Relationship between pre-service and practising teachers' confidence and beliefs about using ICT

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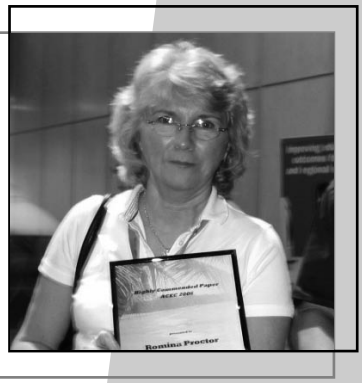

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ABSTRACT

ICT curriculum integration is the apparent goal of an extensive array of ICT initiatives in all Australian states and territories. However, the reported impact of ICT use by teachers on learning and teaching is by no means consistent. Explanations offered for this in the literature include the influence of teacher confidence and expertise, and teacher beliefs about the potential for ICT to make a difference to student learning, as well as issues around teacher professional development, school technological infrastructure and technical support along with the need for leadership. This paper re-analyses data sets from two previously unlinked studies to investigate the relationship between pre-service and practising teachers' confidence in using ICT with students and beliefs about the extent to which computers can improve student learning outcomes. The results show that differences between male and female teachers in their confidence to use ICT with students are not a reflection of undergraduate teacher beliefs about computers. Gender differences would appear to emerge post-graduation. The results from this study warrant further investigation into why female teachers are less confident than their male colleagues and therefore why their students use ICT less frequently than students of more confident male teachers. Given that70% of the teaching workforce in Queensland state schools is female, this has major implications for student use of ICT.

INTRODUCTION

Rapid technological change and global communication are a fact of life in the 21st century. The increasing appearance of ICT in schools through improved provision of computer hardware, infrastructure and connectivity, as a result of a plethora of recent ICT initiatives, provides powerful evidence of the global, social and technological changes that have contributed to the 'new times' we live in. Further, these generally system level ICT initiatives foreground an overt expectation by governments and communities that schools and teachers will provide students with access to ICT experiences that enrich their learning. It is therefore imperative that educators are aware of and able to skilfully manage, at the classroom level, the impacts that result from these social, cultural, political and economic trends and educational initiatives. Roblyer (2004) states that

> *One of the things that makes teaching so challenging is that it goes on in an environment that mirrors – and sometimes magnifies – some of society's most profound and problematic issues. Adding computers to this mix makes the situation even more complex. Yet to integrate technology successfully into their teaching, educators must recognize and be prepared to work in this environment with all of its subtleties and complexities. (p. 15)*

However, research on the impact of curriculum integration of ICT by teachers has generally reported very little impact on classroom teaching and learning (Proctor, Watson, & Finger, 2003). Explanations offered for this include the influence of teacher confidence and expertise, and teacher beliefs about the potential for ICT to make a difference to student learning, as well as issues around teacher professional development, school technological infrastructure and technical support along with the need for leadership (Cowie & Jones, 2005). In 2003, the British Educational Communications and Technology Agency (Becta) reported that there are close relationships between many of the identified barriers to teacher use of ICT and further, any factors influencing one barrier are likely to also influence several other barriers. For example, teacher confidence is directly affected by levels of personal access to ICT, levels of technical support and the quality of training available (Becta), 2003, p. 1).

The educational challenges associated with the complexity of factors influencing teacher ICT use in the curriculum require close scrutiny, analysis and responses to capitalise upon the potential affordances of ICT for teaching and learning. It is also self evident that university graduates, regardless of discipline, must have appropriate information and communication technology (ICT) competencies to function and be employable in the modern world (Department of Education, Training and Youth Affairs (DETYA), 2000; National Research Council, 1999; Winship, 2001). In addition to the requirement that all

