholar, author and trainee academic indexer, she continues to supervise and examine doctoral research, acts as an external course moderator, and is a member of Cambridge University's Higher Education Studies Research Ethics Board.

Paul Baxter has been ARU's Academic Registrar since 2010, covering areas such as quality assurance, assessment and student records. He is responsible for the academic regulatory frameworks and has led on many curriculum and regulatory developments during this time of which the introduction of the interdisciplinary-based Ruskin Modules is the latest.

Student-led Interdisciplinarity 3

Experiential Learning Impacts for Post-Graduates within Scholar-Led Editorial Practice

Gareth J. Johnson

New scholarly journal publishing endeavours by post-graduate or early career researchers are not new, but few experience any degree of longevity with their continued existence largely dependent upon individual enthusiasts. Conversely, the Exchanges interdisciplinary research journal has been in regular publication by the University of Warwick's Institute of Advanced Study since 2013, becoming an established and globally recognised scholar-led platform for interdisciplinary publications by post-graduate researchers (PGRs) and early career scholars (**Adema & Moore, 2018; Johnson, 2019**)

This paper will, alongside providing an introduction to the journal's operations and motivations, explore its efforts to act as a practical, collaborative and scholastic environment forum for developing post-graduate student editorial and authorial skills. These developments will be assessed through a case study lens, specifically examining the development of two special issues, due to be published in 2020, which have partnered the

journal with Warwick and Monash University PGRs as contributing associate editors. Employing a light ethnographic method (**Fetterman, 2010**), the paper will examine both the initial aspirations of and experiential impact on these student editors, exploring the contrasts with their lived experiential perceptions.

The paper will seek to demonstrate how students and early career scholars' participation in editorial journal production processes, serves to develop not only critical writing and editorial skills but facilitates a deeper and more rationalised perception and appreciation for other scholars work, voice and communicative effectiveness. Through exposure to this 'critically collegial environment', student editors have become more empowered to re-examine their own authorial aptitudes, with notable personal and professional benefits.

The paper will seek to delineate the particular impacts upon the associate editors during and subsequent to the involvement, and expose how their learning journeys have reshaped recognition of their own impacts within the global scholarly academy. Furthermore, the paper will consider how through engaging with an explicitly interdisciplinary network of reviewers, authors and fellow editors, the experience has served to increase the student editors 'professional esteem capital' (**Harvey, 2010**), and proffering career advantages and interdisciplinary domain recognition. The paper will address how the lessons learned from this year-long 'editorial apprenticeship' are feeding into the proposed integration of journal paper production into an advanced Global Sustainable Development undergraduate module at Warwick.

The paper will conclude by reflecting on the ethical complexities engendered within scholar-led publishing's continued reliance on 'free' academic immaterial labour practices (**Barassi, 2012; Lynch & Ivancheva, 2016**) whilst seeking to disrupt dominant commercial orthodoxies.

References:

Adema, J. & Moore, S.A., 2018. Collectivity and Collaboration: Imaging new forms of communality to create resilience in scholar-led publishing. *Insights*, 31:3.

Barassi, V. 2012. *Three-D*, Issue 19: Free labour and academic publishing: can we 'Just say No'? *Three-D*, 19.

Fetterman, D.M., 2010. *Ethnography: Step by step*. 3rd ed. Thousand Oaks, CA: Sage

Harvey, D., 2010. *A Companion to Marx's Capital*. London: Verso.

Gareth has been the Managing Editor-in-Chief of the early career and postgraduate focussed journal Exchanges for two years. Possessing a doctorate in cultural academic publishing practices, he also holds various degrees in biomedical technology, information management and research practice. His prior varied career includes extensive experience in academic libraries, project management and applied research roles, and he is also currently executive manager of the regional Mercian Collaboration library consortium. His professional

interests focus on power-relationships within and the evolution of scholarly academic publication practice, viewed from within social theory and political economic focus.

Learning From Each Other Through a Community of Practice: Warwick's Interdisciplinary Learning Circle

Joanne Wale, Debbie Marais and Lauren Schrock, University of Warwick

The Warwick International Higher Education Academic (WIHEA), founded in 2015, is the UK's first institutional academy of educators, where staff and students who are engaged in developing and steering learning and teaching come together to develop and embed outstanding learning and teaching at Warwick. WIHEA accomplishes this goal through the delivery of seminars and masterclasses, the awarding of funding for projects and through its Learning Circles.

WIHEA Fellows can join a circle led by a colleague WIHEA Fellow to develop their expertise in an area that either explores new opportunities or tackles current challenges faced by Warwick and/or other higher education institutions across the world. The Learning Circle aims to gather intelligence, collaborate and share their findings to inform strategic and practical thinking and enhance institutional practice and policy.

