Australian Government
Australian Research Council

EI 2018 ENGAGEMENT AND IMPACT

Engagement and Impact 2018

University of Technology Sydney

UTS13 (SS) - Impact

Overview

Title

(Title of the impact study)

Technology-enhanced learning to improve and increase the use of digital technologies in school education

Unit of Assessment

13 - Education

Additional FoR codes

(Identify up to two additional two-digit FoRs that relate to the overall content of the impact study.)

Socio-Economic Objective (SEO) Codes

(Choose from the list of two-digit SEO codes that are relevant to the impact study.)

93 - Education and Training

Australian and New Zealand Standard Industrial Classification (ANZSIC) Codes

(Choose from the list of two-digit ANZSIC codes that are relevant to the impact study.)

80 - Preschool and School Education

Keywords

(List up to 10 keywords related to the impact described in Part A.)

1. technology-enhanced Learning

2. mobile learning

3. m-learning

4. teacher education

5. mobile technologies

6. professional development

7. education policy

8. connected learning

9. pedagogy

10.curriculum

Sensitivities

Commercially sensitive

No

Culturally sensitive

No

Sensitivities description

(Please describe any sensitivities in relation to the impact study that need to be considered, including any particular instructions for ARC staff or assessors, or for the impact study to be made publicly available after EI 2018.)

Aboriginal and Torres Strait Islander research flag

(Is this impact study associated with Aboriginal and Torres Strait Islander content?
NOTE - institutions may identify impact studies where the impact, associated research and/or approach to impact relates to Aboriginal and Torres Strait Islander peoples, nations, communities, language, place, culture and knowledges and/or is undertaken with Aboriginal and Torres Strait Islander peoples, nations, and/or communities.)

No

Science and Research Priorities

(Does this impact study fall within one or more of the Science and Research Priorities?)

No

Impact

Summary of the impact

(Briefly describe the specific impact in simple, clear English. This will enable the general community to understand the impact of the research.)

UTS research into technology-enhanced learning increased and improved the use of digital technologies in school education in Australia and overseas. The research transformed teachers' understanding of and competence in integrating these technologies into their classroom practice, increased schools' uptake and investment in them, and directly enhanced students' creative and critical thinking skills and engagement with STEM and other subjects. Teachers benefitted also from new curriculum materials, tools and resources arising from the research. New pedagogical frameworks produced by the research had an impact on government policy-making in Australia and Scotland, and informed Microsoft's thinking about educational applications of digital technologies.

Beneficiaries

(List up to 10 beneficiaries related to the impact study)

1.NSW Department of Education

2.NSW Education Standards Authority

3.School executive management: principals, ICT managers etc.; primary and secondary; public and independent; Australia and overseas

4.School teachers: primary and secondary; public and independent; Australia and overseas; practising and pre-service

5.Students: Kindergarten to Year 12 (or equivalents); public and independent; Australia and overseas

6.Microsoft Corporation: multinational technology company (net income: US$16.79 billion in 2016) engaged in developing education technologies

Countries in which the impact occurred

(Search the list of countries and add as many as relate to the location of the impact)

Australia
England
Germany
Hong Kong (SAR of China)
Netherlands
Norway
Scotland

Singapore
United States of America

Details of the impact

(Provide a narrative that clearly outlines the research impact. The narrative should explain the relationship between the associated research and the impact. It should also identify the contribution the research has made beyond academia, including:
- who or what has benefitted from the results of the research (this should identify relevant research end-users, or beneficiaries from industry, the community, government, wider public etc.)
- the nature or type of impact and how the research made a social, economic, cultural, and/or environmental impact
- the extent of the impact (with specific references to appropriate evidence, such as cost-benefit-analysis, quantity of those affected, reported benefits etc.)
- the dates and time period in which the impact occurred.

NOTE - the narrative must describe only impact that has occurred within the reference period, and must not make aspirational claims.)

The major impacts of technology-enhanced learning (TEL) research at UTS arose from the development of two innovative, evidence-based pedagogical frameworks to increase the adoption and enhance the use of digital technologies in school education. High Possibility Classrooms (HPC) is a pedagogical framework that builds teacher capacity and confidence in TEL. iPAC is a pedagogical framework for the use of mobile devices in teaching and learning.

These two frameworks transformed teachers' understanding of digital learning technologies and significantly increased their interest, competence and confidence in using them in the classroom. In Australia, the HPC and iPAC frameworks were incorporated into professional development programs in five Australian states. For example, the NSW Education Standards Authority accredited 4 professional development programs on HPC and iPAC, embedding the frameworks into professional development for over 1200 primary and secondary teachers as well as schools' executive teams (2014-16), and provided in-school professional development on HPC to over 2000 primary and secondary teachers (2014-15). iPAC was used to train teachers working in remote Aboriginal and Torres Strait Islander communities (2015). Both frameworks were incorporated into several Master of Teaching programs around Australia.