university graduates have appropriate ICT competencies to position Australia within a 'knowledge society' and an 'information economy' (DETYA, 2000), education graduates have the additional responsibility of developing ICT competencies that will support the learning of their future students. ICT standards for teachers have been identified for the United States (International Society for Technology in Education (ISTE), 2000) and the United Kingdom (Becta, 2003). In Australia, a framework for teacher ICT competency has been proposed (Department of Education Science and Training (DEST), 2002). In Queensland, the Queensland College of Teachers (formally the Board of Teacher Registration) (2002) has professional standards that specifically require teacher education graduates to be "confident with multiliteracies and proficient in the use of ICT in learning environments" (p. 6). Education Queensland's (2003) *ICTs for Learning Continua* identifies key areas of ICT and curriculum integration, classroom planning and management; productive pedagogies through the use of ICT; ICT knowledge, skills processes and attitudes; and decision making and planning that are required of its teachers.

In summary, the training and professional development of future teachers in the use of ICT needs to be foregrounded in teacher education programs (Watson, Jamieson-Proctor, Finger, & Lang, 2004). Clearly, there are identifiable expectations that graduates from tertiary teacher education programs will have developed an array of ICT competencies, knowledge, skills and attitudes which they will be expected to use in their future careers as teachers in both current and emerging educational contexts to enhance their students' learning outcomes. This paper reports the results obtained from a comparison of practising teachers' perceptions about their confidence to use ICT with their students for teaching and learning with pre-service teachers' beliefs about computers. Implications pertaining to the resultant impact on the quantity and quality of student use of ICT for learning in schools are discussed.

METHOD

Subjects

Two cohorts of subjects were compared in this study: (1) 929 practising primary and secondary teachers and (2) 285 pre-service primary and secondary teachers. The practising teachers came from 38 Queensland state schools who voluntarily applied the Learning with ICT: Measuring ICT Use in the Curriculum instrument (Jamieson-Proctor, Watson, & Finger, 2005) to their individual teaching context in late 2003 as part of Education Queensland's (EQ) ICTs for Learning Annual Census. The 285 pre-service teachers comprised 217 students from the primary Bachelor of Education program and 68 from the secondary program of one Queensland university. The pre-service teachers' survey was administered during regular class time in a core non-ICT course to students in the second semester of the fourth year of their respective programs, just prior to graduation in 2003.

With respect to the practising teachers, 76% (706) were female. Table 1 displays the practising teacher demographic information with respect to school type, years of teaching experience and perceived confidence of teachers in using ICT with students for teaching and learning. As can be seen from the table, 58% of teachers surveyed had more than 10 years teaching experience and 57% indicated that they were reasonably confident or very confident users of ICT for teaching and learning.

Table 1: **Demographic information detailing practising teacher numbers by school type, years of teaching experience and confidence in using ICT for teaching and learning (N=929)**

	Number of teachers	%
School Type:		
Preschool	26	2.8
Primary	513	54.9
Secondary	360	38.5
School of Distance Ed	1	.1
Special Education Unit	29	3.1
Total	**929**	**100**
Years of Teaching Experience:		
0-10 years	393	42.3
11-20 years	277	29.8
21+ years	259	27.9
Total	**929**	**100**
Confidence to use ICT for teaching and learning:		
Very little confidence	84	9
Some confidence	312	33.6
Reasonably confident	406	43.7
Very confident	127	13.7
Total	**929**	**100**

Table 2 contains a breakdown of the practising teacher data pertaining to Year levels and curriculum areas and the teachers' perception of the extent to which their students use ICT at each Year level and in each curriculum area they teach.

Table 2: Percent of practising teachers who indicated their students use ICT by year level and curriculum area that they currently teach (N=929)