Interdisciplinarity has an impressive pedigree at Warwick and the Learning Circle at Warwick was formed in 2018 with the aim of allowing Fellows with a specific interest in interdisciplinary approaches to come together and share best practice. The group regularly discusses topics such as the benefits and barriers to delivering effective interdisciplinary teaching and learning at Warwick and considers how members of the learning circle can champion interdisciplinarity and have a role in steering the strategic development of interdisciplinarity at Warwick.

The Learning Circle has recently been involved in a project that gathered data on interdisciplinary initiatives around the University with the view of creating an inventory of Warwick interdisciplinary activity. In addition, the Learning Circle has been involved with a project seeking to create an Interdisciplinary Hub on the University's website that highlights case studies and areas of good practice with the aim of promoting awareness and engaging staff and students in interdisciplinary opportunities. From March 2020, the Learning Circle has been challenged with continuing the learning community while working remotely and this has impacted upon the projects and activities that were planned.

In this presentation we will consider the role of the WIHEA Interdisciplinary Learning Circle in sharing, shaping and steering interdisciplinary teaching and learning at the University of Warwick as well as the importance of creating a network of interdisciplinary champions who can promote and disseminate best practice in their home departments.

Joanne is Deputy Director at the Institute for Advanced Teaching and Learning (IATL) at the University of Warwick with responsibility for the management of a large portfolio of interdisciplinary modules. She was Co-Lead of the WIHEA Interdisciplinary Learning Circle

and also a WIHEA Fellow. Joanne has worked in academic policy and teaching quality for a number of years at the University of Birmingham, Birmingham City University and Warwick Business School before joining IATL in 2014.

Debbi is a Principal Fellow of the UK Higher Education Academy and has more than 20 years of experience in the higher education environment across three countries. She is currently the Director of Postgraduate studies at Warwick Medical School. She co-leads the WIHEA Interdisciplinarity learning circle at Warwick and is a member of the Institute for Advanced Teaching and Learning (IATL) management committee. Debbi is committed to supporting and promoting innovative teaching, reflective practice and enhancing the student experience.

Practicing Interdisciplinarity: Developing Interdisciplinary ‘Knowing’ and ‘Doing’

Martyn Woodward

In attempting to develop Interdisciplinary learning environments within traditional discipline-based programmes new and often challenging kinds of literacy, pedagogy and assessment are needed. There are often mis-matches in understanding and expectation around the skillsets that are developed and how they are assessed due to the lived experience being different in comparison to disciplinary learning. Such a challenge requires co-ownership from staff and student to ultimately be meaningful and sustainable, we must collectively ‘practice interdisciplinarity’ as much as we practice disciplinary.

This paper will share the journey that Cardiff School of Art & Design has undertaken to build a thematic and project-based interdisciplinary curriculum within a traditional Art & Design school within which we ‘practice interdisciplinarity’: encouraging the development of a lived experience of interdisciplinary knowing and doing. I will share how we have developed an interdisciplinary curriculum which facilitates the integration of conflicting viewpoints across disciplines and the connections between ideas. Highlighting in particular the creation of problem-based and thematic learning environments (de Greef, *et al.* 2017) and building upon the premise of Citizen Scholarship (Arvanitakis & Hornsby, 2016) to aid in the development of interdisciplinary cognitive skillsets. Finally, I will explore how we have more recently been developing assessment and feedback processes which aim to highlight and promote the cognitive, interpersonal, cultural and literary skills required of interdisciplinary learning.

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David is an inter- and transdisciplinary researcher, practitioner and academic. Initially trained in Design he has expanded his skillset and interests across philosophy, anthropology, archaeology and the cognitive sciences. With 10 years of experience working within interdisciplinary learning and teaching and research contexts he has developed an approach to inter and transdisciplinary learning and teaching for undergraduate, postgraduate and doctoral level study. He is currently Associate Dean: Student Engagement at Cardiff School of Art & Design, Cardiff Metropolitan University and co-convenes the Transdisciplinary Research community Metatechnicity Research in Cardiff School of Art & Design: <http://metatechnicityresearch.net/>

Workshop Meaningful assessment in interdisciplinary education

Linda de Greef, and Debby Gerritsen, University of Amsterdam

As a university teacher, you are faced with the challenge of student assessment on a daily basis. Developing a good assessment method that stimulates the learning process of students can be a time consuming and puzzling task, possibly even more so with more complex or skills-oriented learning outcomes that are common in interdisciplinary programmes.

In the first part of this workshop we demonstrate inspiring assessment practices that cover some of the most important skills that foster interdisciplinary understanding such as integration, collaboration, critical thinking and reflection & meta-cognition. Many of the practices use feedback to students in a meaningful and powerful way. For example we show an authentic assessment method to help you give feedback on the students' ability to integrate new knowledge and cooperate with diverse stakeholders and an example of an assessment form where students develop a grading rubric. In this way students are encouraged to take ownership over their own learning.

