



Self-efficacy and ICT integration into initial teacher education in Saudi Arabia: Matching policy with practice

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Success factors for integration of ICTs in higher education teaching and learning reveal a complex mixture of old and new paradigms. A review of the relevant literature and findings from research conducted in Saudi Arabia highlights the importance of actual and perceived self-efficacy within the new paradigms. The research reported reflects these perceptual dilemmas. Participants were 325 Saudi pre-service teachers from the Faculty of Education at King Abdulaziz University. Findings reveal that participants have generally high skill levels with computing tasks and their perceptions of self-efficacy as university teachers increase with computer experience and computer qualifications. These findings imply that increasing Saudi pre-service teacher access, training, and exposure to computers and ICTs will contribute effectively to boosting their self-efficacy, motivation, and computing habits. However, where traditional views of teacher directed learning remain unchallenged change is conservative and context specific. To overcome the perceptual gap, data underline the importance of sympathetic and strategic leadership, effective curriculum design and innovative pedagogies to sustain outcomes.

Background context - global trends and regional differences

The rapidity of technological change challenges both national and international educational policies; especially policy formulation and systems responses. The changes are global. However, evidence shows that educational policies retain their domestic focus (Lingard, Rawolle & Taylor, 2005). According to UNESCO (2004), "Introducing change into a system is relatively easy; ensuring that change flows from policy to the classroom is a formidable challenge" (p.19). Integration of ICTs into our educational models does not happen 'overnight' (Robertson, Fluck & Webb, 2007:115). One of the challenges to be faced is the need to critically rethink our engagement with educational policies in a different way - especially in higher education (Marshall, 2007; Gale, 2007; Altun, 2007).

Adoption of relevant educational responses is more likely in the developed world where the infrastructure and knowledge work along a similar growth trajectory. Higher family incomes and adoption of Internet based behaviours at home are viewed as indicators of lifestyle patterns (see Australian Institute of Health and Welfare, 2009; Pew Research Centre, 2012; The World Bank, 2012). In the developed world, nations have responded with new and reformed policies; infrastructure including hardware and rapid Internet access as well as government rhetoric appears to embrace the spirit of the age. For instance, in the UK the Department for Education and Skills sets out four key objectives for the application of information and communication technology (ICT) in education in its five years e-strategy, *Harnessing Technology 2005* (see

Department for Education, 2005; BECTA, 2007). One significant implication is the significance placed on ICTs in the initial teacher education policy of England (Brisard, Menter & Smith, 2007). Finland, Singapore and Japan have similar centralised decision making contexts (OECD, 2009). By contrast, federal systems have more distributed policies. In Australia, the Federal Government through its strategic plan, the *Digital Education Revolution*, aims to sustain meaningful change to the pedagogical approaches in schools (DEEWR, 2008). However, by contrast with national policy in the United Kingdom, the federal systems of nations including Australia, the US and Germany, for instance, allow for state or territory governments to make their own separate digital technology-related policies to boost, communicate, deliver and support the broad national governmental policies. Technically, agreements can strengthen the likelihood of policy implementation. However, the reality is that the proliferation of government agents with their various responses can have the effect of changing the national agenda and slowing policy response (ACER, 2006). This power dispersal can also be compounded by geography. The United States, Australia and Canada in particular are geographically large in area.

Similar comments can be made about China and India (Bajwa, 2003; MEPRC, n.d.; Ezell & Andes, 2010). As the world's most populous nations, and geographically complex, each nation has made giant leaps forward with technologies. Perhaps the late start time has helped. The cultural histories are dramatically different – India is the 'biggest' democracy on earth and China has the biggest centrally driven economy. Regardless of the obvious complexities of this argument, India and China help focus our attention on the Asian region and its increasing leadership in ICT adoption, manufacturing and innovation. Sitting amid these giants are some of the most centralised and policy-driven nations, including Singapore, Vietnam and Saudi Arabia. Each country has tried to adopt international ICT policies and formulate their own policies that are applicable to their systems and sociocultural structure (Kennedy & Lee, 2008). For instance, the Singaporean Government in its 'iN2015' Master plan that was first launched in 2006 aims to offer a digital future for everyone by harnessing ICT to add value to the economy and society; supplying more funds for technology related projects; ensuring reliable infrastructure such as broadband connections, and computer ownership in homes (IDA, 2009). Another example is the Vietnamese Government's *Education Development Strategic Plan 2001-2010*. Vietnamese education is still facing weaknesses and shortage as this process continues (MOET, 2006; Haydena & Thiep, 2007).