	% of Respondents by Year level and curriculum area taught who indicated students currently use ICT:				
Students use of ICT by Year Level and Curriculum Area	**Never**	**Sometimes**	**Often**	**Very Often**	**Total %**
Year Levels:					
Preschool/Prep	28	39	20	13	100
Year 1	17	52	20	11	100
Year 2	13	48	29	10	100
Year 3	11	51	32	6	100
Year 4	13	38	42	7	100
Year 5	12	28	47	13	100
Year 6	11	37	34	18	100
Year 7	10	35	35	20	100
Year 8	10	62	17	11	100
Year 9	7	58	25	10	100
Year 10	7	53	27	13	100
Year 11	8	44	29	19	100
Year 12	7	42	30	21	100
Specialist Teacher	24	30	24	22	100
Total %	**11**	**45**	**30**	**14**	**100**
Curriculum Areas:					
English	1	49	42	8	100
Mathematics	10	66	21	3	100
The Arts	33	51	13	3	100
Studies of Society & Environment	10	52	28	10	100
Science	16	56	23	5	100
Languages Other Than English	69	22	7	2	100
Technology	8	38	35	19	100
Health & Physical Education	62	32	4	2	100
Preschool Curriculum	65	25	8	2	100
New Basics Curriculum Organisers	41	27	21	11	100
Vocational Education	41	34	15	10	100
Total %	**32**	**41**	**20**	**7**	**100**

With respect to the pre-service teachers, and consistent with the teaching profession generally, the cohort was predominantly female (85% or 183 in the primary program and 60% or 40 in the secondary program). Further, many of the pre-service participants were not recent school leavers with 25% of primary and 13% of secondary participants aged 30+years. The recent school leavers might have been expected to have had reasonable exposure to ICT at school, although it should not be assumed that all school leavers have extensively used ICT in their prior learning (Winship, 2001). Differences in ICT competency for earlier cohorts from this program are recorded in Watson and Prestridge (2001). Differences in ICT experiences are also exacerbated, particularly in the secondary program, by the choice of different electives or teaching areas.

THE SURVEY INSTRUMENTS

The practising teacher survey obtained demographic data on the teacher respondents (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 also asked teachers to respond to 20 items with respect to how their students use ICT for learning, with response categories on a 4-point Likert scale ranging from Never (1) to Very Often (4). Two frequency-of-use scales were used to reflect the 'current' and 'preferred' teacher perceptions of ICT use by their students. In an extensive evaluation of the instrument it was found to contain two strong factors (Jamieson-Proctor et al., 2005). 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.

The pre-service teacher survey elicited general demographic information regarding gender, age and program details. The survey also asked about the participants' current access to computers and the internet; their self-identified competency with a range of ICT applications and a range of examples of ICT integration on a four-point Likert scale from "no

competence" to "very competent"; and open ended responses regarding strengths and recommendations for improvement of the program for preparing graduates to integrate ICT into their students' learning when they became a teacher. As well, the survey gathered data on the participants' interest in using computers; the extent to which the participants use computers each week; and the extent they believe that computers can improve student learning outcomes, on a four-point Likert scale from "not at all" to "very great extent". The detailed results obtained from this audit of pre-service teacher ICT experiences have been reported elsewhere (Watson, Jamieson-Proctor, Finger, & Lang, 2004; Watson, Proctor, Finger, & Lang, 2005). This paper focuses on the pre-service teachers' interest in using computers; the extent to which the participants use computers each week; and the extent to which they believe that computers can improve student learning outcomes. These results are compared with the practising teachers' reported confidence to use computers with students for teaching and learning and the impact of teacher confidence on student ICT use.

The results described in the following section of this paper aim to highlight the relationship between the practising and pre-service teachers' confidence and beliefs about using ICT with students in classrooms. Data from both surveys were analysed using SPSS V11. Chi-square tests were used to investigate relationships between practising teacher gender, school type and teacher confidence to use ICT with their students for teaching and learning; pre-service teacher gender, program type and interest in using computers, extent of weekly computer use and belief that computers can improve student learning outcomes. 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). The following section will report the results for each analysis individually.

Results

1. ***Is there a relationship between the teachers' gender and their confidence to use ICT with their students for teaching and learning among practising teachers?***

When the confidence level of male and female practising 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, $c2$ (3, N = 929) = 14.03, p = .00. Female teachers were more likely to indicate Very little or Some confidence, while male teachers were more likely to indicate that they were Reasonably confident or Very confident. Table 3 displays the frequencies for each category for male and female practising teachers.

