Teaching Teachers for the Future (TTF) Project TPACK Survey: Summary of the Key Findings

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Abstract

This paper presents a summary of the key findings of the TTF TPACK Survey developed and administered for the Teaching the Teachers for the Future (TTF) Project implemented in 2011. The TTF Project, funded by an Australian Government ICT Innovation Fund grant, involved all 39 Australian Higher Education Institutions which provide initial teacher education. TTF data collections were undertaken at the end of Semester 1 (T1) and at the end of Semester 2 (T2) in 2011. A total of 12881 participants completed the first survey (T1) and 5809 participants completed the second survey (T2). Groups of like-named items from the T1 survey were subject to a battery of complementary data analysis techniques. The psychometric properties of the four scales: Confidence - teacher items; Usefulness - teacher items; Confidence - student items; Usefulness- student items, were confirmed both at T1 and T2. Among the key findings summarised, at the national level, the scale: Confidence to use ICT as a teacher showed measurable growth across the whole scale from T1 to T2, and the scale: Confidence to facilitate student use of ICT also showed measurable growth across the whole scale from T1 to T2. Additional key TTF TPACK Survey findings are summarised.

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This paper is one of a suite of research papers at ACEC2012 based on the *Teaching Teachers for the Future (TTF) Project*. It presents a summary of the key findings from the *TTF TPACK Survey*, supported by an overview of the TTF Project and its relationship to initial teacher education, and the TTF Project research and evaluation. The paper summarises the personal, educational and course profiles of participants, and key findings about confidence and usefulness of ICT to support teaching and student learning.

The TTF Project and Initial Teacher Education in Australia

The quality of initial teacher education programs in Australia is critically important for the education outcomes for young Australians. For example, a Media Release by the Ministerial Council for Education, Early Childhood Development and Youth Affairs (MCEECDYA) announced that, "For the first time, Australia has rigorous, consistent national standards for initial teacher education programs in universities and other higher education institutions". In that Media Release, The Hon. Peter Garrett, Minister for School Education, Early Childhood and Youth Affairs, highlighted the importance of teacher quality and national standards (see AITSL, 2012):

> *All Australian families want to know that their children's teachers are highly skilled and well prepared. Teacher quality is the major in-school factor affecting student achievement, and we will take every step to improve teacher quality across Australia.* (MCEECDYA, 2011, p. 1)

Consequently, it is important for all providers of initial teacher education in Australia to design and implement programs that meet AITSL's requirements to graduate teachers who can demonstrate the professional standards.

The *TTF Project* was one of four initiatives funded through the ICT Innovation Fund (ICTIF) and focused on "systematic change in the ICT proficiency of graduate teachers in Australia by building the ICT capacity of teacher educators and developing resources to provide rich professional learning and digital exemplar packages" (Australian Government, 2010, p. 1). The 15 month long TTF Project involved all 39 Australian Higher Education providers of initial teacher education, with the lead agency being Education Services Australia (ESA) and partners being 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). Education Services Australia was the lead agency. Further details about the project are available elsewhere (see, for example, http://www.ttf.edu.au and http://www.aitsl.edu.au/teachers/ttf/ttf-project.html).

The TTF Research and Evaluation - *TTF TPACK Survey*

A TTF Project Research and Evaluation Working Group (REWG) was established with representation from participating Higher Education Institutions (HEIs), and three major research and evaluation strategies were designed and 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) enabled the 'collective wisdom' of these research and evaluation initiatives to be developed through collaboration, and strategic research networks. The TTF Project was informed by the TPACK framework (Mishra & Koehler, 2006), which conceptualises the

intersection of technological knowledge (TK), content knowledge (CK), and pedagogical knowledge (PK), while allowing for contextual differences. It aligned with the *National Professional Standards for Teachers* accountability and improvement agendas for program accreditation (AITSL, 2012) and focused 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 Technological Pedagogical Content Knowledge (TPACK) of preservice teacher education students. This paper focuses on results obtained from the online administration of the *TTF TPACK Survey*.

