MEASURING STUDENT USE OF ICT: A SUMMARY OF FINDINGS OF ICT USE IN QUEENSLAND CATHOLIC SCHOOLS

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Abstract

The measurement of student learning outcomes as a result of the use of information and communication technologies (ICT) in the curriculum has become the focus of recent investigations with a view to improving teaching and learning. For example, a 2005 AARE Conference symposium provided insights into a range of current approaches for measuring ICT use in Australian schools (Fitzallen & Brown, 2006; Lloyd, 2006; Trinidad, Newhouse & Clarkson, 2006; Finger, Jamieson-Proctor, & Watson, 2006). These approaches stem from requirements for the measurement of student outcomes as a result of ICT integration, in line with recent priorities that emphasise outcomes (Andrich, 2002) and accountability (Gordon, 2002). However, researching and measuring the impact of ICT integration in schools has been found to be problematic (Cuttance, 2001). In Queensland, an instrument for measuring student use of ICT in the curriculum was developed, trialled and evaluated (Jamieson-Proctor, Watson, Finger, Grimbeek, & Burnett, 2007). This instrument has shown to be useful in measuring ICT use by students in Queensland State schools (Jamieson-Proctor & Finger, 2006; Jamieson-Proctor, Burnett, Finger & Watson, 2006). This paper summarises the findings obtained from the administration of the instrument in 130 Catholic schools in Queensland.

Keywords   8 Information Communication Technology [ICT]

Introduction

While Information and Communication Technology (ICT) curriculum integration has become the goal of educational initiatives throughout all Australian states and territories, and in state,independent and Catholic schooling systems, what is meant by ICT integration is not easily defined and therefore is less easily measured. Consequently, the measurement of student learning outcomes as a result of the use of ICT in the curriculum has become the focus of recent investigations with a view to developing approaches whereby ICT can be used to enhance and even transform teaching and learning. For example, a 2005 Australian Association for Research in Education (AARE) Conference Symposium provided insights into a range of current approaches for measuring ICT use in Australian schools (Fitzallen & Brown, 2006; Lloyd, 2006; Trinidad, Newhouse & Clarkson, 2006; Finger, Jamieson-Proctor, & Watson, 2006). These approaches stem from requirements for the measurement of student outcomes as a result of ICT integration, in line with recent priorities that emphasise outcomes (Andrich, 2002) and accountability (Gordon, 2002). However, researching and measuring the impact of ICT integration in schools has been found to be problematic (Cuttance, 2001). The literature indicates the complexity of rationales and terminology that underwrite various initiatives; various dimensions and stages of integration; inherent methodological difficulties; obstacles to integration; and significant issues relating to teacher professional development and ICT competencies (Jamieson-Proctor, Watson, & Finger, 2003).

In Queensland, an instrument for measuring student use of ICT in the curriculum was developed, trialled and evaluated (Jamieson-Proctor, Watson, Finger, Grimbeek, & Burnett, 2007). The survey instrument *Learning with ICTs: Measuring ICT Use in the Curriculum* (available for download and use at
http://education.qld.gov.au/smartclassrooms/strategy/sp_census_learning.html) enables teachers, schools and systems to gauge the extent, quality and impact of their ICT curriculum integration strategies. By using the tool, schools can:
• 	identify the current and preferred level of ICT curriculum integration in each of their classrooms;
• 	identify each individual class's access to ICT; and
• 	**generate discussion and think strategically about the best ways to use and integrate ICT into the classroom. (Department of Education, Training and the Arts, 2005)**

This instrument has shown to be useful in measuring ICT use by students in Queensland State schools (Jamieson-Proctor & Finger, 2006; Jamieson-Proctor, Burnett, Finger & Watson, 2006). This paper reports the results obtained from the administration of the instrument in 130 Catholic schools across Queensland (N=1723) in order to investigate teacher perceptions about their confidence to use ICT with their students for teaching and learning and the relationship between those levels of confidence and the quantity and quality of student use of ICT for learning in Queensland Catholic schools. Therefore, this paper progresses the suggestions made at the 2005 AARE Conference Symposium by providing an account of the further use of the instrument for measuring student use of ICT in another schooling sector.