Table 3: **Frequency of confidence in using ICT with students for teaching and learning for male and female practising teachers (N=929)**

	Teacher Gender		
	% Female	% Male	% Of Total
Very little confidence	9.6	7.2	9
Some confidence	35.8	26.5	33.6
Reasonably confident	42.8	46.6	43.7
Very confident	11.8	19.7	13.7
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 less confident than male teachers, $c2$ (1, N = 929) = 9.71, p = .00, with 45.5% of females and 33.6% of males indicating they were unconfident, while 54.5% of females and 66.6% of males indicated they were confident with respect to their use of ICT with their students for teaching and learning. Thus, teacher gender is significantly related to confidence in using ICT with students for this group of practising teachers.

2. ***Is there a relationship between gender and their (1) interest in using computers, (2) extent to which they use computers weekly, and (3) the extent to which they believe computers can improve student learning outcomes among pre-service teachers?***

When male and female pre-service teachers means for each of these three items were compared on a 4-point scale (1=Not at all; 2=Some extent; 3=Great extent; and 4=Very great extent) using the Pearson Chi-square test of significance, a non-significant difference between genders was found for all three. Table 4 displays the means and standard deviations for each item for male and female practising teachers.

Rapid technological change and global communication are a fact of life in the 21st century

Table 4: **Means and standard deviations for male and female pre-service teachers with respect to their interest in using computers, their weekly use of computers and their belief that computers improve student learning outcomes (N=285)**

Gender		Interest in using computers	Weekly use of computers	Improve Student Learning Outcomes
Female	Mean	2.76	3.19	3.00
	N	223	223	223
	Std. Deviation	.78	.69	.72
Male	Mean	2.76	2.95	2.75
	N	59	59	59
	Std. Deviation	.86	.86	.82
Total	Mean	2.76	3.14	2.94
	N	285	285	285
	Std. Deviation	.80	.74	.75

NB. Three pre-service teachers did not provide their gender on the survey

Thus, gender is not significantly related to the pre-service teachers' interest in using computers, the amount they use computers weekly, and their belief in the ability of computers to improve student learning outcomes.

3. *Is there a difference between male and female practising 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 practising 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, Pillais = .02, $F = 3.50$, $df = (4,924)$, $p = .01$, indicating a 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 dimension 1, $F = 7.73$, $df = (1,927)$, $p = .01$, and dimension 2, $F = 6.59$, $df = (1,927)$, $p = .01$, with respect to how frequently their students currently use ICT.

However, the F tests for both dimensions on the preferred scale were not significant, $F = 1.55$, $df = (1,927)$, $p = .21$ for dimension 1, and $F = .00$, $df = (1,927)$, $p = .99$ for dimension 2. Thus, male and female teachers were not significantly different in their preferred level of student use of ICT.

Table 5 displays the means for male and female practising teachers for the current and preferred scales for both dimensions of student ICT use.

As can be seen in Table 5, male teachers indicated that their students currently use ICT more frequently than the students of female teachers for both the curriculum enhancement and transformation dimensions of ICT use. However, a non-significant result for both dimensions of the preferred scale indicates that there is no real difference between male and female teachers with respect to how they'd prefer their students to use ICT.

4. *Is there a difference between unconfident and confident practising 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 teacher confidence, Pillais = .10, $F = 26.75$, $df = (4,924)$, $p = .00$, indicating a difference in the level of student use of ICT between confident and unconfident teachers. The univariate F tests showed there was a significant difference between confident and unconfident teachers for dimension 1, $F = 104.10$, $df = (1,927)$, $p = .00$, and dimension 2, $F = 63.66$, $df = (1,927)$, $p = .00$, with respect to how frequently their students currently use ICT. There was also a significant difference between confident and unconfident teachers for dimension 1, $F = 55.44$,

Table 5: **A comparison of means (with Standard Deviations) for male and female practising teachers for the two dimensions of ICT use by students for both the Current and Preferred scales (N = 929)**

Teacher Gender	Dimension 1 Current Use	Dimension 1 Preferred Use	Dimension 2 Current Use	Dimension 2 Preferred Use
Female	1.97 (0.61)*	2.75 (0.62)	1.58 (0.54)*	2.47 (0.70)
Male	2.1 (0.60)*	2.81 (0.59)	1.68 (0.56)*	2.47 (0.67)

* indicates significance at $p < .05$

df = (1,927), *p* = .00, and dimension 2, *F* = 27.06, *df* = (1,927), *p* = .00, with respect to how frequently they preferred their students to use ICT.