The implementation and findings of the Most Significant Change (MSC) methodology and are presented elsewhere in *Most Significant Change: Teaching Teachers for the Future* (Heck & Sweeney, 2012). Moreover, additional TTF related research and evaluation has been submitted for this ACEC 2012 Conference (for example, Doyle & Reading, 2012; Kigotho & Doyle, 2012; Reading & Doyle, 2012; Galstaun, Kennedy-Clark & Anderson, 2012; Henderson et al., 2012). The national and international profile is being further enhanced through TTF related research being presented and published more widely (for example, Albion, 2012a: 2012b; Anderson et al., 2011; Galstaun, Kennedy-Clark & Anderson, 2011: 2012; Galstaun, Kennedy-Clark & Hu, 2011; Kennedy-Clark, Galstaun & Anderson, 2011a: 2011b; 2012; Galstaun et al., 2011: 2012; Reynolds, Chandler & Duncan, 2012).

The *TTF TPACK Survey* Sample

Personal, Educational and Course Profile

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 10433 participants completed the first survey (T1) and 4473 participants completed the second survey (T2). This arguably represented the largest ICT related research study undertaken of initial teacher education students in Australia. Table 1 summarises the demographic data from both data collections.

Table 1: Demographic data for respondents

		T1 (Sem 1)	%	T2 (Sem 2)	%
Total responses		10433		4473	
Gender	N	10385		4446	
	Female	8633	83%	3735	84%
	Male	1752	17%	711	16%
Age	N	10337			
	< 21	2406	23%	893	20%
	21 – 30	4725	46%	2027	46%
	31 – 40	1786	17%	795	18%
	41 – 50	1141	11%	548	12%
	> 50	279	3%	156	4%
	Mean	Approx. 29			
Country of birth	N	10385		4446	
	Australia	8943	86%	3774	85%
	Other	1442	14%	672	15%
Indigenous identity	N	10355		4424	
	Aboriginal	122	1%	49	1%
	Torres Strait				

	Islander	6	< 1%	6	< 1%
	Neither	10227	99%	4369	99%
Main language at home	N	10355		4424	
	English	9726	94%	4120	93%
	Other	629	6%	304	7%
Highest qualification	N	10355		4424	
	Secondary school	5231	51%	2073	47%
	TAFE	1890	18%	899	20%
	University	2801	27%	1249	28%
	Other	433	4%	203	5%
Mother's highest qualification	N	10325		4403	
	Primary school	655	6%	309	7%
	Secondary school	4112	40%	1699	39%
	TAFE	1759	17%	829	19%
	University	2897	28%	1214	28%
	Other	544	5%	201	5%
	N/A	358	3%	151	3%
Father's highest qualification	N	10324		4401	
	Primary school	723	7%	325	7%
	Secondary school	3494	34%	1408	32%
	TAFE	2126	21%	973	22%
	University	2921	28%	1314	30%
	Other	547	5%	182	4%
	N/A	513	5%	199	5%

Responses to a question about commencement of their current study for a teaching qualification ranged from 1995 to 2012, with 2010 and 2011 as the median and modal years. Estimates about their likely year of completion ranged from 2011 to 2023, with 2013 and 2011 as the median and modal years. Thus the estimated time for completion varies between 0 and 18 years, with 3.75 years as the median number of years. Responses for the follow-up survey were similar.

The number of participants reporting affiliation with a HEI at T1 ranged from 19 to 1056. At T2 the equivalent values ranged from 1 to 556. The numbers of respondents not identifying their HEI were 20% (N=2571) at T1 and 24% (N=1416) at T2.

Summary of the Key Findings – Confidence and Usefulness

In presenting this summary of findings, this paper focuses on results derived from analyses of the section of the *TTF Survey* that deals with 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'.

Jamieson-Proctor et al. (2012) reports an analyses of data based on responses to these items in order to develop meaningful measurement subscales. The parametric analysis and Rasch analysis methods are discussed in detail by Jamieson-Proctor et al. (2012). Due to length constraints, only summaries are provided in this paper of the main results derived from those analyses.

