



UTS STEM Education Futures Research Centre Newsletter Issue # 3, July 2019

Acting Director's Message

Welcome to the 2019 half-yearly newsletter of the STEM Education Futures Research Centre. This issue highlights the many activities and achievements of the Centre so far this year, including an update on selected projects, international collaborations and visits to Key Technology Partner (KTP) universities in Europe. Readers will notice a diverse range of research activities represented in this newsletter, all aiming to produce outputs that positively influence STEM capacity and capability in Australia and beyond.

This newsletter has a wide readership. Interested readers may like to follow-up on projects of interest by visiting our Centre's 2019 [publications page](#). I invite scholars, industry partners and other potential collaborators to contact us via our [Centre website](#) to start a conversation about prospective research projects. I also invite prospective doctoral students to contact potential supervisors via the members' page at our website.

Finally, I would like to welcome two new staff members to our centre, Dr. Mun-Yee Lai (Maths Education) and Dr. Tracey-Ann Palmer (Science Education). I'd also like to welcome our new Centre Manager, Dr Marco Angeleni.

Best wishes

A/Professor Matthew Kearney
(Acting Director, Autumn 2019,
STEM Education Futures Research Centre, UTS)

Contact us via our [Centre Website](#) or
by email: STEMEDFutures@uts.edu.au

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CONTENT

Acting Director's message
UTS KTP visiting scholars, Spring 2019
Project updates
Centre Publications
International Collaborations
KTP University Visits
Distinguished visiting scholar, Autumn, 2019
Congratulations to Dr. Jim Scott
Centre news

UTS KTP VISITING SCHOLARS SPRING 2019



We are delighted to be hosting two visiting scholars in our Centre in Spring, 2019:

Dr. Sue Cranmer (Lancaster Uni, UK);
A/Prof Ruurd Taconis (Eindhoven,
The Netherlands).

Their visits will form part of ongoing and growing collaborations between UTS and these two KTP universities. Dr. Cranmer is PI on our recently submitted Australian Research Council Discovery application led by our Centre titled: *Smart Education in Schools of the Future: Transforming Practice*.



Selected Project Updates

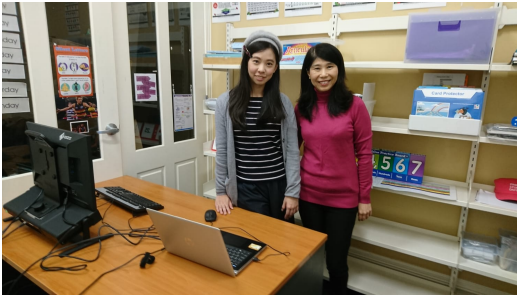
Prof. Sandy Schuck, A/Prof. Mary Coupland, A/Prof. Anne Prescott and Dr Marco Angelini recently received a contract to publish a monograph on the [Maths Inside project](#) through Springer Publications. This contribution to the Springer Briefs in Education series will be published in early 2020, under the title: *Making school maths real: The story of the Maths Inside project*. The picture below includes staff from CSIRO, our project stakeholders.



CENTRE PUBLICATIONS

Centre members publish in high quality journals and books. Selected publications from the first half of 2019 are available via: <http://bit.ly/2019pubs>

Dr. Mun Yee Lai is currently collecting data at St Spyridon School in Adelaide for a new project she is leading titled: *The influence of the Chinese and English languages on students' processing of mathematics word problems*. The study investigates the relationship between the languages of the problems and their possible influence on students' mathematics achievement through analyzing the linguistic components of the TIMSS mathematics assessment items in Chinese and English, and examining the behavioural differences of Chinese (Taipei, Taiwan) and English (Adelaide, Australia) students when they process the items in their languages. The findings will contribute to better interpretation of the results of international studies of mathematics achievement such as TIMSS where multiple languages are used in tests. See images below of Mun Yee and her research assistant, and a trial of her research instrument.



A/Prof. Matthew Kearney and Prof. Sandy Schuck continue to work with European colleagues in an ongoing Erasmus+ Project titled [Designing & Evaluating Innovative Mobile Pedagogies](#). The project is led by Prof. Burden from University of Hull, UK, and uses a design-based methodology to design and construct a multi-purpose professional learning app that will help educators to create and evaluate innovative m-learning tasks. A foundational activity was a systematic literature review recently published in *Computers and Education* that identified key insights into innovative m-learning in K-12 (see [Centre publications page](#)). On 28th June, a teacher from one of the Australian project schools, Sree Raniga from Pymble Ladies College, made a presentation in the Researching and Engaging with Schools day at UTS (see photo). Australian Project schools are holding their Multiplier Event on Friday 16th August at UTS. Teachers interested in attending can contact the Centre manager Dr. Marco Angelini via Marco.Angelini@uts.edu.au



Selected Project Updates cont.