Table 6 displays the means for confident and unconfident practising teachers for the current and preferred scales for both dimensions of student ICT use. Thus, teachers who are more confident in using ICT with their students for teaching and learning indicated that their students currently use ICT more frequently on both dimensions of use. Further, they indicated that they would prefer their students to use ICT more than would less confident teachers.

Table 6: **A comparison of means (with Standard Deviations) for confident and unconfident practising teachers for the two dimensions of student ICT use for both the Current and Preferred scales (N = 929)**

Teacher Confidence Level	Dimension 1 Current Use	Dimension 1 Preferred Use	Dimension 2 Current Use	Dimension 2 Preferred Use
Unconfident	1.77 (0.51)*	2.59 (0.60)*	1.44 (0.47)*	2.33 (0.70)*
Confident	2.17 (0.63)*	2.89 (0.59)*	1.72 (0.58)*	2.57 (0.67)*

* indicates significance at p < .05

5. Is there a relationship between school type and practising teacher confidence to use ICT with their students for teaching and learning?

The confidence levels of practising teachers from four different school types (Preschool, Primary, Secondary and Special Education) were compared using the Pearson Chi-square test of significance and the result was significant, x^2 (9) = 20.53, *p* = .02, indicating that levels of teacher confidence to use ICT with their students for teaching and learning is related to the type of school they teach at. Independent-samples t tests were then computed to compare the means between school type pairs namely, Preschool/Primary, Preschool/Secondary, Preschool/Special Education, Primary/Secondary, Primary/Special Education, and Secondary/Special Education. The results were significant only for the comparison of Secondary and Special Education teachers' means, *t* (387) = 2.20, *p* = .03, indicating that Secondary teachers were more confident in using ICT with their students for teaching and learning than were Special Education teachers. These results are summarised in Table 7.

Table 7: **Confidence levels of practising teachers from different school types to use ICT with their students for teaching and learning (N= 928)**

School Type	n	Mean	Std. Deviation
Preschool	26	2.50	.65
Primary	513	2.60	.81
Secondary	360	2.68*	.88
Special Education	29	2.31*	.66

* significant at p < .05

6. Is there a relationship between program type (primary or secondary) and pre-service teacher (1) interest in using computers, (2) extent to which they use computers weekly, and (3) the extent to which they believe computers can improve student learning outcomes?

When pre-service teachers from the primary and secondary cohorts were compared using the Pearson Chi-square test of significance a non-significant difference was obtained for their interest in using computers and the extent to which they use computers each week. However, the result was significant, x^2 (3) = 9.16, *p* = .03, for their belief in the ability of computers to improve student learning outcomes. For this group of pre-service teachers, primary pre-service teachers believe that computers improve student learning outcomes to a greater extent than secondary teachers. These results are summarized in Table 8.

Table 8: **Means and standard deviations for primary and secondary pre-service teachers with respect to their interest in using computers, their weekly use of computers and their belief that computers improve student learning outcomes (N=285)**

Program of Study		Interest in using computers	Weekly use of computers	Improve Student Learning Outcomes
Primary	Mean	2.80	3.18	*3.00
	N	217	217	217
	Std. Deviation	.80	.71	.70
Secondary	Mean	2.63	3.00	* 2.75
	N	68	68	68
	Std. Deviation	.77	.79	.87
Total	Mean	2.76	3.14	2.94
	N	285	285	285
	Std. Deviation	.80	.74	.75

* significant at p < .05

7. Is the frequency that students use ICT for learning affected by the type of school indicated by the practising teacher?