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 & devices for professional purposes
- Selecting & using a variety of digital media & formats to communicate information
- Collaborating for professional purposes such as online professional communities
- Selecting & organising digital content & 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 & Torres Strait Islander backgrounds
- Managing challenging student behaviour by encouraging responsible use of ICT
- Digital citizenship to promote student demonstration of rights & responsibilities in use of digital resources & tools
- Engaging parents & families in the child's school through ICT
- Teaching strategies responsive to diverse student backgrounds

Generally, the range of ratings extended from approximately 4.2, where a rating of 4 is equivalent to being moderately confident through to approximately 5.6, where a rating of 7 would be extremely confident. When asked to rate the 24 items in terms of their confidence that each item would support the use of ICT for *teaching*, and with the average response per item plus standard error per occasion shown in Table 2, the higher ratings at T2 plus the non-overlapping error terms for T1 vs. T2 are consistent with these differences being statistically significant.

As indicated in Table 2, with the threshold probability set at $p<.002$ (Bonferonni family-wise correction for 24 items), the preservice teachers were significantly more positive on all items on the T2 survey.

Table 2: Nonparametric (Kruskal-Wallis) tests of T1 vs. T2 confidence ratings of 24 items related to how ICT can support teaching[1]

Q18-20 Confidence ratings	Chi-Square	df	Asymp. Sig.
Q18_C. Demonstrate knowledge of range of ICT to engage students (1)	36.10	1	0.00
Q18_C. Teach strategies responsive to diverse student backgrounds (2)	67.91	1	0.00
Q18_C. Teach strategies responsive to students learning styles (3)	37.75	1	0.00
Q18_C. Teach strategies to support students from Aboriginal & TI backgrounds (4)	51.53	1	0.00
Q18_C. Teach strategies to personalise learning activities for students (5)	40.91	1	0.00
Q18_C. Access, record, manage & analyse student assessment data (6)	15.60	1	0.00
Q18_C. Teach specific subject areas in creative ways (7)	12.04	1	0.00
Q18_C. Engage with colleagues to improve professional practice (13)	12.13	1	0.00
Q18_C. Collaborate for professional purposes such as online professional communities (14)	32.80	1	0.00
Q19_C. Design learning sequences, lesson plans & assessment that incorporate ICT use by students (6)	68.34	1	0.00
Q19_C. Select & organise digital content & resources (8)	36.91	1	0.00

[1] Wording of items abbreviated in figures and tables to accommodate available space on page.

Q19_C. Use ICT for reporting purposes such as reporting to parents/carers (10)	14.86	1	0.00
Q19_C. Demonstrate how ICT can be used to support literacy learning (11)	43.36	1	0.00
Q19_C. Demonstrate how ICT can be used to support numeracy learning (12)	46.64	1	0.00
Q19_C. Design ICT activities that enable students become active participants in own learning (13)	66.43	1	0.00
Q19_C. Select & use variety of digital media & formats to communicate info (14)	38.77	1	0.00
Q19_C. Evaluate how ICT use has helped teach specific subject area goals (15)	68.67	1	0.00
Q20_C. Engage parents & families in child's school through ICT (16)	55.17	1	0.00
Q20_C. Manage challenging student behaviour by encouraging responsible use of ICT (17)	53.66	1	0.00
Q20_C. Digital citizenship to promote student demonstrate of rights & responsibilities in use of digital resources & tools (18)	89.91	1	0.00
Q20_C. Demonstrate understanding of safe, legal & ethical use of digital info & technology (19)	25.15	1	0.00
Q20_C. Identify personal & professional learning goals in relation to using ICT (20)	65.76	1	0.00
Q20_C. Reflect on relevant ICT research to inform professional practice (21)	77.94	1	0.00
Q20_C. Use range of ICT resources & devices for professional purposes (22)	34.95	1	0.00

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 own learning
- Teaching specific subject areas in creative ways
- Accessing, recording, managing & 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 & families in the child's school through ICT
- Teaching strategies to support students from Aboriginal & Torres Straight Islander backgrounds
- Digital citizenship to promote student demonstration of rights & responsibilities in use of digital resources & tools
- Reflecting on relevant ICT research to inform professional practice
- Identifying personal & professional learning goals in relation to using ICT

The range of usefulness ratings extend from approximately 5.7, one step up from a rating of moderate confidence (4) through to 6.45, a rating only slightly below the top rating of extremely confident (7). When asked to rate 24 items in terms of the *Usefulness* of ICT to support teaching, and with the average response per item plus standard error per occasion shown in Table 2, the lack of a clear pattern of shifts in the mean scores from T1 to T2, plus the non-overlapping standard errors bars, indicate that the preservice teachers' perceptions did not differ significantly in terms of ICT's *Usefulness* for teaching at T2 from T1.

