

National Centre for STEM Education

NEWSLETTER

December 2022

2022 was a year like no other for STEM Education in EPI•STEM. We were back in-person in the Centre and collaborated on delivering an ambitious strategic action plan for the year.

EPI•STEM is a UL hosted research centre located in the School of Education at the University of Limerick dedicated to the Continuing Professional Development [CPD] of STEM teachers – making a research-led difference in the development of all STEM teachers and their students in secondary schools in Ireland while continuing to publish research in top ranking international journals [UL Wisdom for Action Research Strategy 2022-2027, page 30].

In 2022, we hosted a number of successful conferences at the Centre, reported here in this Autumn Winter 2022 Newsletter, a policymakers conference in January 2022, a first ever national conference of researchers in mathematics education, five research seminars for science educators along the west coast, a STEM education conference with engineering and technology educators, a science teacher educator conference in partnership with the Bernal Institute, a science teachers conference and a math open day for students in local schools.

We are delighted to report another intake for the PDMT programme [2023-2026] and to now have a vibrant on-line ACADEMY OF STEM TEACHERS on the EPI•STEM website [1,000 STEM teachers registered to date]. Teachers can access 110 podcasts and interactive simulations in topics of interest in science and mathematics education in 2022 and in engineering and technology education in 2023. Thanks to the HEA Performance Fund.

A special word of thanks to our colleagues in the School of Education, our EPI•STEM Affiliates in the wider UL community, to our adjunct advisors, Professor Sibel Erduran, University of Oxford and Professor Merrilyn Goos, University of Sunshine Coast, Australia, Dr. Peter Childs and Emeritus Professor John O'Donoghue, Helen Fitzgerald, Executive Administrator, EPI•STEM and Daniel Casey and Martina Ryan for their administrative support with numerous outreach activities throughout the year.

As Director of EPI•STEM, there is a felt sense of accomplishment in the team as we approach the close of 2022. A year made even more special for me in recent days with an invitation to the honorary conferring in UCD of Professor Michael Apple on 5 December 2022, for his outstanding contribution to critical studies in education, and his continued research in the ongoing pedagogical struggle for democracy and democratic education.

Invitation to the Honorary Conferring of Professor Michael Apple in UCD. From L to R: Dr. Geraldine Mooney Simmie, Professor Kathleen Lynch, Professor Rima Apple, Professor Michael Apple and Professor Dympna Devine.



www.epistem.ie

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PDMT Programme in EPI•STEM

The *Professional Diploma in Mathematics for Teaching* [PDMT] is the flagship academic programme at the heart of EPI•STEM and is recognised at national policy level and internationally as a unique and innovative design for upskilling out-of-field mathematics teachers. The PDMT programme is a fully funded programme by the Irish government, a partnership with seven HEIs and managed by the University of Limerick. It is a level 8 academic programme to upskill out-of-field mathematics teachers in Ireland and receives academic accreditation through the School of Education at UL. All graduates of the programme achieve registration as fully qualified mathematics teachers by the teachers' professional regulatory body, the Teaching Council of Ireland.

UL has successfully won the competitive bid for leading and managing this complex national programme every year since 2012. 1,078 students graduated in the first version [PDMT V1] from 2012 to 2019. PDMT Version 2 is currently underway with 310 students in two class groupings. We are currently recruiting a third cohort starting in January [2023-2026]. The PDMT Course Board includes Dr. Geraldine Mooney Simmie, Dr. Niamh O'Meara, Helen Fitzgerald and two specialist project posts, a National Coordinator (Gemma Henstock) and National Administrator (Tracey O'Connell).

Tracey O Connell National PDMT [Administrator](#)

Tracey graduated in 2018 as a post-primary technology teacher from UL before continuing on to complete her Masters by Research in UL. Tracey worked in the EPI-STEM Centre from 2018-2021 as the WISTEM2D programme co-ordinator and also as a research assistant to the HEA funded project focused on upskilling science and mathematics post-primary teachers. While working in EPiSTEM, Tracey was on the School of Education Equality and Diversity Committee and worked on various outreach STEM Education projects such as SFI funded STEMChAT and the DES Gender Systematic Initiative Literature Review. Tracey has worked in Human Resources as an administrator since leaving EPI-STEM where she was the main point of contact in the pensions' team. Tracey's research interests lie in STEM education, particularly the gender imbalance in STEM education that continue to date. Tracey is a highly accomplished administrator and now holds the specialist post of National Administrator of the PDMT programme where she liaises with students, local lecturers and tutors on the programme and works on a variety of tasks to assure quality management.