A MANOVA was used to compare the current and preferred means of each dimension of ICT use by the practising teachers' school type (Preschool, Primary, Secondary & Special Education).

The multivariate result was significant for school type by frequency of student use of ICT, Pillais = .03, $F = 2.39$, $df = (12,2769)$, $p = .00$, indicating a multivariate effect. The univariate F tests showed there was a significant difference between teachers from different school types for dimension 1 current scale, $F = 4.88$, $df = (3,924)$, $p = .00$, dimension 1 preferred scale, $F = 6.86$, $df = (3,924)$, $p = .00$, dimension 2 current scale, $F = 4.53$, $df = (3,924)$, p = .00, and dimension 2 preferred scale, $F = 6.26$, $df = (3,924)$, $p = .00$.

Independent-samples t tests were then conducted to compare the means between pairs of school types for both dimensions of use for both scales. The results indicated that primary students currently use ICT more than preschool students for dimension 1, t (537) = -3.26, $p = .00$ (AB), and dimension 2, t (537) = -3.43, $p = .00$ (IJ). Also, primary teachers prefer their students to use ICT more than preschool teachers for dimension 1, t (537) = -4.3, $p = .00$ (EF), and dimension 2, t (537) = -4.29, $p = .00$ (MN). Secondary students currently use ICT more than preschool students for dimension 1, t (384) = -3.34, $p = .00$ (AC), and dimension 2, t (384) = -3.54, $p = .00$ (IK) and secondary teachers prefer their students to use ICT more than preschool teachers for dimension 1, t (384) = -4.3, $p = .00$ (EG), and dimension 2, t (384) = -4.29, $p = .00$ (MO). Finally, special education students currently use ICT more than preschool students for dimension 2, t (53) = -2.26, $p = .03$ (IL) and special education teachers prefer their students to use ICT more than preschool teachers for dimension 1, t (53) = -2.17, $p = .03$ (EH) and dimension 2, t (53) = -3.27, $p = .00$ (MP).

Table 9 summarises these results and indicates the significant t test differences between the four teacher groups.

Thus, as the means in Table 9 indicate, the frequency that students use ICT for learning was not significantly different for primary or secondary practising teachers; only preschool students used ICT less than the other student cohorts.

8. Is there a difference between the pre-service teachers' (1) interest in using computers, (2) extent to which they use computers weekly, and (3) the extent to which they believe computers can improve student learning outcomes?

Independent-samples t tests were used to compare the three means with each other (interest/use; interest/improve LOs; and use/improve LOs). The results indicated that the pre-service teachers who were surveyed used computers more than they were interested in them, t (284) = -8.17, $p = .00$ (AB); they believed computers improved learning outcomes more than they were interested in them, t (284) = -3.58, $p = .00$ (AC); and they used computers more than they believed they had the potential to improve learning outcomes, t (284) = 4.34, $p = .00$ (BC). Table 10 summarises these results and indicates the significant t test differences between the three pre-service teacher beliefs.

Table 9: **A comparison of means for the two dimensions of ICT use for both the Current and Preferred scales based on school type (N= 929)**

Dimension & Scale	School Type	n	Mean		Std. Deviation
D1 current	Preschool	26	1.61	A	.47
	Primary	513	2.01	B	.61
	Secondary	360	2.02	C	.62
	Special Education	29	1.80	D	.45
D1 preferred	Preschool	26	2.25	E	72
	Primary	513	2.78	F	.61
	Secondary	360	2.78	G	.60
	Special Education	29	2.64	H	.59
D2 current	Preschool	26	1.23	I	.44
	Primary	513	1.61	J	.55
	Secondary	360	1.63	K	.56
	Special Education	29	1.89	L	.61
D2 preferred	Preschool	26	1.90	M	.61
	Primary	513	2.49	N	.70
	Secondary	360	2.48	O	.68
	Special Education	29	2.49	P	.73