As indicated in Table 3, with the threshold probability set at p<.002 (Bonferonni family-wise correction for 24 items), the positivity of all responses varied non-significantly between T1 and T2. Further, the lowest ratings for usefulness are about the same as the highest ratings for confidence (5.7). One conclusion might be that ratings for usefulness suffer from a ceiling effect, that is, the response scale lacks sufficient room to move for participants to indicate that their perception of usefulness about ICT to support teaching has improved beyond that recorded at T1.

Table 3: Nonparametric (Kruskal-Wallis) tests of T1 vs. T2 usefulness ratings of 24 items related to how ICT can support teaching

Q18-20 Usefulness items	**Chi-Square**	**df**	**Asymp. Sig.**
Q18_U. Demonstrate knowledge of range of ICT to engage students (1)	0.54	1	0.46
Q18_U. Teach strategies responsive to diverse student backgrounds (2)	0.26	1	0.61
Q18_U. Teach strategies responsive to students learning styles (3)	4.16	1	0.04
Q18_U. Teach strategies to support students from Aboriginal & TI backgrounds (4)	0.15	1	0.70
Q18_U. Teach strategies to personalise learning activities for students (5)	0.39	1	0.53
Q18_U. Access, record, manage & analyse student assessment data (6)	3.02	1	0.08
Q18_U. Teach specific subject areas in creative ways (7)	3.16	1	0.08
Q18_U. Engage with colleagues to improve professional practice (13)	2.55	1	0.11
Q18_U. Collaborate for professional purposes such as online professional communities (14)	0.00	1	0.96
Q19_U. Design learning sequences, lesson plans & assessment that incorporate ICT use by students (6)	0.13	1	0.72
Q19_U. Select & organise digital content & resources (8)	0.00	1	0.98
Q19_U. Use ICT for reporting purposes such as reporting to parents/carers (10)	0.00	1	0.99
Q19_U. Demonstrate how ICT can be used to support literacy learning (11)	0.09	1	0.77
Q19_U. Demonstrate how ICT can+A106 be used to support numeracy learning (12)	0.15	1	0.70
Q19_U. Design ICT activities that enable students become active participants in own learning (13)	2.98	1	0.08
Q19_U. Select & use variety of digital media & formats to communicate info (14)	1.21	1	0.27
Q19_U. Evaluate how ICT use has helped ach specific subject area goals (15)	0.14	1	0.71
Q20_U. Engage parents & families in child's school through ICT (16)	0.52	1	0.47
Q20_U. Manage challenging student behaviour by encouraging responsible use of ICT (17)	4.26	1	0.04
Q20_U. Digital citizenship to promote student demonstrate of rights & responsibilities in use of digital resources & tools (18)	4.71	1	0.03
Q20_U. Demonstrate understanding of safe, legal & ethical use of digital info & technology (19)	0.63	1	0.43
Q20_U. Identify personal & professional learning goals in relation to using ICT (20)	1.95	1	0.16
Q20_U. Reflect on relevant ICT research to inform professional practice (21)	5.97	1	0.02

Q20_U. Use range of ICT resources & devices for professional purposes (22)	1.20	1	0.27

Confidence and Usefulness – ICT supports student learning

Based on responses to items asking them how confident they were 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 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 integration of curriculum areas to construct multidisciplinary knowledge
- Understanding and participating in a changing knowledge economy
- Synthesising their knowledge
- Acquiring awareness of global implications of ICT-based technologies
- Developing functional competencies in specified curriculum areas

The range of ratings extended from approximately 4.8, where a rating of 4 is equivalent to being moderately confident through to approximately 5.5, an average rating roughly equidistant from moderate (4) and extremely confident (7). When asked to rate the 24 items in terms of their confidence that they had the knowledge, skills and abilities to support students' use of ICT, and with the average response per item plus standard error per occasion shown in Table 3, the higher ratings at T2 plus the non-overlapping error terms for T1 vs. T2 are consistent with these differences being statistically significant.