Gemma Henstock National PDMT [Coordinator](#)

Gemma Henstock completed a BSc (Honours) in Mathematics in the University of Northumbria, UK in 2012 and despite having an interest in teaching and learning, her enthusiasm for statistics led her to pursue a career in industry. Gemma worked at the healthcare company Johnson & Johnson from 2012 to 2020 in a variety of quality assurance roles based across various healthcare sites within Europe.

In 2020, Gemma decided to leave industry to pursue her love of developing others going on to complete her Professional Masters of Education in Mathematics at the University of Limerick.

Gemma is extremely passionate about mathematics and sharing this with others and is hoping to undertake a PhD in 2023. This will focus on developing a model of knowledge for teaching mathematics for understanding. Her research interests include teaching mathematics for conceptual understanding and highlighting the usefulness of mathematical applications.

PhD Graduations in Mathematics Education

In August 2022, three EPI•STEM doctoral students graduated from the University of Limerick. Dr Kathy O'Sullivan was conferred having submitted a thesis entitled *Investigating pre-service teachers' knowledge of numeracy and their ability to teach numeracy for disciplinary learning*. Dr Stephen Quirke investigated EPiSTEM's flagship PDMT programme with his thesis entitled *A performative lens on the mathematics-related teacher identities of out-of-field mathematics teacher-learners*. Finally, Dr Jillian White's thesis was entitled *A reimagined approach to professional development for Irish mathematics teachers*. Each student had a supervisory team made up of key personnel within EPiSTEM. Adjunct Professor Merrilyn Goos was on the supervisory team for all three, EPiSTEM Deputy Director Dr Niamh O'Meara was on the supervisory team for Dr O'Sullivan and Dr Quirke, while EPiSTEM affiliate Dr Patrick Johnson was part of Dr Jillian White's supervisory team.



Dr Stephen Quirke, Dr Niamh O'Meara and Dr Kathy O'Sullivan

EPiSTEM Summer Schools

During the summer break EPiSTEM hosted the Career Mathways Summer School. Career Mathways is an SFI funded research and outreach project which explores how a range of professionals use mathematics in their jobs on a daily basis. During phase one of the project 13 STEM Ambassadors were interviewed including Met Eir-eann's Joanna Donnelly, RTÉ Sports Journalist Jacqui Hurley and *Making a Murder* Lawyer Dean Strang and each spoke about how mathematics was critical to everything they did in their professional lives. During phase two of the project a further four STEM Ambassadors were interviewed, including an Eir Technician, a firefighter, a master brewer from Diageo and former CEO of the HSE Paul Reid. A key component of phase 2 of the study was the inaugural Career Mathways Summer School which took place from August 12th – 14th. 14 teachers from 13 schools across all four provinces attended and developed their own knowledge and understanding of the prevalence of mathematics in a variety of careers. Based on the STEM Ambassador interviews the teachers were able to explore mathematics in the work of the four new STEM Ambassadors and designed a series of lesson plans and resources based on their findings. The resources developed are currently being rolled out to all 13 schools and students are now busy conducting interviews with people in their local community to see how they use mathematics on a daily basis. For more information on Career Mathways you can contact the principal investigator Niamh O'Meara at niamh.omeara@ul.ie

NALA Report

During Maths Week 2022, the National Adult Literacy Agency [NALA] published a report entitled *Numeracy Definition Report: A report on adult learner's understanding and conceptualisation of numeracy*. EPISTEM's Deputy Director Dr Niamh O'Meara was the lead author of this report, with EPISTEM alumni Dr Fiona Faulkner, Dr Mark Prendergast, Dr Kathy O'Sullivan and Professor Merrilyn Goos acting as co-authors.

This report set out to discover adult learners' understanding of numeracy to support the development of a working definition for numeracy in Ireland. It also sought to determine how the Common European Numeracy Framework (See www.cenf.com) could be used or adapted to represent adult learners' conceptualisation of numeracy. The main finding to emerge from this study was that adult learners have a very narrow and limited understanding of numeracy. The report highlights problems similar to those identified internationally in relation to difficulties distinguishing between numeracy and basic mathematics. In addition to this the report found that while confidence and self-belief are at the heart of the CENF framework many adult learners in this study only associated negative dispositions towards the concept of numeracy,

with many indicating that they were suffering from mathematics anxiety. The authors concluded, based on the series of interviews conducted as part of this study, that this was a direct result of their school experience of mathematics.



