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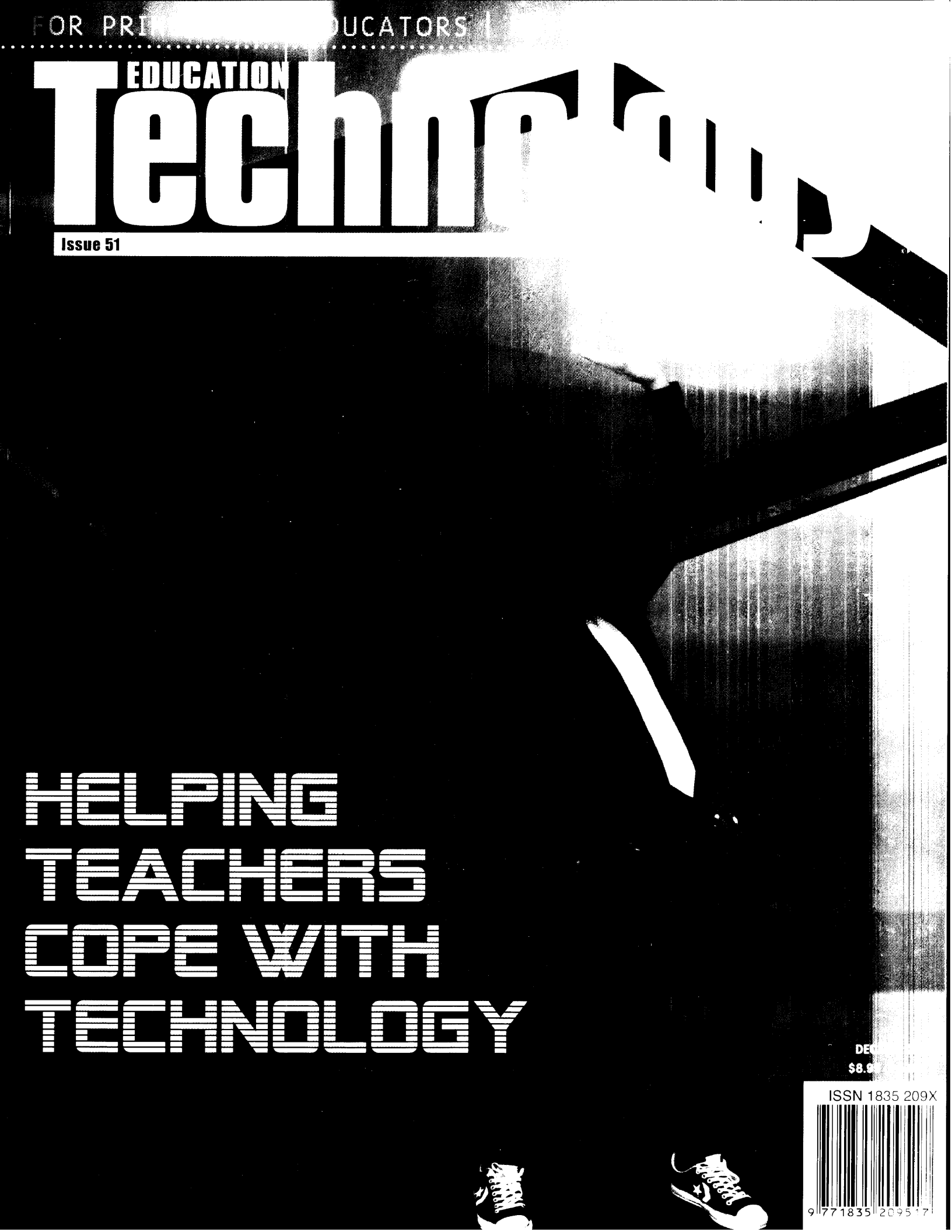