Saudi Arabia and the Islamic perspective

The third nation in this Asian trilogy is perhaps the most problematic to predict. As such, the country provides significant insights to cultural change associated with the digital age. The dominance of Islam is all pervading in the life, education and cultural development of the nation. Nevertheless, amid this highly structured and sometimes closed and conservative society, Saudi Arabia, the focus of this study, is a rapidly developing nation. This is because "international competitiveness is likely to ... impact significantly and possibly irrevocably on Saudi cultural traditions and religion norms" (Onsman, 2011: 1). Therefore, Saudi Arabia has willingly partaken in global digital developments. For the last few decades, the country has been booming economically. Largely through earnings linked with the petroleum industry, developments within the national economy have aided health, public education, higher education, and levels of consumption of technology (Ministry of Education, 2005; Zeen-Aldeen, 2007; Hartley & Al-Muhaideb, 2007; Nelson, 2010; Onsman, 2011).

In releasing its *Eighth Development Plan 2005-2009*, the Saudi Arabian government brought into focus the nation's challenges in the digital age. In particular, the Saudi Ministry of Economy and Planning in the *Eighth Development Plan* has stressed four important demands, which are: improving and expanding the current ICT infrastructure; expanding the Arabic online content; bridging the digital gap between all segments of the nation, and applying the concept of e-government (Ministry of Economy and Planning, 2005). In the educational sector, the Saudi Ministry of Education has released its *Ten Year Plan 2004-2014*, which includes the goals of developing the required infrastructure for digital technology to be better implemented in education (Ministry of Education, 2005). Homes are part of this vision. At the core of *The Saudi Arabian Home Computing Initiative* is enabling all Saudi families to obtain a personal computer through easy and affordable instalment plans (Communication and Information Technology Commission, 2010).

The ICT landscape reflects global patterns and appears to be extremely optimistic. However, reality is different. Effective integration of technology in Saudi pre-service teacher education seems to lag behind other developments in the country. There is too little teacher preparation and training in terms of ICTs (Abu-Arrad & Fosaiel, 2006; Al-Jarf, 2006; Al-Asmari, 2008). While traditional approaches in pedagogy are still widely accepted and practiced, less opportunity for effective integration of ICTs is presented. For illustration, Al-Jarf (2006) confirms that the integration of ICTs into pre-service teacher education curriculum, such as online instruction, is unknown due to issues related to computer affordability, Internet accessibility, trained academic staff, and finally, the levels of organisational professional support. Hence, and despite government initiatives, barriers to success include ineffective curriculum design, access issues to ICTs, and the instructors' inadequate computer literacy (Al-Asmari, 2008).

In brief

ICTs are well integrated into the fabric of everyday life globally. However, especially within developing countries, the spread of expertise is not even. In the Saudi Arabian context, there is strong public policy that supports the development of new technologies in all aspects of daily life including the education sector. Acknowledging this context as a mirror image of global trends, the research sought affirmation of the alignment of public policy and curriculum implementation within higher education. The hunch was that content and teaching approaches in higher education are not keeping pace with more generic societal trends in both the developed (Reimer, 2005; Vannatta, 2007) and developing countries such as most of the Arab world including Saudi Arabia (Al-Asmari, 2008; Zeen-Aldeen, 2007). Two key concepts were used to frame the research – pedagogical change and self-efficacy.

The key concepts

Pedagogical shift for the digital age

We accept that rapid and massive developments of ICTs worldwide have changed the nature of learning radically and it is difficult for current educational paradigms to remain unchallenged (Alexander, 2008). The younger generations and ICTs are inseparable in their everyday lives (Valentine, Holloway & Bingham, 2002). Indeed there is some argument that as a consequence of the way that digital generations grow

up, their 'brains have physically changed' and may function differently (Prensky, 2001:1). This strongly suggests that current pedagogical approaches to ICTs need a total revision based on understanding the current learners' nature, needs, preferences and learning styles. In the context of teacher training, understanding pre-service teachers' perceptions and beliefs related to ICTs hold the promise of improving their professional preparation and sense of learning community (Hall & Herrington, 2010; Lee, Teo, Chai, Choy, Tan & Seah, 2007; Northcote, 2009). As Leach and Moon (2008) state "good teachers are intellectually curious about pedagogy" (p.4) and a better understanding of their beliefs may contribute effectively to the enhancement of pedagogies as well as learning styles and approaches with ICTs.