Dr. Tracey-Ann Palmer, A/Prof Mary Coupland and Dr. Kimberley Pressick-Kilborn are negotiating with participating school staff to begin collaborative research into the impacts of the WAFUS Science Challenge. This Challenge is now in its fourth year, and is scheduled over school term 2. In April, UTS Microbiologist Dr Nural Cokcetin gave an inspiring talk about science in general and her research in particular to selected Year 10 students from Fort St High School and Tempe High School. These students also had sessions in “how to be a mentor”, then spent Wednesday mornings during school term 2, mentoring groups of 3 or 4 Primary School students from Wilkins Public School, Ashfield Public School, and Summer Hill Public School. On July 3, a UTS team of judges visited Fort St High School to talk to the groups about their science projects, and award prizes. In September, all the school students involved will visit UTS to tour the science facilities. The aim of the research is to find out what the students and their teachers see as the benefits of participation in the Challenge, and to investigate the ways that participating in the Challenge has contributed to the professional learning of the teachers involved. We anticipate that the research will establish recommendations for future iterations and/or expansion of the Challenge to other schools. Participants at the Waftus event on 3rd July are shown below.



Selected International Collaborations

In May 2019, A/Prof. Wan Ng visited the Vietnamese National Institute of Educational Sciences (VNIES) in Hanoi. VNIES is a Government administrative agency in sciences under the supervision of the Ministry of Education and Training, mandated to assist the Minister of Education and Training in comprehensive research on education. The institute develops educational strategies and public administration policies in education and training, including master and doctoral training in educational sciences and relevant fields. There are currently 220 researchers in VNIES. Vietnam ranked 8th internationally in science in PISA 2015 while Australia ranked 10th.

As Director of the STEM Education Futures Research Centre, Wan has previously established a collaborative research relationship with VNIES through the Institute’s Vice General Director, A/Prof. Anh Vinh Le, a Harvard University doctoral graduate in mathematics. Current collaborative activities include researching the state of STEM education in Vietnam and Australia; capitalising on the Institute’s maths education expertise to design maths focused-STEM curriculum and collaborative grant application.



A/Prof Wan Ng presented with a ‘vase’ made from ice-cream sticks by the students and principal in Nam Dinh

Wan presented a research seminar at VNIES and the roomful of 40+ researchers were very responsive and the seminar generated a lot of questions and discussion. The conceptualisation of STEM education and challenges in its implementation in Vietnamese schools are similar to those faced in Australia. Wan visited a few STEM schools in metropolitan and regional Hanoi. [cont. on next page]

International Collaborations cont.

[cont. from previous page]. Two of the primary schools have dedicated STEM display rooms where innovative STEM artefacts created by students, such as the ice-cream-stick-vase that was presented to Wan as a gift (see photo above), are displayed. Wan also observed primary and secondary students coding and testing their robotic cars or robots playing soccer, constructing air-powered cars as well as creating hydraulic 'rockets' out of soft drink bottles and testing them with the aid of a bicycle pump (the rockets worked nicely!).



Wan was particularly impressed with the outdoor library (see picture above) in one of the primary schools in the district of Nam Dinh, an outdoor learning space where primary children could sit on swings and read in pairs or they gather around tables that simulate cut off tree trunks with chess boards on them, and where the children play chess or read in their groups. There is a cupboard of books in this outdoor learning space.

DISTINGUISHED VISITING SCHOLAR AUTUMN 2019



Prof. Merrilyn Goos from the University of Limerick, Ireland, visited the Centre as a Distinguished Visiting Scholar in March 2019 (hosted by A/Prof. Anne Prescott). Merrilyn is the director of EPI*STEM, Ireland's National Centre for STEM Education. She presented two successful seminars and forged collaborations with Centre members.

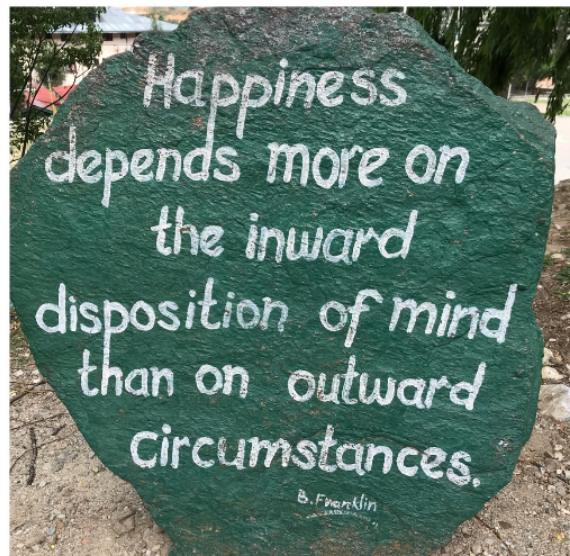
Dr. Damian Maher (with UTS staff member and Centre HDR student Annie Agnew) successfully hosted the international Mobile Technology in Teacher Education (MITE) conference at UTS in January, 2019. Centre members Schuck, Maher, Agnew & Kearney gave presentations at the conference. Damian is pictured below with MITE leader Sean Ó Grádaigh from the National University of Ireland (NUI), Galway. Professor Punya Mishra (also pictured) was a keynote speaker.