EPI•STEM CONTRIBUTES TO NATIONAL STEM EDUCATION POLICY

The role of EPI•STEM as a national policy actor came into play when the Department of Education and Skills [DES] announced their intention in December 2021 to update the current national policy statement [STEM Implementation Policy Statement 2017-2026]. On the 18th January 2022, [EPI•STEM](#) hosted a UL Policy Forum that was well attended by STEM faculty across campus and colleagues from the School of Education. Our aim was to write a collaborative EPI•STEM submission for this STEM Policy 2022-2026. Subsequently, the Director of EPI•STEM attended one of the national focus groups organised by the DES in order to update the most recent version of the policy statement.

EPI•STEM CONTRIBUTES TO STEM EDUCATION RESEARCH

MATH, SCIENCE, ENGINEERING & TECHNOLOGY EDUCATION

EPI•STEM and the School of Education are uniquely positioned to make inroads into STEM education in Ireland. We are the only higher education institute with all of the STEM subject disciplines in Initial Teacher Education. We are leading national partnerships and working well as partners in other research-led CPD projects. In 2022, we ran a number of highly successful STEM researcher seminars and



conferences to build on our current momentum, to offer support to new researchers and to welcome international STEM educators.

EPI•STEM hosted a **STEM Education Research Seminar** entitled 'Engaging with Evidence Based Practice in STEM Education' on Thursday 22 September 2022, 10am to 2pm in our conference facility.

The seminar was led by Dr. Jason Power, a lecturer in technology and engineering education in the School of Education and included Professor Erik Hulthen from Chalmers University of Technology, Sweden, a partner in this EU Erasmus R&D project entitled 'Enhancing STEM Education'.

On the morning of 13th October 2022, we held a **Science Teacher Educator Conference** at EPI•STEM in collaboration with Dr. Sarah Hayes and the Bernal Institute, welcoming members from an SFI funded ESAT project on inclusion in science education. Dr. Geraldine Mooney Simmie presented on the outreach activities of EPI•STEM, Dr. Regina Kelly, Lecturer in Science Education (School of Education) outlined the Initial Teacher Education programmes in Science Education in SoE and Dr. Deirdre O'Neill shared information about the OT-TER project, a Horizon 2020 project in relation to inclusive science education at SoE. Attendance included science teacher educators from Georgia and Bosnia-Herzegovina.

On the afternoon of 13th October 2022, we held the **First Mathematics Education Researcher Conference** at EPI•STEM from 1pm to 4pm. The Conference had a number of presentations, including a keynote address by Adjunct Professor Merrilyn Goos from the University of the Sunshine Coast, Australia, Professor Hamsa Venkat, the Chair of STEM Education at DCU, Aisling Leahy, MIC and Dr. Niamh O'Meara, Lecturer in Mathematics Education (SoE) and Deputy Director, EPI•STEM.



EPI•STEM OUTREACH TO STEM TEACHER PROFESSIONAL BODIES AND SCHOOLS

We were invited to attend a number of conferences held by STEM teacher professional bodies in Ireland, including conferences by the ISTA, IMTA, and the IAMTA. On Saturday, 15 October 2022, research & development officers from EPI•STEM introduced the on-line CPD HEA-funded project to chemistry teachers at their annual CHEM-ED Conference in TUS, Moylish (10.30am to 11.am. Presenters included Dr. Geraldine Mooney Simmie, Tara E. Ryan, STEM Researcher at EPI•STEM and Martha Cosgrove, an R&D officer. On Tuesday, 18th October, schools in Limerick city took part in a Maths Week seminar held at EPI•STEM.

SCIENCE EDUCATION RESEARCHERS ALONG THE WEST COAST



In 2022, EPI•STEM in consultation with its international science education advisory group - led by the Director [Dr. Geraldine Mooney Simmie], Adjunct Professor Sibel Erduran [University of Oxford] and Emeritus Dr. Peter E. Childs, Director of CERC - designed a new cultural and contextually sensitive research-led development in *Science Education Along the West Coast*, EPI•STEM Science EDNeT [<https://epistem.ie/events-view/epistem-science-ednet-science-education-reading-group-along-the-west-coast>]. EPI•STEM Science EDNeT is a reading group for all interested science educators, researchers and EPI•STEM Associates in science education in the School of Education, across the UL campus and in HEIs along the West Coast [St. Angela's College, Sligo; MIC, NUI Galway, LIT and UCC].