Internationally the iPAC framework was delivered to around 200 teachers in professional development programs in the UK and Europe, including the Creative Use of Tablets in Schools meeting in Ireland (2015), the European Studies Program Junior Planning Conference in Karlsruhe, Germany (2015), and several head teacher advanced training sessions in Ettenheim and Haslach, Germany (2016). The frameworks were also introduced into postgraduate teacher training programs in the Netherlands, UK, Norway and Germany. Dr Anneke Smits, a teacher educator in the Netherlands, explained how HPC changed teachers' practices: 'When they start in the course their use of ICTs is pedagogically relatively poor… [Y]our book and the cases that you describe as well as the model, open up new horizons for them in their understanding of pedagogical technology use.'

The frameworks were integrated into 9 schools in Sydney. For example, at Epping West Public School, HPC became 'the delivery model for Quality Pedagogy to develop the whole child within our whole school community' (Therese Hinder, Principal). At Parramatta Public School, it 'Enhanced the development of students' creative and critical thinking', promoted 'Higher level of knowledge application and higher order thinking skills', 'Increased writing skills', and 'Amplified and highlighted the authenticity of STEM' (Gail Charlier, Principal). At Belmore South Public School, teachers commented 'I will be taking everything that I learnt… and embedding it into all my future practice' (Tara Cooke) and 'The change in my students' learning as well as the change in the way I teach is a true testament to the power of [the framework]' (Kieran Aggett). At East Hills Technology Girls High School, IPAC helped produce 'engaged learners' and 'was really useful as a set of manageable criteria to focus upon when designing personalised, authentic and collaborative learning tasks' (Linda Clutterbuck, Science teacher). At Killara High School, 'use of the mobile technologies is making students work more collaboratively… [S]tudents are using their own work samples as teaching aides for other students. I think that's really exciting.' (Liesl Williamson, Deputy Principal). Further, HPCs were incorporated into the strategic plans of at least 6 more schools in NSW, and iPAC was introduced into secondary schools in Norway (Metis videregående, Bergen) and Germany (Rennbuckel-Realschule, Karlsruhe).

Teachers also benefitted from numerous technology-based curriculum materials, tools and resources developed by the researchers and their collaborators. In Australia, for example, the iPAC framework was used in the national

Teaching Teachers for the Future project (2014) to analyse Maths Education activities in order to help teacher educators integrate technology into their teaching. This was subsequently included as an exemplar in an industry book for teachers and school leaders, Preparing Teachers for the Digital Age. A major project in Europe, of which Dr Kearney was a core member, used the iPAC framework to develop a mobile learning toolkit to assist teachers and teacher educators in building knowledge around more diverse mobile pedagogical approaches. The toolkit, which includes an m-learning task survey, video-based exemplars, interactive e-books, online course, and an app evaluation rubric focusing on mobile pedagogic potential, was incorporated into several teacher training programs in Australia and Europe.

The work of the researchers was also adopted by third parties engaged in designing and developing new educational tools and resources. For example, iPAC was used by Georgia Southern University researchers in the US to design a rubric to aid teachers' evaluation of K-12 science apps, and by researchers at Deakin University to design a survey tool to elicit students' attitudes to using mobile technology for second and foreign language learning.

The frameworks influenced government policy in Australia and overseas, e.g. the HPC framework was actively promoted by the NSW Department of Education (NSWDOE) through its school networks and was selected by three NSWDOE Regional Directors as a strategic priority for the region of schools they lead. The iPAC framework informed a significant Scottish government report of mobile learning in schools (iPad Scotland Evaluation final report, 2012).

There was also industry impact. In 2014 the iPAC framework was used in a collaboration between the researchers and Microsoft to investigate innovative uses of mobile devices on student learning in 3 secondary schools (Microsoft white paper, Moving Classrooms to Third Space Learning, 2016).

Associated research

(Briefly describe the research that led to the impact presented for the UoA. The research must meet the definition of research in Section 1.9 of the EI 2018 Submission Guidelines. The description should include details of:
- what was researched
- when the research occurred
- who conducted the research and what is the association with the institution)

This research was undertaken by full-time academics based in the UTS Centre for STEM Education Futures. The (ongoing) research program investigates ways in which information and communications technologies can be used to enhance teaching and learning in schools. The work of High Possibility Classrooms (HPC) established a pedagogical framework to build teacher capacity and confidence in TEL, while the work on iPAC brought a mobile pedagogical perspective to TEL.

Development of the HPC framework began with a qualitative study of exemplary teachers' knowledge of technology integration in NSW classrooms (2013). This was followed by validation in a series of mixed-method studies (2014-16) involving teams of primary and high school teachers and students at ten schools in NSW and two in the ACT.