AB, AC, EF, EG, EH, IJ, IK, IL, MN, MO, MP significant at $p < .05$

Table 10: **A comparison of means for the three pre-service teacher beliefs about computers (N=285)**

Pair	Mean		Std. Deviation
Interest in computers	2.76	A	.80
Weekly use of computers	3.14	B	.74
Interest in computers	2.76	A	.80
Improve Learning Outcomes	2.94	C	.75
Weekly use of computers	3.14	B	.74
Improve Learning Outcomes	2.94	C	.75

AB, AC, BC significant at $p < .05$

The means in Table 10 indicate that pre-service teachers have a lower interest in using computers than they have a belief in the extent that computers can improve student learning outcomes. They also use computers more than they are interested in them.

CONCLUSION

This paper has investigated eight questions to explore the relationship between practising and pre-service teachers' confidence and beliefs about using ICT with students in classrooms. The paper has provided data on practising teachers' confidence to use ICT with students for teaching and learning related to their gender and school type. It has also provided evidence of the quantity and quality of student use of ICT for learning related to practising teachers' gender, confidence and school type. Data highlighting pre-service teacher beliefs about their interest in using computers, the extent they use computers weekly and the degree to which computers can improve student learning outcomes, based on gender and program type, were also provided. The analysis of these two data sets from two previously unlinked studies has revealed an interesting story.

There would appear to be no differences between male and female pre-service teachers with respect to their beliefs about computers, but primary pre-service teachers believe that computers can improve student learning outcomes to a greater extent than do pre-service teachers in the secondary degree program. However, there is a significant difference between male and female practising teachers in their confidence to use ICT for teaching and learning, but no difference in confidence between primary and secondary teachers. The analysis also shows that students of less confident teachers currently use ICT less frequently than students of confident teachers, but both male and female (confident and less confident) teachers would equally prefer their students to use ICT more frequently. The obvious question that now needs to be asked, based on these data, is: What happens to teachers in Queensland state schools after their graduation from university that produces the gender differences with respect to confidence in using ICT with students? Further, if we assume that all teachers have as their primary goal the enhancement of student learning outcomes, and both male and female teacher graduates believe equally in the extent to which computers can improve student learning outcomes, why is there a difference between male and female teachers in the extent to which their students use ICT for learning? Another anomaly in the data is that primary pre-service teachers have a greater belief in the ability of computers to improve student learning outcomes than do secondary pre-service teachers, yet there is no difference between primary and secondary practising teachers with respect to the frequency that their students use ICT for learning. One would expect primary teachers to report that their students use ICT more frequently than secondary teachers if their belief in the extent to which computers can improve learning outcomes continues past their graduation and into their professional lives as teachers.

Finger, Charleston and Baker (2004) found that 58% of pre-service teachers surveyed believed that it was essential to observe teachers integrating ICT to either a great extent or very great extent during their undergraduate preparation program. However, only 12% reported actually observing ICT integration in classrooms to a great or very great extent during their studies. Obviously, pre-service teachers believe that ICT integration is important for them to observe and one might therefore extrapolate from this that they believe that ICT integration is important for student learning outcomes. However, for some reason female teachers after graduation are not using ICT in their classrooms as much as their male colleagues, but they would like their students to use ICT equally as much as male teachers. We believe that this result should concern education authorities. An investigation is needed into the factors that afford and constrain practising teacher confidence in using ICT with students for teaching and learning, and in particular why female teachers, who in 2004 made up 70% of the full-time teachers in Queensland state schools (Australian Bureau of Statistics (ABS), 2005) are less confident than their male counterparts. If the results reported in this investigation are representative of the state education system in Queensland then 70% of students are currently being taught by teachers who are less confident to use ICT than the other 30% and 70% of students use ICT less than the other 30% as a result of their teacher's lower confidence level. The researchers believe that issues such as these need to be addressed with the upmost urgency if current and future ICT initiatives are to have the desired impact on student learning outcomes.

BIOGRAPHY

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