EPI•STEM Science EDNeT research seminars held five meetings in 2022, at the Centre and on-line in order to showcase the published research work of members of the group. This research-led project aims to build new synergies and networks of science education researchers with the aim of deliberately building capacity through EPI•STEM to apply for more ambitious STEM and science related competitive research funding bids, nationally and internationally. The following list includes links to the items discussed to date:

Edling, S., & Mooney Simmie, G. (2022). What might it mean for STEM Teacher Education? Routledge (London) invited us to make short videos to accompany our book **Democracy and Teacher Education (2020)**: <https://www.routledge.com/go/exchanges-with-authors-silvia-edling-and-geraldine-mooney-simmie-democracy-and-teacher-education>

Hourigan, M., O' Dwyer, A., Leavy, A.M. and Corry, E. (2021). Integrated STEM - A step too far in elementary education contexts? *Irish Educational Studies*, DOI: 10.1080/03323315.2021.1899027 <https://www.tandfonline.com/eprint/NUQXTCQDTPJTE3ZK6ZFR/full?target=10.1080/03323315.2021.1899027>

Murphy, D., & O'Flaherty, J. (2021). Addressing Education for Sustainable Development in the Teaching of Science: The Case of a Biological Sciences Teacher Education Programme. *Sustainability*, 13, 12028. <https://doi.org/10.3390/su132112028>

Dr Audrey O'Grady: Adapting interactive hands-on STEM engagement in schools outreach to remote online live interactions ([link to PDF of poster](#))

Dr Sarah Carroll: Practice makes progress: an evaluation of an online scientist–student chat activity in improving scientists' perceived communication skills. <https://doi.org/10.1080/03323315.2021.1915840>

HEA PERFORMANCE FUND: SMART CLASSROOMS AND INTERACTIVE SIMULATIONS

In 2019, The Higher Education Authority awarded €350,000 in performance funding to EPI•STEM, based on a review of Research Impact Assessment Case Studies submitted by all HEIs in Ireland. This successful funding bid was written by Professor Merrilyn Goos, former Director of EPI•STEM. Dr. Geraldine Mooney Simmie is the Principal Investigator.

The project supports a research-led team and an administrator to provide high quality CPD resources for science and mathematics teachers in post-primary schools in Ireland. The research team includes the Director and Deputy Director of EPI•STEM, two former postdoctoral researchers, one current postdoctoral science education researcher, an administrator, a STEM research assistant and a number of Research & Development officers.

The aim of this contextually sensitive and research-led project is to support the CPD of all science and mathematics teachers in Ireland. At the very same time, it assures the continuation of EPI•STEM as a priority research centre in STEM education by building on the Centre's wealth of expertise in upskilling out-of-field and in-field STEM teachers.

To date we have 1,000 registered Science and Math teachers in post-primary schools in Ireland and the EPI•STEM website continues to register new STEM teachers on a daily basis. The project aims to support the pedagogical repertoire of teaching young people for understanding and making a difference in the world. This new Academy of STEM Teachers is currently supported by 110 newly designed podcasts in science and math topics – in electricity, physics of light, viruses, electronegativity, interactive simulations in physics, chemistry of the atom, electronegativity, lab management, ecology, photosynthesis, financial maths, calculus, and trigonometry and through the publication of five booklets in science education [see below]. We continue to register science and math teachers and will be issuing an invitation to engineering and technology teachers in spring 2023.

EPI•STEM-HEA team: Geraldine Mooney Simmie, Niamh O'Meara, Merrilyn Goos, Stephen Comiskey, Ciara Lane, Tracey O'Connell, Vo Van De, Tara E. Ryan, Martina Scully, Jack Nealon, Daniel Casey, Keith Kennedy, Annette Forster, Céren O'Connell, Martha Cosgrave, Martina Ryan, Veronica Ryan, Gemma Henstock

EPI•STEM ON-LINE CPD RESOURCES: SCIENCE & MATHS TEACHERS

RESEARCH-LED OUTREACH INITIATIVE BETWEEN EPI•STEM, PDMT & HEA PERFORMANCE FUND

TO REGISTER: contact Helen.Fitzgerald@ul.ie

UNDERPINNING PHILOSOPHY: reflective teacher learning, student-centred, inquiry-oriented, research-informed, deep learning

PEDAGOGIES: flexible learning, resource rich, use of simulation, animation etc.