Method

Subjects

A total of 1723 participants drawn from five Queensland Catholic Diocese: Brisbane (N=676, 39%), Cairns (N=27, 2%), Townsville (N=108, 6%), Rockhampton (N=354, 21%), Toowoomba (N=434, 25%); together with a group of Religious Institutes (Christian Brothers schools (N=124, 7%) completed the survey instrument - *Learning with ICTs: Measuring ICT Use in the Curriculum.*

Of the total number of participants, 74% (1272) were female. Participants predominantly came from Primary schools with preparatory programs (40%, n=689) and Secondary schools (39%, n=666), with another 12% (n=213) coming from Primary schools with preschool programs. The remaining 9% came from an array of four other settings (P-12, P-10, Middle School, Special Education units, & Other).

Table 1. Demographic information detailing teacher numbers by school type, years of teaching experience, and confidence in using ICTs for teaching and learning

Demographic Descriptor	Number of teachers	%
Gender:		
Female	1272	74
Male	451	26
School Type:		
Primary with Preparatory students	689	40.0
Primary with Preschool students	213	12.4
Secondary	666	38.7
P-12, P-10	96	5.6
Middle School	11	0.6
Special Education Unit	1	0.1
Other	47	2.7
Years of Teaching Experience:		
0-5years	433	25.1
6-10 years	287	16.7
11-20 years	440	25.5
21-30 years	389	22.6
More than 30 years	174	10.1
Confidence to use ICT for Teaching and Learning:		
Very little confidence	148	8.6
Some confidence	616	35.8
Reasonably confident	680	39.5
Very confident	279	16.2
Total	**1723**	**100**

As illustrated in Table 1, in terms of the years of teaching experience of participants, results were spread reasonably evenly across the five response categories and, in total, 58% of teachers surveyed had more than 10 years of teaching experience. Further, participants were asked to

indicate their level of confidence in using ICT with students. Table 1 indicates that 75% felt moderate levels of confidence (either some confidence or reasonable confidence). A relatively small percentage (9%) reported very little confidence and another 16% reported that they were very confident to use ICT for teaching and learning.

Participants were asked to nominate the extent their students currently used ICT (Never, Sometimes, Often, Very Often) at each Year level they taught. They were asked to focus on one class only, preferably the class they taught for the most time, if they taught more than one class at each level. Table 2 reports these data.

Table 2: Percent of teachers indicating their students used ICT (by Year level taught)

| Year level | % of Respondents indicating students use ICT by Year level | | | | | |
	NA/Null	Never	Sometimes	Often	Very often	Total
Preschool	94.9	2.3	2.1	0.5	0.2	100
Prep	91.6	2.4	3.5	1.9	0.6	100
Year1	86.4	2.9	7.4	2.6	0.6	100
Year2	84.9	2.6	8.5	3.1	1.0	100
Year3	85.3	2.4	7.4	3.8	1.1	100
Year4	85.2	2.4	6.2	5.3	0.9	100
Year5	84.7	2.3	6.2	5.3	1.5	100
Year6	84.9	2.1	4.8	5.6	2.6	100
Year7	84.6	1.9	4.6	6.0	3.0	100
Year8	68.2	2.5	13.8	9.8	5.8	100
Year9	65.4	1.9	13.8	12.5	6.4	100
Year10	65.2	1.7	11.3	13.8	8.1	100
Year11	65.8	1.2	9.7	12.5	10.7	100
Year12	67.3	1.1	8.9	11.8	10.9	100
Specialist teacher	93.0	1.1	2.3	1.7	1.9	100
Other settings	97.3	1.2	0.9	0.3	0.3	100

Note that NA/Null responses for each Year level range from 65-97%, which means that at most 35% and at least 3% of participants indicated that they currently teach one of the specific year levels. Thus, when the data are broken down by Year level, it becomes obvious that the distribution of responses in terms of frequency may not provide a reliable indicator of the total population of teachers teaching in these Year levels across the entire Catholic system in Queensland. Similar frequency distributions were noted for Curriculum Area and, therefore, these results are not reported here. Generally speaking, these indications of ICT use should not be relied on in terms of generalising to the entire population of teachers and classrooms.