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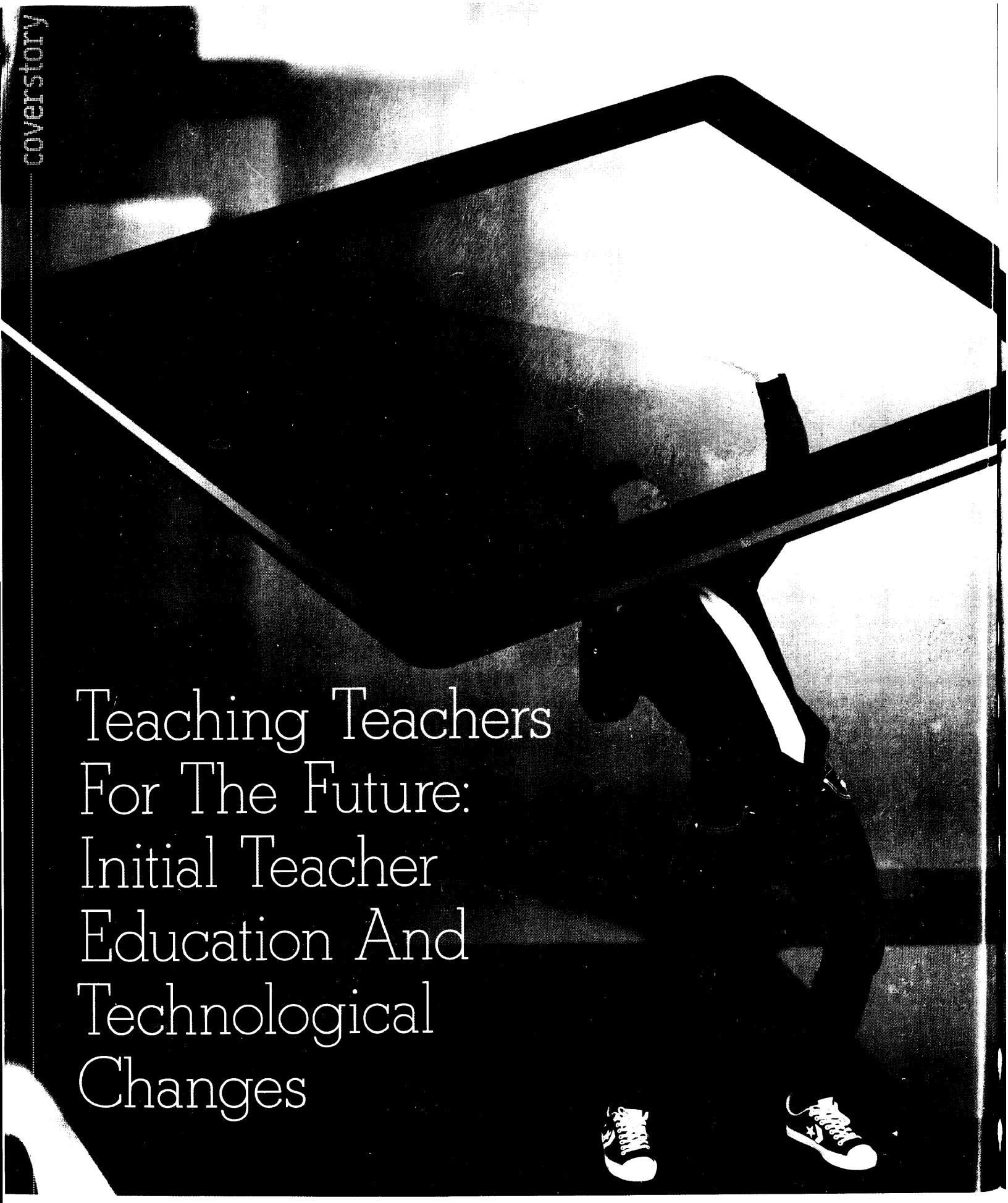

Teaching Teachers For The Future: Initial Teacher Education And Technological Changes

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Initial Teacher Education and the Challenge of Technological Changes

This cover story focusses on the importance of initial teacher education in Australia, within a context of dynamic technological changes. The positioning of many stories by media, teacher regulatory authorities, and Government tends to focus on problems with teacher quality, as reflected by calls for increased accountability and reviews of teacher education programs.