As shown in Table 4, with the threshold probability set at $p<.002$ (Bonferonni family-wise correction for 24 items), the preservice teachers indicated they were more confident at T2 than T1.

Table 4: Nonparametric (Kruskal-Wallis) tests of T1 vs. T2 confidence ratings of 24 items related to how ICT can support student learning

Q21-23 Confidence items	**Chi-Square**	**df**	**Asymp. Sig.**
Q21_C. Provide motivation for curriculum tasks (9)	62.02	1	0.00
Q21_C. Develop functional competencies in specified curriculum area (10)	82.9	1	0.00
Q21_C. Actively construct knowledge that integrates curriculum areas (11)	72.68	1	0.00
Q21_C. Actively construct own knowledge in collaboration with peers & others (12)	74.80	1	0.00
Q21_C. Analyse their knowledge (13)	61.48	1	0.00
Q21_C. Synthesise their knowledge (14)	85.77	1	0.00
Q21_C. Demonstrate what they have learned (15)	54.68	1	0.00
Q21_C. Acquire knowledge, skills, abilities & attitudes to deal with techno change (16)	32.81	1	0.00

Q22_C. Integrate different media to create appropriate products (9)	55.04	1	0.00
Q22_C. Develop deep understanding about topic of interest relevant to curriculum areas studied (10)	50.48	1	0.00
Q22_C. Support elements of learning process (11)	54.71	1	0.00
Q22_C. Develop understanding of world (12)	35.03	1	0.00
Q22_C. Plan & manage curriculum projects (13)	38.27	1	0.00
Q22_C. Engage in sustained involvement with curriculum activities (14)	47.50	1	0.00
Q22_C. Undertake formative and/or summative assessment (15)	48.95	1	0.00
Q22_C. Engage in independent learning through access to education at time, place & pace of own choosing (16)	37.03	1	0.00
Q23_C. Gain intercultural understanding (17)	57.78	1	0.00
Q23_C. Acquire awareness of global implications of ICT-based technologies (18)	58.65	1	0.00
Q23_C. Communicate with others locally and globally (19)	13.80	1	0.00
Q23_C. Understand and participate in changing knowledge economy (20)	47.85	1	0.00
Q23_C. Critically evaluate own and society's values (21)	46.00	1	0.00
Q23_C. Facilitate integration of curriculum areas to construct multidisciplinary knowledge (22)	58.49	1	0.00
Q23_C. Critically interpret & evaluate worth of ICT-based content for specific Ss (23)	47.12	1	0.00
Q23_C. Gather info and communicate with known audience (24)	27.49	1	0.00

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 & pace of own choosing
- Developing understanding of the world
- Demonstrating what they have learned
- Acquiring knowledge, skills, abilities & 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 & evaluating the worth of ICT-based content for specific subjects
- Gaining intercultural understanding
- Acquiring awareness of global implications of ICT-based technologies
- Facilitating integration of curriculum areas to construct multidisciplinary knowledge
- Developing functional competencies in specified curriculum areas

The range of usefulness ratings extend from approximately one step up from a rating of moderate confidence (4) through to 6.35, a rating only slightly below the top rating of extremely confident (7). When asked to rate the 24 items in terms of the usefulness of ICT for students, and with the average response per item plus standard error per occasion shown, the lack of a clear pattern of shifts in the mean scores from T1 to T2 plus the non-overlapping standard errors bars are consistent with items at T2 not differing significantly in terms of usefulness from T1.

As indicated in Table 5, with the threshold probability set at p<.002 (Bonferonni family-wise correction for 24 items), responses on all items varied non-significantly between T1 and T2. Again, the lowest ratings for usefulness (6) are well above the highest ratings for confidence (5.45). One explanation is that the response scale lacks sufficient room for participants to indicate that their perception of usefulness of ICT to support student learning has improved beyond what they recorded at T1.