Measurement instrument

Besides the demographic data on teachers (gender, school type, years of teaching experience, confidence to use ICT with students for teaching and learning, year levels and curriculum areas currently taught), the *Learning with ICT: Measuring ICT Use in the Curriculum* instrument contains 20 items, with response categories on a 4-point Likert scale ranging from Never (1) to Very Often (4), that investigate both the quantity and quality of student use of ICT for learning.

Two frequency-of-use scales are used to reflect the 'current' and 'preferred' teacher perceptions of ICT use by their students. The instrument was found to contain two strong factors. The first factor is comprised of 14 items that define ICT as a tool for the development of ICT-related skills and the enhancement of curriculum learning outcomes. The second factor comprises 6 items that define ICT as an integral component of reforms that change what students learn and how school is structured and organised (Jamieson-Proctor et al., 2003, 2007). In the present study, after excluding six cases with missing data, confirmatory factor analysis was used to test this two factor solution for the remaining 1717 participants.

Table 3 contains the standardised regression weights and the scale Alphas for both dimensions of the *Learning with ICT: Measuring ICT Use in the Curriculum* instrument. All standardised regressions load moderately to strongly on the variables. Each of the two latent variables is statistically significantly associated with each of these coefficients (p<.001), and the alpha value for the scale exceeds 0.800.

Table 3: Confirmatory Factor Analysis for the *Learning with ICT: Measuring ICT Use in the Curriculum* Instrument (N = 1717)

Items	Factor 1	Factor 2
In my class, <u>students use</u> ICTs to…	**Standardised Regression Weights**	
2 provide motivation for curriculum tasks.	.681	
3 develop functional competencies in a specified curriculum area.	.700	
4 actively construct knowledge that integrates curriculum areas.	.730	
5 actively construct their own knowledge in collaboration with their peers and others.	.727	
6 synthesise their knowledge.	.744	
7 demonstrate what they have learned.	.738	
9 acquire the knowledge, skills, abilities and attitudes to deal with on-going technological change.	.729	
10 integrate different media to create appropriate products.	.718	
12 develop deep understanding about a topic of interest relevant to the curriculum area/s being studied.	.723	
13 support elements of the learning process.	.745	
15 develop a scientific understanding of the world.	.580	
17 plan and/or manage curriculum projects.	.701	
18 engage in sustained involvement with curriculum activities.	.773	
20 undertake formative and/or summative assessment.	.692	
1 engage in independent learning through access to education at a time, place and pace of their own choosing.		.415
8 gain intercultural understanding.		.421
11 acquire awareness of the global implications of ICT-based technologies on society.		.514
14 communicate with others locally and globally.		.348
16 understand and participate in the changing knowledge economy.		.504
19 critically evaluate their own and society's values.		.538
Cronbach's Alpha	**0.931**	**0.829**

NB. (All estimates statistically significant at p < .001 level)

For the purposes of this study, one baseline close-fit index (RMSEA: Root mean square error of approximation) and two incremental close-fit indices (TLI & CFI) were chosen. Here, a baseline

fit of 0.06 (Hu & Bentler, 1999) and close-fit indices of 0.90-0.95 (Byrne, 2001) would be considered acceptable. As shown in Table 4, the 20-item, 2-factor model appears to support the ICT model proposed by Jamieson-Proctor et al. (2007).