The iPAC research began by bringing three central and distinctive features of mobile pedagogical learning into a coherent framework (2012). The framework was subsequently developed and refined through a series of projects: a European Commission Erasmus+ Strategic Partnerships Project, an international collaboration of expert education practitioners in Germany, the Netherlands and Norway (2014 onwards); an ARC Discovery Project on mobile learning in mathematics and science (2015 onwards); and a Microsoft-funded project on mobile learning (2015).

FoR of associated research

(Up to three two-digit FoRs that best describe the associated research)

13 - Education

References (up to 10 references, 350 characters per reference)

(This section should include a list of up to 10 of the most relevant research outputs associated with the impact)

1.Schuck, S., Kearney, M., & Burden, K (2017). Exploring mobile learning in the Third Space, Teaching, Pedagogy and Education, 26 (2), 121-137. DOI: 10.1080/1475939X.2016.1230555 Received 25 Aug 2015, Accepted 15 Feb 2016, Published online: 03 Oct 2016

2.Schuck, S. (2016). Enhancing Teacher Education in Primary Mathematics with Mobile Technologies. Australian Journal of Teacher Education, 41(3), 126-139. DOI: 10.14221/ajte.2016v41n3.8

3.Hunter, J. (2015a). Technology Integration and High Possibility Classrooms: Building from TPACK. New York: Routledge.

4.Hunter, J. (2015b). 'High Possibility Classrooms in the Middle Years: A Model for Reform'. In S. Groundwater-Smith & N. Mockler (Eds.), In Big Fish Little Fish: Teaching and Learning in the Middle Years. Cambridge: Cambridge University Press, 95-108

5.Hunter, J. (2015c). High Possibility Classrooms: A New Model for Technology Integration. In. M. Neiss & H. Gillow-Wiles (Eds.), Handbook on Research in Teacher Education in a Digital Age. Hershey, PA: IGI Global, 466-492 DOI: 10.4018/978-1-4666-8403-4.ch018

6.Kearney, M. D., Burden, K., & Rai, T. (2015). Investigating teachers' adoption of signature mobile pedagogies. Computers & Education, 80, 48-57. DOI:10.1016/j.compedu.2014.08.009

7.Kearney, M. D., & Maher, D. (2013). Mobile learning in Maths teacher education: Using iPADs to support pre-service teachers' professional development. Australian Educational Computing, 27(3), 76-84.

8.Kearney, M. D., Schuck, S. R., Burden, K., & Aubusson, P. J. (2012). Viewing mobile learning from a pedagogical perspective. ALT-J, Research in learning technology, 20(3), 1-17. DOI:10.3402/rlt.v20i0/14406

9.Hunter, J. (2011). Connected learning in an Australian technology program: a case study. International Journal of Virtual and Personal Learning Environments, 2 (1), 66-74 DOI: 10.4018/jvple.2011010105

10.Mitchell, J., Hunter, J. & Mockler, N. (2010). Connecting classrooms in rural communities through interactive whiteboards. Australasian Journal of Educational Technology, 26 (Special issue, 4), 464-476. DOI: 10.14742/ajet.1065

Additional impact indicator information

Additional impact indicator information

(Provide information about any indicators not captured above that are relevant to the impact study, for example return on investment, jobs created, improvements in quality of life years (QALYs). Additional indicators should be quantitative in nature and include:
- name of indicator (100 characters)
- data for indicator (200 characters)
- brief description of indicator and how it is calculated (300 characters).)

Name

Publications for professional audiences, including commissioned

Indicator Data

(1) Technology Integration and High Possibility Classrooms: Building from TPACK (book) sold 1029 units to June 2016
2. 18 publications commissioned by professional organisations (2013-16)

Indicator Description

1. Book sales: figures (to June 2016) provided by Routledge, email 01/03/17.
2. Publications commissioned by professional associations (e.g. ACEL, Education HQ), technology companies (e.g. Microsoft) professional journals (e.g. Education Technology Solutions) and national online education sites

Name

Industry and public engagement with the research as evidenced by social media reach and reception

Indicator Data

1. HPC website >800,000 views
2. HPC Twitter account >2900 followers, an average weekly tweet impression rate >12,000 views.
3. 'An Introduction to the iPAC framework' Youtube video: 106 views

Indicator Description

1. Data from HPC website stats platform
2. Data from HPC blog at https://www.edutopia.org/blog/high-possibility-classrooms-tech-enhanced-learning-jane-hunter
3. HPC Twitter account dashboard enables daily/weekly views of activity
4. iPAC Youtube data from https://www.youtube.com/watch?v=WXxp3saPeXQ

Name

Industry recognition of the innovative nature of the research

Indicator Data

HPC lead researcher:
1. Named in Top 10 Australian Education Innovators, Education Nation Conference (2015, 2016)
2. Microsoft award for outstanding contributions to student learning in TEL (2014)

Indicator Description

1. Calculated by Pearsons Limited in their annual ranking of awards that acknowledge innovative teaching practices and educator excellence
2. Social Science education category, Society for Information Technology in Teacher Education conference 2014