EVALUATION: feedback through surveys, interviews and conferences



EPI•STEM Science Booklets

Science Teacher Learning for Imagination and Sustainability, EPI•STEM-HEA CPD resource, THE PHYSICAL WORLD & PHYSICS ISBN: 9781911620518

Science Teacher Learning for Imagination and Sustainability, EPI•STEM-HEA CPD resource INTRODUCTION TO EARTH AND SPACE SCIENCE ISBN: 9781911620549

Science Teacher Learning for Imagination and Sustainability, EPI•STEM-HEA CPD resource,

THE CHEMICAL WORLD & CHEMISTRY ISBN: 9781911620532

Science Teacher Learning for Imagination and Sustainability, EPI•STEM-HEA CPD resource, THE BIOLOGICAL WORLD & BIOLOGY ISBN: 9781911620525

Science Teacher Learning for Imagination and Sustainability, EPI•STEM-HEA CPD resource ECOLOGY- A STUDY OF THE RELATIONSHIP BETWEEN ORGANISMS AND THEIR ENVIRONMENT ISBN: 9781911620501

To find out more about the project: <https://hea.ie/funding-governance-performance/managing-performance/institutional-stories-of-impact/university-of-limerick/>



Dr. Vo Van De is a research fellow in science education at EPI•STEM - National Centre for STEM Education, working on the HEA Performance Fund for developing new on-line CPD resources for post-primary school science teachers in Ireland.

Vo served several years in research and teaching in Physics Education at the An Giang University - Vietnam

National University in Ho Chi Minh City. In 2022, he graduated with a PhD in Educational Studies from the University of Szeged (Hungary). His interests lie at the intersection of science education and assistive technology in education.

Vo is passionate about inspiring science teachers and students in their learning of science in enjoyable and problem-posing environments, particularly through the application of technology and an ICT-enhanced focus to active pedagogies. He is currently interested in applying artificial intelligence (AI) in education to support personalized teaching and learning with focusing on formative assessment in digital environment.

Vo Van De has published his findings in the top high-ranked international journals in the field of science education and psychology of education. His papers explore how scientific reasoning skills can be applied to science classrooms in new and ground-breaking ways [see below].

In the HEA funded on-line CPD project, Dr. Vo Van De designed and developed an original package of interactive simulations - in linear motion, velocity and acceleration, forces and Hooke's Law - in order to encourage ICT-enhanced inquiry-based learning approaches to physics teaching with young people in junior cycle. This package of original resource materials, includes a senior cycle interactive simulation of electromagnetic induction, and is accompanied by details lesson notes and teacher guidance.



My name is Daniel Casey. I have been working as part of the EPI•STEM team as the national administrator of the HEA funded CPD project for maths & science teachers. My background is in business and languages. I have a bachelor's degree in international business at

DCU and spent time working and studying abroad in Spanish speaking countries. My interests include languages, politics, sport, and music. After completing my postgrad in Digital Marketing at TUD, I joined the team at EPI-STEM where I have enjoyed honing my administration skills and being faced with diverse and exciting challenges that the different roles bring. I have mostly enjoyed being a key part of the project developing the CPD materials for Irish STEM teachers. The quality of the materials produced by the researchers has been very gratifying after all the hard work the team has put in and the positive response from the math and science teachers who have engaged with the materials so far.



Left to Right: Geraldine Mooney Simmie, Vo Van De, Tracey O'Connell, Tara E. Ryan and Helen Fitzgerald.

Interactive Simulations: Science Teaching & Learning 

Science teachers and students are invited into a digital environment to run the experiments using QR codes on their computer screens and i-phones and draw the graphs in real time. Interactive simulations support SMART classrooms and allow teachers and students in post-primary schools in Ireland better access to physics teaching for understanding.

Journal articles

Van Vo, D., & Csapó, B. (*in press*). Exploring inductive reasoning, scientific reasoning and science motivation and their interaction with a parent involvement variable in predicting STEM achievement across grade levels. *International Journal of Science and Mathematics Education*.