Table 4: Fit indices for the *Learning with ICT: Measuring ICT Use in the Curriculum Instrument* 2-dimensional model

Items	Ideal values	20-item model
Chi square		413.73
RMSEA	0.00-0.06	.07
TLI	0.90-1.00	.92
CFI	0.90-1.00	.93

NB. CFI=Comparative fit index, RMSEA=root mean square error of approximation, TLI=Tucker-Lewis index.

Finally, the two latent factors are correlated at the 0.91 level, which suggests that the current 20-item instrument would also work well as a single scale. This outcome is not surprising, given the theoretical basis of the two dimensions. Dimension 1 relates to using ICT to *enhance* the current curriculum while Dimension 2 relates to *transforming* teaching and learning. Therefore, participants who report high levels of ICT use on Dimension 2 are also most likely to have reported high levels on Dimension 1.

Results

The data were analysed using the Statistical Package for the Social Sciences (SPSS 14). Chi-square (χ^2) tests were used to investigate relationships between teacher gender, years of teaching experience, and teacher confidence to use ICT with their students for teaching and learning. Chi-square is a non-parametric test of significance suitable for nominal and ordinal data where the data are classified into discrete categories such as gender or confidence levels and then treated as frequencies. "Chi square tests hypotheses [sic] about the independence (or alternatively the association) of frequency counts in various categories" (Burns, 1990, p. 153). Multivariate analyses of variance (MANOVA) were used to compare the mean scores on both the current and preferred scales of the instrument by gender, years of teaching experience, and teacher confidence. This was followed, if the MANOVA was significant ($p < .05$), by univariate analyses of variance (*F*-tests) for each of the significant dependent variables. Analyses of variance are appropriately used to test for difference both between and within groups. This section will report the results for each analysis individually.

1. Is there a relationship between teacher gender and teacher confidence to use ICTs with students for teaching and learning?

When the confidence level of male and female teachers (1=Very Little confidence; 2=Some confidence; 3=Reasonably confident; and 4=Very confident) was compared using the Pearson Chi-square test of significance, a significant difference between genders with respect to their confidence in using ICT with their students for teaching and learning was found, χ^2 (3, *N*=1717) =101.15, $p < .001$. Female teachers were more likely to indicate Some confidence, while male teachers were more likely to indicate that they were Very confident. Table 5 displays the frequencies for each category for male and female teachers as percents of the total population.

Table 5: Frequency of confidence in using ICT with students for teaching and learning for male and female teachers (N=1717)

	Teacher Gender		
	% Female	% Male	% Of Total
Very little confidence	9.4	6.5	8.6
Some confidence	40	23.9	35.8
Reasonably confident	39.4	39.4	39.4
Very confident	11.2	30.2	16.1
Total %	100	100	100

Further, when the data were recoded to indicate two levels of teacher confidence for ease of comparison (Unconfident=Very little or some confidence, Confident=Reasonably or Very confident) the Pearson Chi-square test result indicated that female teachers were significantly less confident than male teachers, χ^2 (1, N=1717) = 48.06, p < .001, with 49.4% of females and 30.4% of males indicating they were unconfident, while 50.6% of females and 69.6% of males indicated they were confident with respect to their use of ICT with their students for teaching and learning. Thus, gender is significantly related to confidence in using ICT with students for these teachers.

2.   Is there a difference between male and female teachers with respect to the frequency that their students use ICT for learning?

A MANOVA was used to compare the current and preferred means of male and female teachers for the two dimensions of ICT use defined by the instrument, namely: (D1) ICT as a tool for the development of ICT-related skills and the enhancement of curriculum learning outcomes; and (D2) ICT as an integral component of reforms that change what students learn and how school is structured and organised.

The multivariate result was significant for gender, Pillai's Trace = .03, F = 13.29, df = (4,1712), p = .001, indicating a general difference in the level of student use of ICT between male and female teachers. The univariate F tests showed there was a significant difference between males and females for D1, F = 28.94, df=(1,1715), p < .001, and D2, F = 51.78, df=(1,1715), p < .001, with respect to how frequently their students *currently* use ICT. The univariate F tests also showed there was a significant difference between males and females for D1, F = 11.31, df=(1,1715), p < .01, and D2, F = 14.40, df=(1,1715), p < .001, with respect to how frequently they would *prefer* their students to use ICT.