In contrast, this cover story takes an optimistic view of our next generation of teachers and summarises the positive influence of the Teaching Teachers for the Future (TTF) Project implemented throughout 2011-2012 in 39 collaborating, Higher Education Institutions (HEIs) in Australia. From the outset, the author acknowledges the powerful ways in which TTF Project colleagues across all of those institutions adopted an approach enabling a collective wisdom to progress an improvement agenda for preparing our nation's next generation of teachers.

Scholarly outcomes of the TTF Project included the generation of Most Significant Changes Stories from each institution, a rich range of research projects and publications, and the provision of the evaluation accountability requirements for the Australian Government. Given the length constraints of this cover story, a summary of the key findings are provided, and these are more comprehensively provided elsewhere (Finger et al., 2012). In addition, at this year's Australian Council for Computers in Education (ACCE) Conference in Perth, an entire TTF Project strand provides the space for the dissemination of TTF Project-related research.

In my role as a key leader in a high-performing Australian University, I understand the importance of a disposition to identify the BIG issues, ask the BIG questions, and respond to and shape the BIG trends. This involves stepping back from the daily noise, administrative tasks, and reactively going through the motions of leadership.

Reflecting upon my pre-service, teacher education program (undertaken from 1972-1974), now some 40 years ago, the technological expectations were largely confined to planning a good 'blackboard summary', and there were expert teachers willing to assess my use of chalk. Learning was largely by teacher talk, students using pencil and paper, and the more innovative teachers were using overhead transparency projectors (OHPs). For me, the BIG trend over the past 40 years in teacher education, has been the impact of technological changes on initial teacher education programs.

Essential reading for educators is the Horizon Reports, especially the K-12 editions, which identify the technologies for three, Time-to-Adoption Horizons. These editions include: One Year or Less, Two to Three Years, and Four to Five Years.

Therefore, the latest Horizon Report takes us through to 2016-2017, and it is highly likely, based upon our experiences over the past four to five years, that we might not know the shape and form of technologies which might be disruptive innovations during the next few years. For example, the iPad, launched in April 2010, has seen more than 60 million tablets sold and, in the AppStore, there are more than 650,000 apps with 785 new apps submitted daily. (indvik, 2012)

So, when we consider that the graduate teacher in 2012 is likely to teach for 30 to 40 years, and their students are likely to see the 22nd century, this represents significant challenges for the design of initial teacher education. Collectively, considering the discourses of teacher quality and technological change, the BIG questions are:

- What are the capabilities needed for the next generation of teachers to shape and respond to the technological challenges of the 21st century?
- How well prepared is the next generation of teachers to have the capabilities to shape and respond to the technological changes of the 21st century?
- What are the implications for initial teacher education programs in Australia?
- What are appropriate responses to the challenges of technological changes?

The TTF project assists in answering those BIG questions.

Teaching Teachers for the Future (TTF) Project

In the *Education Technology Solutions*, Issue 29 Cover Story, Arthur (2009) argued that the Australian Government's Digital Education Revolution vision will require 'well-trained teachers' and that, 'Teacher pre-service education coverage of ICT issues is varied' (p. 52). Almost a year later, Peter Garrett, the Minister for School Education, Early Childhood and Youth, announced four projects would receive more than $16 million under the Information and Communication Technology Innovation Fund (ICTIF). One of those four projects, Teaching Teachers for the Future Project, focused on improving the capabilities of pre-service teachers. (http://www.deewr.gov.au/Schooling/DigitalEducationRevolution/DigitalStrategyforTeachers/Documents/TeachingTeachersfortheFuture.pdf)

The 15-month TTF Project involved all 39 Australian HEIs which provide initial teacher education. The lead agency was Education Services Australia (ESA) in partnership with the Australian Council of Deans of Education (ACDE), the Australian Institute for Teaching and School Leadership (AITSL), and the Australian Council for Computers in Education (ACCE). Further details about the project are available elsewhere (see http://www.ttf.edu.au and http://www.aitsl.edu.au/teachers/ttf/ttf-project.html). The TTF Project involved the appointment of a TTF Project Coordinator (TTF PC) and ICT Pedagogy Officers (ICT PO) in each HEI.