Self-efficacy

Associated with their world view is the learners' self-efficacy or sense of purpose and effectiveness (Abdulibdeh & Syed Hassan, 2011; Bong & Skaalvik, 2003; Chao, 2003). Introduced in the early 1970s, Bandura's theory of self-efficacy is a key concept in social cognitive theory. The theory triangulates the relationship between the individual's personality, behaviour and environment (Chao, 2003). Self-efficacy can be best defined as the individuals' judgments of their abilities to execute certain and conditioned courses of behaviour/s or to complete specified tasks (Bandura, 1997). Simply described, self-efficacy determines whether tools and capabilities are necessary to accomplish specific tasks (Cassady, 2000). Current theoretical approaches to the integration of technology acknowledge that learners' computer knowledge, experience and expertise do impact on their perceived self-efficacy. According to Robertson, et al. (2007), there is: "The point at which personal beliefs intersect with working knowledge and related skills is the habit zone [or] unconscious behaviours" (p. 36). Habits reflect expertise and these influence learners' self-efficacy (Abu-Jaber & Qutami, 1998; Milbrath & Kinzie, 2000; Ndubisi, 2004; Sam, Othman & Nordin, 2005; Hakverdi, Gücüm & Korkmaz, 2007; Maninger & Anderson, 2007; Lancaster & Bain, 2007; Liang & Tsai, 2008; Jungert & Rosander, 2010). In turn, increasing self-efficacy is claimed to improve learners' academic performance and the institutional environment (Jungert & Rosander, 2010; Abdulibdeh & Hassan, 2011).

As a means of seeking a local catalyst for effective change, there appears wisdom in seeking new knowledge related to these key issues. That is, teacher beliefs and habits as well as their levels of confidence and related competence using the new technologies in schools. The research findings reported below provide related insights.

The research study

Two major research questions were investigated:

- How do pre-service teachers perceive their general self-efficacy in regard to the integration of ICTs into their current and prospective pedagogical approaches?
- Is their perceived self-efficacy associated with computer access at the University and with their computer expertise in terms of prior computer experience and computer qualifications?

Research design

The research relied on an initial questionnaire. This was based on the work of Bandura (1997) and Bong and Skaalvik (2003). The survey consisted of two main sections: the first asked about the participants' background including categorical responses for computer access at university, computer experience and related computer qualifications; while the second asked about general self-efficacy based on eight statements with responses given in a five point Likert scale where 5 = strongly agree and 1 = strongly disagree. Developed first in English and subsequently translated to Arabic, validity issues relied on the judgment of experts fluent in both Arabic and English. In line with similar exercises at this stage, translation relied heavily on native speakers' collaboration (Mertens, 2005). Three specialists and Arabic native speakers who are familiar with Saudi pre-service teacher education as well as varied forms of technology implementation reviewed the translations.

Scale reliability was calculated using *SPSS* (Pallant, 2007). In the present study, the pre-service teachers' survey had a very good internal consistency, with a Cronbach *alpha* coefficient of .841. Furthermore, the Cronbach *alpha* coefficient for the self-efficacy scale was .891, which also indicated a very good level of internal consistency.

To better understand key findings from survey questionnaires, follow-up (in depth) semi-structured interviews were conducted. Probing relied on questionnaire findings (Gillham, 2005: 24). Similar to data obtained from questionnaires, interviews were firstly transcribed in Arabic. Then, significant comments were carefully translated into English and reviewed by three Arabic native speakers to ensure their validity and accuracy.

Study participants

The subjects of this study were 325 volunteer Saudi male pre-service teachers from the Faculty of Education at King Abdulaziz University. A 'probability sampling' strategy was used; therefore, every member of the population had a voluntary and equal chance to be included in the study. Distribution of the study survey was carried out during their normal lecture sessions using a 'snowball technique' commencing early 2009 (Mertens, 2005). After excluding incomplete surveys, the final number of useable surveys was 325, yielding a 65 percent return rate and representing 19 percent of the total pre-service teacher population.