Table 6: A comparison of means (with Standard Deviations) for male and female teachers for the two dimensions of ICT use by students for both the Current and Preferred scales (N = 1717)

Teacher Gender	Dimension 1 Current Use	Dimension 1 Preferred Use	Dimension 2 Current Use	Dimension 2 Preferred Use
Female	2.05 (0.02)[*]	2.82 (0.02)[*]	1.68 (0.01)[*]	5.54 (0.02)[*]
Male	2.21 (0.03)[*]	2.92 (0.03)[*]	1.88 (0.02)[*]	2.67 (0.03)[*]

[*] indicates significance at p < .05

Table 6 indicates that male and female teachers differ with respect to how they perceive their students currently use ICT and also how they'd prefer their students to use ICT. It would seem that the students of male teachers currently use ICT more frequently than the students of female teachers for both the curriculum enhancement and transformation dimensions of ICT use. Interestingly, while male teachers indicate higher current student use of ICT for both dimensions

of use, female teachers would prefer their students to use ICT more in order to transform teaching and learning (D2) than male teachers.

3. Is there a difference between unconfident and confident teachers in the frequency that their students use ICT for learning?

A MANOVA was used to compare the current and preferred means on both dimensions of ICT use of teachers with little confidence as opposed to teachers who indicated they were confident in using ICT with their students for teaching and learning.

The multivariate result was significant for confidence, Pillai's Trace = .09, F = 43.22, df = (4,1712), $p < .001$, indicating a general difference in the level of student use of ICT between unconfident and confident (female and male) teachers. The univariate F tests showed there was a significant difference between unconfident and confident teachers for D1, F = 145.33, df=(1,1715), $p < .001$, and D2, F = 95.78, df=(1,1715), $p < .001$, with respect to how frequently students *currently* use ICT. The univariate F tests also showed there was a significant difference for confidence both for D1, F = 124.46, df=(1,1715), $p < .001$, and D2, F = 91.30, df=(1,1715), $p < .001$, with respect to how frequently they *preferred* their students to use ICT.

Table 7: Comparison of means (with Standard Deviations) for unconfident and confident teachers for two dimensions of ICT use by students for both the Current and Preferred scales (N = 1717)

Teacher Confidence Level	Dimension 1 Current Use	Dimension 1 Preferred Use	Dimension 2 Current Use	Dimension 2 Preferred Use
Unconfident	1.92 (0.02) [*]	2.68 (0.02) [*]	1.60 (0.02) [*]	2.42 (0.02) [*]
Confident	2.22 (0.02) [*]	2.97 (0.02) [*]	1.84 (0.02) [*]	2.70 (0.02) [*]

* indicates significance at $p < .05$

These results indicate that for both dimensions of ICT use, teachers who feel more confident to use ICT with their students for teaching and learning report that their students currently use ICT more than the students of unconfident teachers. Further, they also would prefer their students to use ICTs more for teaching and learning than do unconfident teachers.

4. Is there a relationship between length of teaching experience and confidence to use ICT with students for teaching and learning?

When the teachers' confidence to use ICT with their students for teaching and learning was compared based on their different numbers of years of teaching experience (<=5 years; 6-10 years; 11-20 years; 21-30yrs, >30yrs) a statistically significant difference was found, χ^2 (4) = 40.38, $p < .001$.