TTF Research and Evaluation

A TTF Project Research and Evaluation Working Group (REWG) was established with representation from participating HEIs, and three major research and evaluation strategies were implemented, namely:

(1) The development and administration of an online

Technological Pedagogical Content Knowledge (TPACK) Survey – referred to as the TTF TPACK Survey;
(2) The implementation of Most Significant Change (MSC) methodology; and
(3) The facilitation of institution-initiated TTF research and evaluation projects.

The TTF National Support Network (NSN) was established to enable the collective wisdom of these research and evaluation initiatives to be developed through collaboration and strategic networks. The TTF Project was informed by the TPACK framework (Mishra & Koehler, 2006) which conceptualises Technological Pedagogical Content Knowledge (TPACK) as the intersection of technological knowledge (TK), content knowledge (CK), and pedagogical knowledge (PK), while allowing for contextual differences. The project also aligned with the National Professional Standards for Teachers accountability and improvement agendas for graduate teachers (AITSL, 2012), and focused on the four curriculum areas of the Australian Curriculum – English, Mathematics, Science and History.

The TTF REWG developed and administered the TTF TPACK Survey (Jamieson-Proctor et al., 2012) to gather data about the TPACK of pre-service teacher education students. The following findings were obtained from the online administration of the TTF TPACK Survey. Two data collections, involving all 39 participating Australian HEIs were undertaken in 2011, toward the end of Semester 1 (T1) and toward the end of Semester 2 (T2). In total, 10,433 participants completed the first survey (T1) and 4,473 participants completed the second survey (T2).

This arguably represented the largest, ICT-related research study undertaken of initial teacher education students in Australia. It was also different from previous, initial teacher education studies which had been more limited to examining pedagogical content knowledge (PCK). The data collected from the TTF TPACK survey represented a more sophisticated approach which understood the technological changes and expectations for teaching and learning in the 21st century – a far cry from the expert 'blackboard summary'.

Confidence and Usefulness

The TTF TPACK Survey sought participants' perceptions of their (1) confidence with ICT, and (2) the level of usefulness of ICT, on two key aspects, namely:

- Use of ICT for teaching; and
- Use of ICT by their future students.

Confidence and Usefulness – ICT to Support Teaching

Based on responses to confidence items, participants were most likely to be confident that ICT would support teaching in relation to:

- Using a range of ICT resources and devices for professional purposes;
- Selecting and using a variety of digital media and formats to communicate information;
- Collaborating for professional purposes, such as online professional communities;
- Selecting and organising digital content and resources;
- Using ICT for reporting purposes, such as reporting to parents/carers;
- Teaching specific subject areas in creative ways;
- Engaging with colleagues to improve professional practice.

In contrast, they were least likely to be confident ICT would support teaching in relation to:

- Supporting students from Aboriginal and Torres Strait Islander backgrounds;
- Managing challenging student behaviour by encouraging responsible use of ICT;
- Digital citizenship to promote student demonstration of rights and responsibilities in the use of digital resources and tools;
- Engaging parents and families in the child's school through ICT;
- Teaching strategies responsive to diverse student backgrounds.

Based on responses to usefulness items, participants were most likely to consider that ICT would usefully support teaching in relation to:

- Demonstrating knowledge of a range of ICT to engage students;
- Teaching strategies responsive to students' learning styles;
- Designing ICT activities that enable students to become active participants in their own learning;
- Teaching specific subject areas in creative ways;
- Accessing, recording, managing and analysing student assessment data.

In contrast, participants were least likely to consider that ICT would usefully support teaching in relation to:

- Managing challenging student behaviour by encouraging responsible use of ICT;
- Engaging parents and families in the child's school through ICT;
- Teaching strategies to support students from Aboriginal and Torres Strait Islander backgrounds;
- Digital citizenship to promote student demonstration of rights and responsibilities in the use of digital resources and tools;
- Reflecting on relevant ICT research to inform professional practice;
- Identifying personal and professional learning goals relating to the use of ICT.