Table 5: Nonparametric (Kruskal-Wallis) tests of T1 vs. T2 usefulness ratings of 24 items related to how ICT can support student learning

Q21-23 Usefulness items	**Chi-Square**	**df**	**Asymp. Sig.**
Q21_U. Provide motivation for curriculum tasks (9)	0.22	1	0.64
Q21_U. Develop functional competencies in specified curriculum area (10)	1.20	1	0.27
Q21_U. Actively construct knowledge that integrates curriculum areas (11)	0.52	1	0.47
Q21_U. Actively construct knowledge in collaboration with peers & others (12)	0.51	1	0.48
Q21_U. Analyse their knowledge (13)	0.39	1	0.53
Q21_U. Synthesise their knowledge (14)	0.38	1	0.54
Q21_U. Demonstrate what they have learned (15)	0.52	1	0.47
Q21_U. Acquire knowledge, skills, abilities & attitudes to deal with techno change (16)	4.21	1	0.04
Q22_U. Integrate different media to create appropriate products (9)	0.31	1	0.58
Q22_U. Develop deep understanding about topic of interest relevant to curriculum areas studied (10)	0.55	1	0.46
Q22_U. Support elements of learning process (11)	0.59	1	0.44
Q22_U. Develop understanding of world (12)	0.00	1	0.98
Q22_U. Plan & manage curriculum projects (13)	0.07	1	0.80
Q22_U. Engage in sustained involvement with curriculum activities (14)	0.09	1	0.77
Q22_U. Undertake formative and/or summative assessment (15)	2.15	1	0.14
Q22_U. Engage in independent learning through access to education at time, place & pace of own choosing (16)	0.01	1	0.92
Q23_U. Gain intercultural understanding (17)	0.05	1	0.83
Q23_U. Acquire awareness of global implications of ICT-based technologies (18)	0.04	1	0.83
Q23_U. Communicate with others locally and globally (19)	0.07	1	0.80
Q23_U. Understand and participate in changing knowledge economy (20)	1.87	1	0.17
Q23_U. Critically evaluate own and society's values (21)	0.56	1	0.45
Q23_U. Facilitate integration of curriculum areas to construct multidisciplinary knowledge (22)	0.03	1	0.86
Q23_U. Critically interpret & evaluate worth of ICT-based content for specific Ss (23)	0.09	1	0.77
Q23_U. Gather info and communicate with known audience (24)	1.61	1	0.21

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Rasch analysis outcomes – Confidence and Usefulness

The Rasch analysis of the *TTF TPACK Survey* to establish the measurement properties is described elsewhere (Jamieson-Proctor et al., 2012). Four scales were confirmed as reliable (1) Confidence - teacher items; (2) Usefulness - teacher items; (3) Confidence - student items; (4) Usefulness - student items, at both T1 and T2. There was no reported increase, for the national sample, on either of the Usefulness sub-scales, between T1 and T2. However, the samples report substantive and statistically significant increases in Confidence with using ICT, both "for you as a teacher" and "for your future students" sub-scales. The results are reported as two plot lines (items estimates + SEs) on one graph for each subscale so the differences between item values (beyond their joint SEs) can be immediately appreciated. Higher locations on the graphs report higher levels of Confidence / Usefulness. T1 is BLUE, and T2 is RED.