Table 8: Confidence in using ICT with students for teaching and learning for teachers with different numbers of years of experience as a % (N=1717)

Years of Teaching Experience (% of Total)	Teacher Confidence Level		
	% Unconfident	% Confident	% of Total
<=5yrs (25.1)	38.1	61.9	100
6-10yrs (16.7)	33.1	66.9	100
11-20yrs (25.5)	47.0	53.0	100

21-30yrs (22.6)	53.2	46.8	100
>30yrs (10.1)	52.9	47.1	100
Total % (100)	44.4	55.6	100

* Significant at *p* < .05

Thus, years of teaching experience, which is an approximate indication of teacher age, was a significant determiner of the confidence of these teachers to use ICT with their students for teaching and learning. Table 8 shows the frequency of responses provided by each of the five experience groups. More specifically, years of teaching experience (and probably therefore teacher age) is significantly related to teacher confidence in using ICT with students for teaching and learning for this group of teachers such that teachers with less than 10 years of experience (41.8%) are more likely to report that they are confident about using ICT, whereas teachers with more than 20 years of experience (32.7%) are less likely to report that this is the case.

Table 9: Confidence in using ICTs with students for teaching and learning for teachers with different numbers of years of teaching experience as a % (N=1717)

Years of Teaching Experience	% Unconfident	% Confident	% of Total
0-20 years (67.3%)	40.2	59.8	100
>20 years (32.7%)	53.1	46.9	100
Total	44.4	55.6	100

As might be expected, when the five groups of years of teaching experience were collapsed to form two levels (0-20 yrs, >20 yrs), the effect for years of teaching experience was statistically significant (χ^2 (1, N=1717) =25.50, p < .001) such that teachers with 0-20 years (67.3%) tended to be confident whereas those with more than 20 years (32.7%) tended to be unconfident.

5. Is the frequency that students use ICT for learning affected by the number of years of teaching experience of the teacher?

A MANOVA was used to compare the current and preferred means of each dimension of ICT use by the teachers' years of experience (0-20yrs, >20 yrs).

The multivariate result was significant for years of teaching experience by frequency of student use of ICT, Pillai's Trace = .01, *F* = 5.23, *df* = (4,1712), *p* > .001, indicating a general effect on student frequency of ICT use by teachers' years of experience. The univariate *F* tests showed there was no significant difference between teachers with different numbers of years of experience for the *current* scale. However, years of experience did impact significantly on the teachers' *preferred* student frequency of use for the first dimension, *F* = 11.64, *df*=(1,1715), *p* < .01, as well as the second dimension, *F* = 6.41, *df*=(1,1715), *p* < .05.

Table 10: A comparison of means (with Standard Deviations) for teachers with 0-20 and >20 years of teaching experience for the two dimensions of ICT use by students for both Current and Preferred scales (N = 1717)

Teacher Experience	Dimension 1 Current Use	Dimension 1 Preferred Use	Dimension 2 Current Use	Dimension 2 Preferred Use
0-20 years (67.3%)	2.09 (0.02)	2.88 (0.02)*	1.73 (0.02)	2.60 (0.02)*
>20 years (32.7%)	2.08 (0.02)	2.78 (0.02)*	1.75 (0.02)	2.52 (0.03)*

* Significant at $p < .05$

As shown in Table 10, the effect for years of teaching experience differs significantly in terms of *preferred* use, such that less experienced teachers (<20 years) are likely to rate both Dimension 1 (curriculum enhancement with ICTs) and Dimension 2 (transforming the curriculum with ICTs) more highly than their more experienced colleagues.

6.   Is there a difference in teacher confidence related to school type?

Table 11: Teacher confidence in using ICT by school type (N = 1658)

	Teacher Confidence Level		
School Type	% Unconfident	% Confident	% of Total
Primary with preparatory	44.8	55.2	100
Primary with preschool	55.9*	44.1*	100
Secondary	41.0	59.0	100
P-10/ P-12	47.8	52.2	100
Total	**44.9**	**55.1**	**100**

* Significant at $p < .05$

The association between teacher confidence and type of school (Primary (prep), Primary (Pre), Secondary, P-10/P-12) was such that the effect on confidence of type of school was statistically significant (χ^2 (df=3, N=1658) =14.84, p < .01). Teachers in Primary schools with preschool programs tended to be relatively less confident about using ICT with students for teaching and learning than teachers in the other three school types. In total, the data suggests that approximately half of the teachers across the four school types surveyed reported that they felt unconfident in using ICT with students for teaching and learning.