Confidence and Usefulness – ICT Supports Student Learning

Based on responses to items asking them how confident they were that they had the knowledge, skills and abilities to support students' use of ICT for learning, they were most likely to be confident in relation to:

- Providing motivation for curriculum tasks;
- Demonstrating what they have learned;
- Developing understanding of the world;
- Gathering information and communicating with a known audience;
- Communicating with others, locally and globally.

In contrast, they were least likely to be confident they had the knowledge, skills and abilities to support students' use of ICT for learning in relation to:

- Facilitating the integration of curriculum areas to construct multidisciplinary knowledge;
- Understanding and participating in a changing knowledge economy;
- Synthesising their knowledge;
- Acquiring an awareness of the global

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implications of ICT-based technologies;
• Developing functional competencies in specified curriculum areas.

Based on responses to items asking them how useful they considered it would be for them, as a teacher, to ensure students' use of ICT for learning, they were most likely to be confident in relation to:
• Engaging in independent learning through access to education at time, place and pace of their own choosing;
• Developing an understanding of the world;
• Demonstrating what they have learned;
• Acquiring the knowledge, skills, abilities and attitudes to deal with technological change.

In contrast, they were least likely to feel that ICT would be useful for students' use of ICT for learning in relation to:
• Understanding and participating in the changing knowledge economy;
• Critically evaluating their own and society's values;
• Critically interpreting and evaluating the worth of ICT-based content for specific subjects;
• Gaining intercultural understanding;
• Acquiring awareness of the global implications of ICT-based technologies;
• Facilitating the integration of curriculum areas to construct multidisciplinary knowledge;
• Developing functional competencies in specified curriculum areas.

Overall, important findings were that there was a measurable growth in the confidence of initial teacher education students to use ICT as a teacher, and that there was a measurable growth in their confidence to facilitate student use of ICT as future teachers. By illustrating that there was measurable growth in confidence, this signals the effectiveness which could be realised if the intent of this initiative is sustained and built upon. Each HEI has developed an institutional plan to sustain their work, and this will be critical for developing the TPACK capabilities needed by the next generation of teachers.

In addition to the measured growth in confidence and the identification of areas where student teachers were most likely to be confident, the project also identified areas which, importantly, need to be addressed. These areas tend to reflect some lack of confidence in dealing with the challenges of a global, knowledge economy.

Conclusion

The TPACK conceptualisation informed the project and became the shared language and lens for strengthening the design of initial teacher education programs. The project strategically joined the important dots between the Australian Curriculum's first-phase subjects – English, Mathematics, Science and History, AITSL's National Professional Standards for Teachers, and implemented a collaborative approach involving all Australian HEIs in sharing and developing their collective wisdom. We understood that innovation was already happening in various places, but the TTF Project enabled this sharing of 'best and next' practice across all HEIs.

In combination with higher levels of initial teacher education students' perceptions of the usefulness of ICT for them as a teacher, and their perceptions of the usefulness of ICT for their future students, the findings suggest that initial teacher education students are now more likely to demonstrate TPACK as future teachers. In summary, the TTF Project has demonstrated that measurable improvement can be achieved, and it is important for this momentum to be supported and maintained. According to Mishra and Koehler, this project, 'dwarfed anything else occurring internationally'. It has certainly demonstrated that, with leadership, support and collective wisdom, it is possible for the next generation of teachers to improve the confidence needed to respond to and shape their responses to technological changes.

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Professor Glenn Finger is Dean (Learning and Teaching) of the Arts, Education and Law Group at Griffith University, Queensland, Australia. He was the Chair of the Research and Evaluation Working Group of the TTF Project referred to in this cover story. Professor Finger has contributed to the scholarship of teaching through more than 70 peer-reviewed publications and major reviews, including being the lead author of Transforming Learning with ICT: Making IT Happen and co-editor of Developing a Networked School Community. He has won various teaching awards and citations, including the Australian Learning and Teaching Council Award for Excellence in Teaching in the Social Sciences (2009), and was the Australian Teacher Education Association Pearson Education Teacher Educator of the Year in 2008. Visit Glenn's Professional Page at: http://www.griffith.edu.au/professional-page/glenn-finger or Email Glenn at: G.Finger@griffith.edu.au.