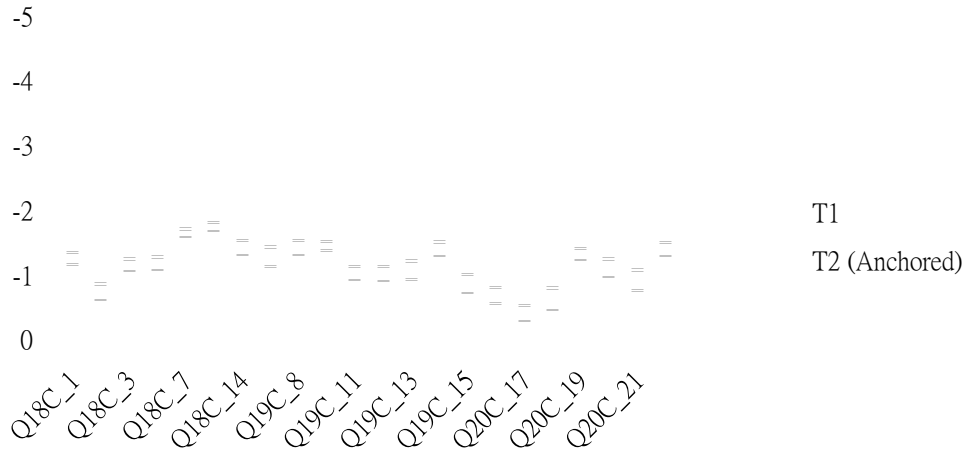

Figure 1. Confidence to use ICT for teaching (18C, 19C & 20C *combined*)
Removed items: Q18C_4 and Q18C_6

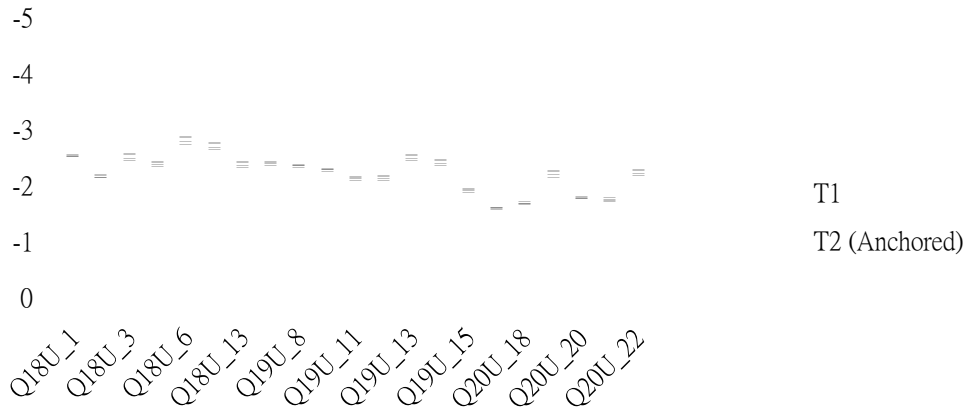

Figure 2. Usefulness of ICT for you as a teacher (18U, 19U & 20U *combined*)
Removed items: Q18U_4 and Q20U_17

Author Names: Finger, G., Jamieson-Proctor, R., Cavanagh, R., Albion, P., Grimbeek, P., Bond, T., Fitzgerald, R., Romeo, G., & Lloyd, M.

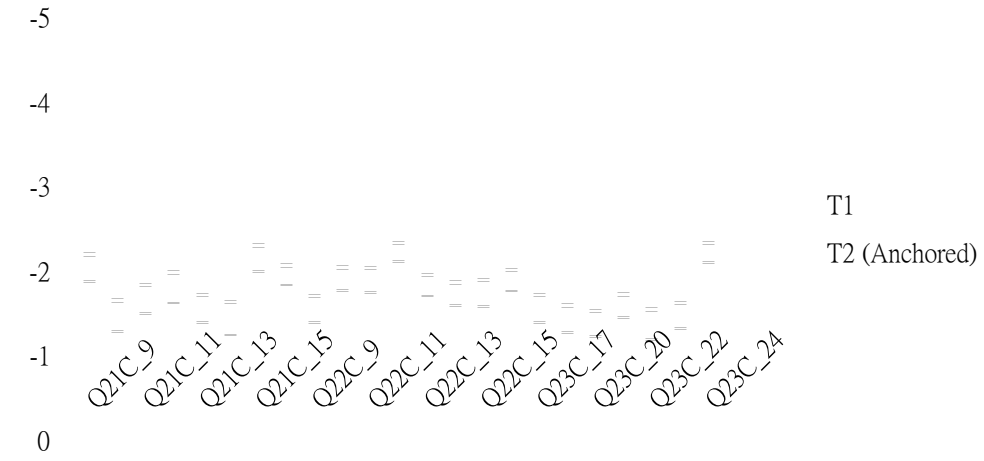

Figure 3. Confidence to facilitate student use (21C, 22C & 23C *combined*)
Removed items: 23C_19