Van Vo, D., & Csapó, B. (2022). Measuring inductive reasoning in school contexts: A review of instruments and predictors. *International Journal of Innovation and Learning*, 31(4):506 – 525. <https://doi.org/10.1504/IJIL.2022.123179>

Van Vo, D., & Csapó, B. (2021). Development of scientific reasoning test measuring control of variables strategy in physics for high school students: evidence of validity and latent predictors of item difficulty. *International Journal of Science Education*. 43 (13), 2185-2205. <https://doi.org/10.1080/09500693.2021.1957515>

Van Vo, D., & Csapó, B. (2021). Exploring students' science motivation across grade levels and the role of inductive reasoning in science motivation. *European Journal of Psychology of Education*. 37(3), 807–829. <https://doi.org/10.1007/s10212-021-00568-8>

Van Vo, D., & Csapó, B. (2020). Development of inductive reasoning in students across school grade levels. *Thinking Skills and Creativity*, 37(2020), 100699. <https://doi.org/10.1016/j.tsc.2020.100699>

Tara E. Ryan is a graduate of the School of Education at UL, having complete a Bachelor of Science Education degree in chemistry and physics education. after graduating, Tara stayed in UL and completed a Master of Science degree in biomedical device materials. In 2022, Tara joined the EPI*STEM team as a STEM Researcher with the HEA performance fund project. She has worked with the research and design team in science education to design and bring to completion a number of on-line

CPD resources for science teachers in post-primary schools, in topics, such as, electrochemistry, the chemistry of the atom, lab management, the physics of light, interactive simulations, sound and waves, photosynthesis, ecology and earth and space. Tara will start a PhD in pure physics in January 2023 in UL.

EPI•STEM AND INDUSTRY LINKS

EPI•STEM continues to build productive links with industry and to work with industry to innovate and reimagine new ways to support inquiry based approaches to STEM Education, for outreach activities to schools and cognisant of the policy on the continuum of teacher education (Teaching Council, 2018) - to connect pre-service teachers and experienced teachers with the university and with industries.

Our industry link contact in EPI*STEM is Helen Fitzgerald, Senior Executive Administrator Helen.Fitzgerald@ul.ie

In 2022, we became partners with DCU in a new STEM Internship project that provided opportunities to all STEM student teachers at the School of Education to apply for a three-month paid internship in a STEM related industry in Ireland.

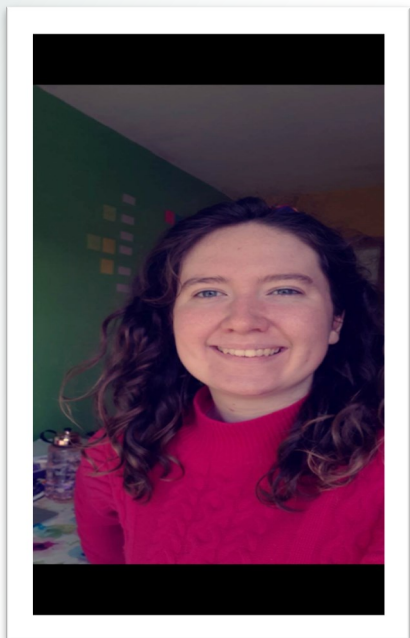
The STEM Teacher Internship (STInt) Programme was founded in DCU in 2016 and has 177 STInt Alumni to date. STInt is aimed at Student & Early Career Primary and Secondary STEM Teachers from DCU, TCD, UCD, UCC, University of Limerick, University of Galway, and MU.

In the first roll out in summer 2022 EPI•STEM secured five internship places for undergraduate students to work in Boston Scientific, ESB, Astellas, MSD and Ericsson.

Recent EPI•STEM seminars on STInt, facilitated by Helen Fitzgerald were well attended by interested students and introduced Katie Keogh, Strategic Programme Manager STEM Teacher Internship (STInt) Programme, Centre for the Advancement of STEM Teaching and Learning (CASTeL), Dublin City University and Dr. Jennifer McKenna, European Research Manager, Intel Ireland and STInt Industry Liaison.

The UL students heard from Paul Scally who recently graduated from the Bachelor of Technology (Education) in Materials and Engineering Technology about his experience in Ericsson and James Campion a final year student on the PME of Education with Science spoke about his summer internship experience in the ESB.