In the second part of this workshop, we will use a brainwriting exercise to find opportunities to assess skills as integration, collaboration, critical thinking and reflection in your own teaching practice. This workshop will serve as a foothold to empower students to be independent self-assessors.

Set-up of the workshop

- Welcome and getting to know each other

- Overview of skills that foster interdisciplinary understanding
- Examples of assessment methods that foster interdisciplinary understanding
- Brainwriting exercise on how to assess Integration, Collaboration, Reflection
- Discussion and take-aways

About the Institute for Interdisciplinary Studies

The Institute for Interdisciplinary Studies (IIS) is the University of Amsterdam's knowledge centre for interdisciplinary learning and teaching. It develops new courses in collaboration with the faculties. The IIS has more than fifteen years' experience in interdisciplinary education and continuously develops substantive education innovations with an interdisciplinary character. The Institute identifies new themes and issues linked to current developments in academia and society.

Debby Gerritsen is a senior lecturer at the bachelor's program of Interdisciplinary Social Science and the interdisciplinary Research Master Social Sciences at the University of Amsterdam. She is specialized in developing interdisciplinary and transdisciplinary research projects for students in which she combines her expertise on research methods and interdisciplinary and transdisciplinary education.

Linda de Greef is program manager at the Institute for Interdisciplinary Studies at the University of Amsterdam. She is an experienced advisor and administrator within higher scientific education. She is specialized in interdisciplinary and transdisciplinary learning and teaching, vision and strategy development, innovation and development, and the professional development of interdisciplinary teaching skills.

New Forms, New Features; Changing Structures of Interdisciplinary Curricula –

Rafe Hallett and Filippo Nereo, Keele University

We will set the scene (10mins) in this workshop by reviewing the diverse curriculum structures that have emerged over the last 5 years in UK interdisciplinary education. Referencing the rise of differently nuanced Liberal Arts programmes, we will nonetheless focus here on curriculum structures that experiment beyond the 'programme' level of design: institutional initiatives in interdisciplinary 'discovery themes', 'elective pathways' and teaching colleges, centres and units that foreground trans-disciplinary routes for student learning. What are the pedagogic forms and features if this trend, and how far should we expect the trend to grow and evolve in a context where interdisciplinary education is still poorly served by governance and conventions?

In the second, interactive section (10 minutes), we will gather case studies from delegates of interdisciplinary curriculum structures that have emerged (or are being designed) in their HEIs. There will be room for participants to raise the questions of strategy, governance and policy that enable or problematise interdisciplinary forms of provision.

In the final, interactive section (15minutes), we will publicise an online platform dedicated to featuring and exploring these new forms of curriculum design across the UK: the AdvanceHE Connect 'interdisciplinary education network', hosted at Keele University but open to editors and contributors from across the HE sector. Legacy for delegates will be ensured by their agreement to join and contribute to this innovative online community.

The 'question time' (5 mins) will enable delegates to define particular modes of contributing to the AdvanceHE Connect platform, and pitch ideas for case studies, news stories, scholarly reports and webinars on aspects of interdisciplinary education.

Embedding Undergraduate Research as Interdisciplinary Pedagogy

Kirsten Harris, Gavin Schwartz-Leeper, Lauren Bird, Bryan Brazeau, University of Warwick

This workshop uses the Liberal Arts degree programme at the University of Warwick as a case study to explore the value of embedding advanced undergraduate research as a pedagogical tool for interdisciplinary learning and understanding. The Liberal Arts programme at Warwick is structured around a model of problem-based learning which asks students to craft active, critical responses to real problems—both those observable in the contemporary world and those that emerge from the conflicts and clashes of great ideas. Underpinning this model is the rigorous development of the skills and strategies needed for flexible advanced undergraduate research across disciplines.

From first year modules in quantitative and qualitative research methods to an extended one-year final dissertation project, primary and secondary research methodologies are woven into the fabric of the degree programme. In their very first year students build a toolkit of foundational primary and secondary research skills, such as conducting interviews, using archives, exploring different creative expressions and, from a quantitative perspective, collecting, analysing and interpreting different types of data.

This understanding of the process of knowledge construction allows students to move flexibly between modules in different departments across the University, conduct primary research, make original contributions in class and assessments, and produce innovative work that is intentionally interdisciplinary. Moreover, it also encourages students to occupy a liminal space, one between disciplines, that enables them to learn the limits of their own understanding and the tools they have at hand, encouraging them to identify expertise in others and take leadership roles in drawing out the knowledge of their peers.