International Collaborations cont.

During Autumn semester, 2019, members visited **Key Technology Partner universities (KTPs)** to collaborate on existing projects and to build future research collaborations. In May, A/Prof. John Buchanan presented a paper at *Lancaster University*, UK, titled: 'Poor understanding? Challenges to global development education' (co-authored with Dr. M. Varadharajan). In June, A/Prof. Wan Ng visited *Technology University Berlin (TUB)* and the *International STEM Education Centre* at the University of Freiberg, Germany, to engage in further STEM collaborative research discussions. While Prof. Peter Aubusson met with STEM education staff at TUB and *Eindhoven University of Technology (TuE)*, The Netherlands, to discuss staff exchanges, ongoing collaborations and to plan an Erasmus Plus project with A/Prof Taconis (TuE). The opportunity to collaborate with TUB has improved as they expand their offerings in STEM teacher education.

Centre member Dr. Kimberley Pressick-Kilborn has collaborated with UTS Education colleagues A/Profs. Nick Hopwood & Nina Burrige on their research and engagement activities with Paro College of Education and Samste College of Education, *Royal University of Bhutan*, over 10 days in May. Highlights in Paro included meeting with teacher educators and teachers about school-university collaborative action research projects, and visiting Khangkhu School where our IPE students completed their placements in 2018. Highlights in Samste included speaking with preservice teachers about their experiences of project-based learning in maths and science education subjects. The UTS team also worked with Samste colleagues to co-design and co-present a 3 hour PL workshop on differentiated instruction for teacher education academics, repeated for MEd students. There is particular interest from Samste College in working with STEM Ed Futures Research Centre members as the College establishes its own STEM Education Centre. Nick and Kimberley will present a UTS lunchtime research seminar in August on the local collaborative action research projects focused on enhancing quality and equity in maths and science education. There also are two journal manuscripts currently being collaboratively written from the partnership research work, funded through the DFAT's Australia Awards Fellowship program, and we are anticipating HDR applications in the near future.



Other Centre News

Prof. Lori Lockyer's journal article, 'Towards sustainable technology-enhanced innovation in higher education: Advancing learning design by understanding and supporting teacher design practice', published in *British Journal of Educational Technology*, is one of the journal's top downloaded recent papers. Lori will be presenting a workshop on her ARC DP project, *Designing Effective Learning Experiences* at the [EARLI 2019 conference](#) in August 2019.

Prof. Didar Zowghi presented a paper (see [selected Centre papers](#)) at the Software Engineering Education (SEET) Track of the 41st ACM/IEEE International Conference on Software Engineering (ICSE). ICSE is the oldest and premier software engineering conference in the world (A* ranked), where researchers, practitioners, and educators come together to present, discuss, and debate the most recent research results, innovations, trends, and concerns in the field of software engineering.

Dr. Jane Hunter recently conducted a [theory workshop](#) in Launceston for AARE titled: *Laying out priorities: How research in STEM education in schools creates cross/inter/trans/disciplinary possibilities for teaching and learning*. She was a keynote speaker at *ESL teachers, STEM and Technology PD day* at UTS on Saturday 25 May, and led a pro bono outreach for new immigrants: [Changing Careers in an Age of STEM and AI](#) at Suncorp Discovery Centre, Pitt St Mall on Sunday 26 May. She recently wrote an article on [STEM Savvy Students](#) in 'Education Matters', and has a forthcoming paper on *Pedagogy, leading from the middle and digital technologies: Potent forces for STEM education in Australian primary schools* in *AEL Journal*, Issue 2 (see [selected Centre papers](#)).

Dr. Simon Knight was invited to speak at Newcastle University in May, 2019 with his PhD student Kristine Deroover, on their collaboration with Tamara Bucher (at Newcastle), and Paul Burke (UTS:Business), on how people deal with conflicting evidence in the context of nutrition, an example of the role of epistemic cognition in this important science literacy.

In Spring, 2019, Dr. Kirsty Young and A/Prof. Matthew Kearney are conducting a project titled: *Digital Pedagogies in Inclusive Contexts*. The project will shed light on contemporary technology-enhanced learning practices for students with moderate intellectual disabilities.

A/Prof. Mary Coupland was a keynote speaker at the first "International Conference on Mathematics, Science and Technology Teaching and Learning" conference at the Sydney campus of Central Queensland University, on 29th June. Her talk was titled "The M in STEM – not always last!" The photo shows conference organisers and plenary speakers.



CONGRATULATIONS TO

Dr. Jim Scott on his recent graduation. His [PhD thesis](#) is titled *Exploring the impact of formative practices on Science learning outcomes: A mixed methods study of the Essential Secondary Science Assessment Program in New South Wales*. Jim was supervised by Prof Peter Aabusson & A/Prof Matthew Kearney.



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Do you work with NSW Independent Schools as partners? The AIS NSW school-based research project applications are now open. These are school-led, school initiated projects that involve an academic mentor as a research partner. For more information, [see their website](#) (applications close on 1st Aug, 2019).