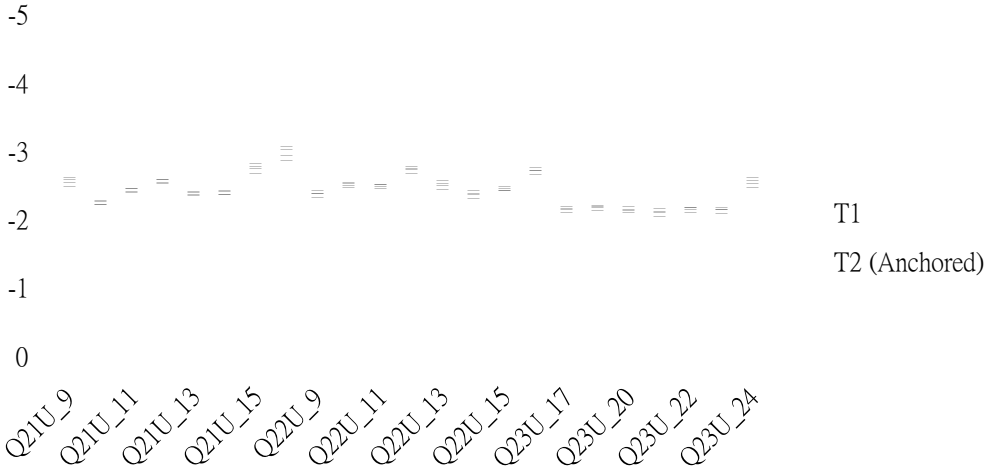

Figure 4. Usefulness for your future students. (21U, 22U & 23U *combined*)
Removed items: Q23U_19

The chief benefit of Rasch measurement scales over many others is that the outcomes are expressed as interval level measures. The graphs in this report all have the same format, and the same scale on the vertical axis. Gaps that exceed the combined errors bars are measurably different (beyond measurement error from T1 to T2). All graph origins (at 0.0 logits) are calibrated at the mean of the sample, so, for the purposes of general interpretation, the locations can be compared directly within and between graphs. It is reasonable to assume that an interval (i.e., gap between two graph locations) of *c*.0.5 logits would be educationally meaningful – not merely statistically significant. There are many ways that the graphs could be tailored to provide summary information at the individual HEI level. Such graphs can provide opportunities to detect complements and contrasts between a specific University vs. ALL University reports and guide interpretation at each HEI. Subsequent data analyses are being undertaken to produce these reports.

The data graphically displayed in Figures 1-4 complement the data presented in Tables 2-5. That is, the parametric and Rasch analysis based outcomes converge as, at the national project level, there is some agreement that:

- The scale: Confidence to use ICT as a teacher showed measurable growth across the whole scale from T1 to T2.
- The scale: Confidence to facilitate student use of ICT also showed measurable growth across the whole scale from T1 to T2.
- The scale: Usefulness of ICT for initial teacher education students as a future teacher showed no change from T1 to T2.
- The scale: Usefulness of ICT for initial teacher education students for their future students showed no change from T1 to T2.

Conclusion

This paper has provided a summary of key findings obtained from the *TTF TPACK Survey* administered at two data collection periods in 2011. This enabled data to be obtained from initial teacher education students from all 39 Australian HEIs participating in the national TTF Project. 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.** 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.

However, some caution is expressed as analysis of four sets of data using the individual HEI as the unit of analysis found marked differences from the national project results for those universities tested. Further analysis is recommended at the individual HEI level, and the data obtained can form the basis upon which to conduct further studies at HEIs at the program, institution, and national levels. Moreover, the MSC stories reported elsewhere (Heck & Sweeney, 2012) provide complementary insights about the changes which occurred within and across HEIs. We conclude by suggesting that the data collected and presented in this paper can form the basis for important longitudinal studies to be conducted.

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