Crucially, undergraduate research is utilised as a resource for collaborative, student-led learning in all core and optional Liberal Arts modules. In weekly seminar preparation and assessments, students are asked to be co-producers of knowledge and work in groups to produce collaborative responses to the problem at hand. In doing so, students combine their individual interests and areas of academic expertise, opening up the curriculum to possibilities outside individual staff interests.

During the first 15 minutes, each of the four Liberal Arts members of staff will discuss how they embed undergraduate research as a pedagogic approach to foster interdisciplinarity in core and optional modules. We will reflect on our experience of integrating undergraduate research as a foundational principle into a degree programme which progressively builds skills for interdisciplinary and collaborative learning from first to final year.

In the remaining 25 minutes, we will facilitate workshop-style group discussion in which participants will explore how undergraduate research could be embedded in different kinds of interdisciplinary programmes. Participants will have the opportunity to share their experiences and ideas for best practice around the following topics: i) integrating undergraduate research in weekly seminars; ii) undergraduate research and assessment strategies; and iii) programme design, including course outcomes and university strategy.

Learning from Each Other through Design Thinking

Bo Kelestyn, Rebecca Freeman, Luke Netherclift, Giacomo Bottoli, Celine Nithila-George, Johannes Pittgens, University of Warwick

A recent Wonkhe article highlights the value students place on universities being able to identify and solve problems that are 'felt viscerally' by the student body (Dickinson, 2020).

It illustrates how the dynamic of student engagement with their education and University is transforming, not least due to increased diversification of student cohorts (Mercer-Mapstone and Bovill, 2019), demanding more participatory approaches where all parties can be equal partners in engaged learning (Healey et al., 2014).

New tools for decision making, problem solving, and ideation have been created in the business and digital realms to reflect the complexity and uncertainty brought about by the accelerated levels of innovation and change, which old management tools could no longer speak to (Ries, 2011). These tools are also relevant to the higher education context. Applying Design Thinking, one of these new tools, to student engagement proposes new and exciting areas of student experience innovation and research (Dunne, 2016).

Used for student engagement, design thinking allows to create a new space outside of the formal structures of the University and the Students' Union, and tensions associated with these structures. This workshop will focus on the Warwick Secret Challenge (WSC), a model based on design thinking principles, which reimagines student engagement and creates a number of distinct affordances including increased diversity, student engagement in innovation and research, active creativity around policy and experience design and skills development. Through this workshop we hope to put design thinking on the map from which new ideas and insights are developed to innovate higher education. During the workshop we will reflect on the initial and emergent design of the WSC and its impact, reveal and share elements of the WSC that participants can take away with them and apply in their home institutions.

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Potential Additional Paper:

[Design of Microcontroller Based Interdisciplinary Activity for First-year Students in Engineering at Warwick University – A Pilot Study.](#)

Samuel Agbroko, Gill Cooke and Christos Mias

The School of Engineering at the University of Warwick offers many engineering degrees, such as Civil, Mechanical, Electrical and Electronic, and General Engineering, which have common modules in the first year and the first term of the second year. This means students have to study modules outside their chosen discipline, e.g. mechanical engineering students would need to study modules in electronics engineering. Such structure is intended to help students develop competencies beyond their disciplines that would be required to give them a competitive advantage in the engineering field which increasingly becomes more integrated as the engineering problems become more complex. A challenge for University teachers is to develop learning environments in their modules so students appreciate the need for skills across various disciplines in the engineering practice. To address this challenge we argue that modules in engineering should contain engaging interdisciplinary activities which by their nature highlight the need for acquiring knowledge across disciplines.

In this pilot study, we designed a set of interdisciplinary laboratory activities, based on the Arduino microcontroller, to enable first-year engineering students to acquire both subject knowledge and understanding and key skills such as communication skills and social competences beyond their specific disciplines. The lab activities are 2 hours in duration and students take part in three sessions over three weeks. The tasks in each session requires

students to work in pairs. Students build a simple pendulum and incorporate the electronics required to measure the period of oscillation and find the acceleration due to gravity. The activity was designed to ensure that skills in several engineering disciplines were required to complete the problem-solving design task. At the end of the laboratory sessions, students are required to take part in a reflective session to discuss the relevance of the skills they have acquired from the various modules/disciplines to complete the design task.

This paper describes the microcontroller tasks and summarises student feedback in relation to our assertion that this interdisciplinary approach to teaching in engineering can improve the students perspective of integrated engineering and emphasise the need for teaching modules of different disciplines.

Dr Samuel Agbroko is a Teaching Fellow with the Electrical Electronics Engineering stream at the School of Engineering, University of Warwick. He received a BEng degree in Mechanical Engineering from the University of Benin, Nigeria and an MSc degree in Mechanical Systems at the University of Warwick in 2013. His PhD research was in electronics engineering and focused on the emerging gas sensor technologies. His research interests include the design of embedded systems, artificial intelligence and pedagogy of these subject areas.