Spread over the 2009-10 period follow-up interviews, thirteen pre-service teachers were contacted based on their pure willingness to participate, following suggestions made by Gillham (2005) to ensure ethical issues were carefully taken into consideration. Also, participants were offered anonymity, and a chance to review, alter and edit transcripts of the interviews.

Results of survey questionnaire

To test the homogeneity of variance and choose the appropriate analysis tests, Levene's test was conducted in accordance with Pallant (2007: 246). For all the following tests reported below, the values of Levene's test were found to be greater than .05; therefore, the assumption of equal variances has been met.

The majority (180 responses, or 55.4%) of pre-service teachers reported that they can access a computer at the University. In addition, almost a third of pre-service teachers (108 responses or 33.2%) had more than 5 years experience of using computers. Only 113 pre-service teachers (34.8%) had some kind of ICT or computer certification, the other 212 (65.2%) did not. The 113 ICT qualified pre-service teachers had either a diploma or short course certification: 98 pre-service teachers (30.2%) had taken short courses, while 15 (4.6%) had a diploma or a degree (Table 1).

Table 1: Pre-service teachers' computer access, experience and qualifications (N= 325)

		N	%
Computer access at the University	No	145	44.6
	Yes	180	55.4
Years of experience	Less than 2 years	70	21.5
	From 2 - 3 years	45	13.8
	From 3 - 4 years	48	14.8
	From 4 - 5 years	50	15.4
	More than 5 years	108	33.2
	No response	4	1.2
Qualifications and type	No qualifications	212	65.2
	Short course	98	30.2
	Diploma	15	4.6

Pre-service teachers' general perceived self-efficacy

Table 2 shows that mean scores for the eight statements ranged from 3.76 to 4.09. Standard deviation scores also had a narrow range ($SD = 0.91$ and $SD = 1$). Further, the total self-efficacy was calculated to establish the general picture as well as to gain more understanding of the participants' responses (Pallant, 2007: 84-86). The mean total self-efficacy score was 4 ($SD = 0.72$).

Table 2: Pre-service teachers general self-efficacy items
(5 = strongly agree; 1= strongly disagree)

Items		N	M	SD
1	Interested in implementing ICTs in my learning approaches	321	4.09	0.94
2	Enjoy implementing ICTs in my learning approaches	319	3.97	1.00
3	Feel confident when I implement ICTs in my learning approaches	318	4.06	0.91
4	Feel satisfied in implementing ICTs in my learning approaches	316	4.01	0.98
5	Look forward to integrating ICTs in my learning approaches	318	4.08	0.96
6	Interested in integrating ICTs in my learning approaches	315	3.98	0.97
7	Sure that I can integrate ICTs in my learning approaches	318	3.76	0.95
8	Sure that I can integrate ICTs in my teaching approaches in the future	320	3.98	0.97
Total self-efficacy		302	4.00	0.72

Interestingly, the results reveal that pre-service teachers have a very good level of general self-efficacy. They showed that they are interested, enjoy using the new technologies, feeling confident, satisfied and looking forward to integrating technology into their current and future pedagogical approaches. Also, they are motivated and looking forward to innovative preparation with ICTs rather than the dominant traditional approaches.

Computer access at the University impacts on self-efficacy

As indicated in Table 2, 55.4% of pre-service teachers (n=180) indicated that they have access to computers at the University and 44.6% (n=145) indicated no access. To better understand these responses, further analyses were conducted. To compare these sub-samples in terms of the self-efficacy scales an independent-samples t-test was conducted resulting in a statistically significant difference in self-efficacy scores for pre-service teachers who mentioned that they have access to computers at the University ($M = 4.11$, $SD = 0.64$) and those who have no access ($M = 3.86$, $SD = 0.79$); $t(300) = -3.15$, $p = .002$ (two-tailed). The magnitude of the differences in the means (mean difference = -0.26 , 95% CI: -0.42 to -0.10) was small ($\eta^2 = .03$). See Table 3.