7.   Is there a difference between teachers in different types of school with respect to the frequency that their students use ICT for learning?

A MANOVA was used to compare the current and preferred means of each dimension of ICT use by type of school (Primary with prep; Primary with preschool; Secondary; P-10/P-12).

The multivariate result was significant for type of school by frequency of student use of ICT, Pillai's Trace = 0.114, $F = 16.37$, $df = (12,4959)$, $p > .001$, indicating a general effect on student frequency of ICT use by school type. The univariate F tests showed a significant difference for type of school for D1 ($F = 29.45$, $df=(3,1654)$, $p < .001$) and D2 ($F = 53.48$, $df=(3,1654)$, $p < .001$) of the *current* scale and D1 ($F = 8.41$, $df=(3,1654)$, $p < .001$) and D2 ($F = 11.10$, $df=(3,1654)$, $p < .001$) of the *preferred* scale.

Table 12: A comparison of means (with Standard Deviations) for the two dimensions of ICT use by students, and for Current and Preferred scales in terms of School type (N = 1657)

School Type	Dimension 1 Current Use	Dimension 1 Preferred Use	Dimension 2 Current Use	Dimension 2 Preferred Use
Primary with prep	2.04 (0.02)	2.80 (0.02)*	1.63 (0.02)*	2.50 (0.02)*
Prim with preschool	1.85 (0.04)*	2.73 (0.04)*	1.50 (0.03)*	2.47 (0.04)*
Secondary	2.22 (0.02)*	2.90 (0.02)*	1.91 (0.02)*	2.66 (0.02)*

P-10/P-12	2.04 (0.06)	3.00 (0.06) *	1.70 (0.05)	2.68 (0.06) *

* Significant at *p* < .05

As shown in Table 12, for D1 *current* teachers from Secondary schools were most likely, and those from Primary schools with preschool programs least likely, to report their students frequently use ICT for learning. For D1 *preferred*, teachers from P-10/P-12 and Secondary schools were most likely and teachers from Primary schools (Pre/Prep) least likely to report that their students frequently use ICTs for learning. For D2 *current,* teachers from Secondary schools were most likely and teachers from Primary (prep/pre) least likely to report their students frequently use ICTs for learning. For D2 *preferred*, teachers from Secondary and P-10/P-12 were most likely and teachers from Primary (Pre/Prep) least likely to report their students frequently use ICT for learning. The data indicate that students in Secondary schools in general are reported by their teachers to currently use ICT for learning more than students in primary schools, and further, Secondary teachers appear to prefer that their students use ICT for learning more than do primary teachers across both dimensions of ICT use.

8.   Is there a difference between mean scores for the current and preferred scales for each of the two dimensions of student use of ICT?

The difference in mean values for the current versus preferred estimates of D1 and D2 were examined via repeated measures ANOVA with dimension and context (current or preferred) entered as nested repeated measures. The dependent variables were Current (D1 vs. D2) VS Preferred (D1 vs. D2). This analysis examines the main effects for dimension and context and also examines the interaction between these. The main effects for dimension (D1 vs. D2: F $(1,1716) = 4576.40$, $p < 001$)) and context (current vs. preferred: (F 1,1716) = 2027.27, $p < 001$)) was statistically significant, as was the interaction between these (F (1,1716) = 144.29, $p < 001$).

Table 13: Comparison of means (with Standard Deviations) for two dimensions of ICT use by students for both the Current and Preferred scales (N = 1717)

Scale	Dimension		
	D1	**D2**	**Average (Context)**
Current	2.09 (0.01) *	1.73 (0.01) *	1.91
Preferred	2.84 (0.01) *	2.58 (0.01) *	2.71
Average (D)	2.47	2.16	

* Significant at *p* < .05

As shown in Table 13, regardless of context (current or preferred), teachers report higher levels of use for ICTs for Dimension 1 than Dimension 2. Also, regardless of dimension, teachers would prefer their students use ICTs for learning more than they are currently doing.