UL STEM students can [Register here](#) to join the STInt mailing list to receive the application link when it opens in January 2023. For further information about this CASTeL-EPI•STEM partnership contact Helen Fitzgerald, EPI•STEM at Helen.Fitzgerald@ul.ie





In the past month a European funded project that aims to support the use of evidenced based practice within University STEM delivered a professional development workshop within the EPI-STEM centre. This event saw leading academics from Germany and Sweden in attendance. This workshop is one of the first outputs from this multi-year project that is led by UL, and in partnership with North Rhine-Westphalia Technical University of Aachen and Chalmers University of Technology. Both European partner Universities are renowned for their STEM degree programs and have expressed a desire to continue their strategic partnership with our University. This is a potentially valuable opportunity for those of us who wish to increase our international networks and collaborations. Future events will include professional networking opportunities where we hope to partner STEM educators with researchers from a social science background. We will also be launching an open and free digital short course, collated database as well as a range of practitioner resources.

These resources are designed to support university lecturers who have no formal background in education, but who wish to include evidenced based practice and potentially research their own practice. The final launch of all resources and research outputs associated with the project is scheduled for September 2023. Further communications will be circulated at faculty level at a closer date. If you are interested in attending any future event, or would like to collaborate as we prepare to submit a future capacity building EU grant, please contact Jason.power@ul.ie

ENGINEERING AND TECHNOLOGY EDUCATION

BY DR. KEELIN LEAHY



Funded by the
Erasmus+ Programme
of the European Union

PROJECT TITLE: Integrated Approach to STEM Teacher Training

Summary of the project:

There are two challenges that face the STEM subjects at school in Russia, India and Kazakhstan. These include the **low interest to STEM subjects** at school, as a result the average grade in STEM subjects is very low; **not all places in STEM programs is filled at university level.**

This project aims to address these challenges, to meet the needs of knowledge economy in high quality STEM specialists in Russia, India and Kazakhstan, by increasing the number of young people choosing the STEM career routes.

Through this project we will **promote students' interest to STEM subjects by introducing an integrated approach to Master teacher training program.** This will be achieved through retraining school and university teachers in new methods and to set up STEM centers at

each university which would provide training and methodical resources for a specific region and help organizing extra-curricular activities at high schools (by providing instructions how to do it and ambassadors to implement it).

AIMS:

- To enhance quality of STEM Teacher training in line with Bologna provisions and needs of knowledge economy.
- To meet the needs of knowledge economy in high quality STEM specialists in Russia, India and Kazakhstan by increasing the number of young people choosing the STEM career routes

Objectives:

- To develop STEM Teacher Training Master programs based on an integrated approach
- To train teachers in new skills
- To set up STEM regional resource centers
- To introduce high-quality flexible extra-curricular STEM activities on a regular base
- To raise awareness of a wider public of STEM activities
- To produce high-quality deliverables on time

Project Outputs:

Now at the near completion we have achieved the majority of the project outputs, including:

- the establishment of four integrated master curriculum Msc STEM programmes,
- facilitated over twenty workshops,
- disseminated a STEM Handbook detailing the National STEM policies and practices for six countries,
- developed a STEM atlas for STEM career routes,
- disseminated new skills for key participants,
- developed STEM education T&L resources,
- facilitated eight inter-project coaching sessions, and
- hosting a final conference (6th January 2023).





Concepts in the Teaching of Photosynthesis: A Literature Review 2000-2021. *Higher Education of Social Science*, 21 (2), 1-11. DOI: 10.3968/12304.

Mooney Simmie, G. & Sheehan, C. (2022). The positioning of moral leadership in primary education: perspectives and contextual understandings of school principals in Ireland. *International Journal of Leadership in Education Theory & Practice, first-on-line*. <https://doi.org/10.1080/13603124.2022.2077457>

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O'Meara, N., Fitzmaurice, O., & Johnson, P. 2022. Career Mathways: evaluating a novel initiative aimed at enhancing students' attitudes towards and appreciation of mathematics, *Teaching Mathematics and Its Applications*, 41(3), 218-239.

O'Meara, N. & Faulkner, F. 2022. Professional development for out-of-field post-primary teachers of mathematics: An analysis of the impact of mathematics specific pedagogy training, *Irish Educational Studies*, 41(2), 389-408.

Prendergast, M., O'Meara, N., Duffy, L.L., & O'Rourke, I. 2022. Delving into the shadow: Mathematics teachers' perspectives on the impact of private supplementary tutoring in Ireland, *Asian Journal for Mathematics Education*, 1(3), 323-337.