When both context and dimension are taken into account then, it appears that teachers report higher levels of use relative to D1 than D2 in both current and preferred contexts. However, teachers also report that they would prefer higher levels of student use of ICTs for D1 and D2 separately than are currently being achieved.

Conclusion

This paper has investigated eight questions with respect to teacher perceptions about their confidence to use ICT with their students for teaching and learning and its resultant impact on the quantity and quality of student use of ICT for learning in Queensland Catholic schools. The paper has provided data on the confidence with which teachers use ICT with students for teaching and learning related to teacher gender, years of experience, and school type. It has also provided

evidence of the quantity and quality of student use of ICT for learning related to these three variables.

Overall, the analysis found that male teachers report significantly higher levels of confidence in using ICT with students for teaching and learning and the students of male teachers, or confident teachers, currently use ICT more frequently to both enhance and transform the curriculum. However, interestingly, female teachers would prefer their students to use ICT more to transform teaching and learning experiences rather than to enhance the current curriculum offering. Further, there was a significant relationship between years of teaching experience and teacher confidence, with less experienced (more recently qualified/younger) teachers indicating that they were more confident to use ICT with their students for teaching and learning. Also, years of experience impacted significantly on the level of use that teachers prefer their students to use ICT; with teachers who have had less than 20 years experience preferring their students to use ICT more to both to enhance and transform the curriculum. The results also indicated that in educational settings where there is a Primary school with a preschool, teachers were less confident than teachers in other school types in terms of their students' use of ICT for learning. Secondary and P-10/P-12 teachers generally were more likely than Primary (Pre/Prep) teachers to report that their students currently used ICT to enhance and transform the curriculum, and they prefer that their students would do so more frequently. Lastly, when the differences between current and preferred levels of student use of ICT for both dimensions were investigated, teachers in general indicated that they would prefer their students to use ICT more than they are currently using it to both enhance and transform the curriculum. The results further demonstrated that teachers currently use ICT more to enhance the curriculum than to transform it and that they prefer this trend to continue.

In summary, the results of this investigation involving 1723 Queensland Catholic system teachers strongly support the finding that teacher confidence is a major factor determining teachers' and students' engagement with ICT. This result supports that of Jamieson-Proctor et al., (2006) in a study involving 929 state school teachers in Queensland. Interestingly though, more experienced Catholic system teachers, as represented by the subjects in this study, would prefer to increase their students' level of use of ICT, in order to transform teaching and learning experiences. This is a reversal of the trend found with state school teachers (Jamieson-Proctor et al., 2006). There also appears to be a close relationship between such factors as teacher gender, confidence, and school type, and these factors impact significantly on the level of student use of ICT. For example, it would appear from these results that it could be inferred that less experienced (younger/more recently graduated), male teachers in the Catholic system are the most confident users of ICT with their students for teaching and learning. Furthermore, the students of these teachers more frequently use ICT for learning than do the students of other teachers. These results provide both positive trends as well as continuing challenges for the Catholic system in Queensland.

The evidence supplied by this research, which supports results found in previous studies, should provide the basis for an investigation of, among other things, the factors that afford and constrain teacher confidence in using ICT with students for teaching and learning, and in particular why more experienced female teachers are less confident than their less experienced male counterparts. In addition, it appears that there are still substantial numbers of teachers who reported that they remained unconfident in using ICT, suggesting the need for continuing professional development. Perhaps, systemically, interventions based on further research could address this imbalance aimed at providing better outcomes for students with respect to their use

of ICT for learning. It would be particularly interesting, in view of the international trends in l ICT initiatives which aim to transforming learning with ICT in an increasingly globalised, knowledge economoy, to undertake an investigation into why female teachers perceive value in transforming the curriculum with ICT rather than simply enhancing the current curriculum through integrating ICT use within existing frameworks.

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