Book Chapters

Mooney Simmie, G. (2023). Chapter 14: Radically Dreaming Emancipatory Teaching: Supporting Teachers as Problem-Posing Intellectuals and Activists for a Just Global World. In *Radically Dreaming: Illuminating Freirean Praxis in Turbulent Times*, pp. 155-164. Edited by Tricia M. Kress, Robert Lake & Elizabeth Stein. New York City: DIO Press. <https://www.diopress.com/radically-dreaming>

Mooney Simmie, G. (2022). Chapter 8. Suppression of Teacher's Voices: Agency and Freedom within Neoliberal Masculinist Performativity. In *Transnational Feminist Politics, Education and Social Justice: Post Democracy and Post Truth*. Edited by Silvia Edling & Sheila Macrine, pp.141-154. ISBN 9781350174467. London and New York: Bloomsbury Academic. <https://www.bloomsbury.com/us/transnational-feminist-politics-education-and-social-justice-9781350174467/>

Ní Riordáin, M., Goos, M., Faulkner, F., Quirke, S., Lane, C. & O'Meara, N. 2022. Eliminating the Fear of Getting 'Caught Out': An Examination of the Development of Out-of-Field Mathematics Teachers' Professional Self-Understanding. In Hobbs, L. & Porsch, R. (Eds.) *Out-of-Field Teaching across Teaching Disciplines and Contexts*, Singapore: Springer, 241-259.

Prendergast, M. & O'Meara, N. 2022. Questionnaire design and implementation. In Ní Riordáin, M. and Delaney, T. (Eds.) *Perspectives in Contemporary STEM Education Research*, London: Routledge, 120-128.

Journals

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Reports

Mooney Simmie, G. 2022. Curriculum and the generation of Utopia: Interrogating the current state of critical curriculum theory. Book Review. Paraskeva, Joao M., New York: Routledge, 2020, 338p. Book review. Published first-on-line on the BERA (*British Educational Research Association*) website: 29 January 2022. *The Curriculum Journal*, 1-3. <https://doi.org/10.1002/curj.148>

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Invited Keynote and Conference Presentations and Proceedings

Mooney Simmie, G. 2022. How can the philosophy of education inform STEM Education Policy in schooling and higher education in a post-Covid pluralist and democratic Ireland: Growing back better. In E. Costello, P. Girme, D. Hyland, T. Kaur, O. Kelly, T. McLoughlin, & P. Van Kampen (Eds) *Proceedings of the CASTeL 9th STEM Science and Mathematics Education Research Conference 2022 Proceedings* (pp. 66-78), Dublin City University. <https://doi.org/10.5281/zenodo.6953886>

#Mooney Simmie, G. 2022. *Science Teacher Education as Emancipatory Practices: for epistemic and social justice*. 11am to 12pm, 27th January 2022. School of Education, University of Oxford, UK.

Mooney Simmie, G. 2022. *Critical Policy Research Analysis – a theory and a method*. An invited research seminar at the PhD Summer School, School of Education, University College Cork. 9th July 2022 (2pm).

Mooney Simmie, G. 2022. Radically Dreaming after Neoliberalism: Teachers' Emancipatory Practices as a 'Wicked Problem' of Public Interest Values? *American Educational Research Association AERA 2022 Annual Meeting. Paulo Freire Special Interest Group (SIG), Cultivating Equitable Education Systems for the 21st Century*. San Diego, CA. Monday, April 25th, 2022 [11.30am to 1pm].

Murphy, D., & Mooney Simmie, G. 2022. (Re)Conceptualising a new Ethic of Care within Discourses of Early Childhood Education and Care Professionalism. *American Educational Research Association AERA 2022 Annual Meeting. Critical Perspectives in ECEC Education Special Interest Group (SIG), Cultivating Equitable Education Systems for the 21st Century*. San Diego, CA. Saturday, April 23, 2022 [2.30pm to 4pm].

Contact Details

EPI•STEM

Register for on-line CPD resources: <https://epistem.ie>

EPI•STEM project: [Resources](#)

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This on-line CPD project [HEA funded] is an initiative with EPI•STEM for science and mathematics secondary teachers in Ireland. The research-led development team includes:

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Please see our website www.epistem.ie for all news items, resources and events

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