Table 3: Independent samples test: Computer access impacts on self-efficacy

	No access <i>M (SD)</i>	Have access <i>M (SD)</i>	Mean difference	<i>t</i>	<i>df</i>	Sig. (2-tailed)	η^2
Total self-efficacy	3.86 (0.79)	4.11 (0.64)	-.26	-3.15	300	.002	.03

Prior computer experience impacts on self-efficacy

A one-way between groups analysis of variance was performed to explore the impact of the years of computer experience upon the level of pre-service teachers' general self-efficacy. As shown in Table 4, pre-service teachers were categorised into five groups according to their computer experience (Less than 2 years, From 2 - 3 years, From 3 - 4 years, From 4 - 5 years, and More than 5 years).

Table 4: Descriptive statistics for prior computer experience

Computer experience	N	M	SD
From 2 - 3 years	42	3.97	0.56
From 3 - 4 years	46	4.01	0.79
From 4 - 5 years	44	4.06	0.66
More than 5 years	98	4.18	0.72
Total	299	4.00	0.72

There was a statistically significant difference at the $p < .05$ level in general self-efficacy scores for the five groups of computer experience: $F(4, 294) = 4.4$, $p = .002$ (see Table 5). Based on Cohen's terms (cited in Pallant, 2007), the actual difference in mean scores between the groups was medium. The effect size, calculated using η^2 , was .06.

Table 5: ANOVA test: Prior computer experience impacts on self-efficacy

	SS	<i>df</i>	MS	<i>F</i>	Sig.
Between groups	8.67	4	2.17	4.36	.002
Within groups	146.19	294	.497		
Total	154.86	298			

To identify the existing differences, post-hoc comparisons were performed using the Tukey HSD test, which indicated that the mean score for the group of more than 5 years ($M = 4.18$, $SD = 0.72$) was significantly different from the group of less than 2 years ($M = 3.72$, $SD = 0.72$) in regards to their general self-efficacy (see Table 6). No

other significant differences were found between the other groups of computer experience in scores of self-efficacy.

Table 6: Multiple comparisons using Tukey HSD: Self-efficacy

Computer experience (I)	Computer experience (J)	Mean difference (I-J)	Sig.
More than 5 years	Less than 2 years	.46*	.000

* Mean difference is significant at the 0.05 level.

Computer qualifications and the type of qualification

A one-way between groups analysis of variance was carried out to investigate the impact of computer qualifications and the type of these qualification on levels of pre-service teachers' perceived self-efficacy. Pre-service teachers were categorised into three groups based on computer qualifications as shown in Table 7 (no qualifications, diploma, and short courses).

Table 7: Descriptive statistics for computer qualifications

Qualification	N	M	SD
No qualifications	199	3.90	0.74
Short course	91	4.17	0.65
Diploma	12	4.40	0.44
Total	302	4.00	0.72

There were statistically significant differences at the $p < .05$ level in general self-efficacy scores for the three groups of computer qualifications: $F(2, 299) = 6.9$, $p = .001$ (see Table 8). The effect size, calculated using *eta squared*, was .04, and therefore the actual difference in mean scores between the groups was small according to Cohen's criteria (Pallant, 2007).

Table 8: ANOVA test: Computer qualifications impacts on self-efficacy

	SS	df	MS	F	Sig.
Between groups	6.9	2	3.45	7	.001
Within groups	148.36	299	.5		
Total	155.25	301			

Post-hoc comparisons using the Tukey HSD test indicated that the mean score for the pre-service teachers who have no qualifications ($M = 3.89$, $SD = 0.74$) was significantly different from those who have a diploma ($M = 4.39$, $SD = 0.44$), and from those who have short course certificates ($M = 4.17$, $SD = 0.65$). Although the sample size of pre-service teachers who have a diploma was too small to have much meaning ($N = 12$), they were not found to be statistically different from those who had taken short courses (see Table 9).

Table 9: Multiple comparisons using Tukey HSD: Total self-efficacy

Qualification (I)	Qualification (J)	Mean difference (I-J)	Sig.
No qualifications	Short courses	-.28*	.005
	Diploma	-.50*	.045

* Mean difference is significant at the 0.05 level.

Results of follow-up interviews

The dilemma raised by these data is that whilst self-efficacy related to computer applications and skills is acceptable at a personal level, there is no clear pattern of adoption of related techniques in higher education teaching. To better understand this gap between the rhetoric and practice, interviews were conducted with thirteen pre-service teachers. Initially, interviews revealed that most of pre-service teachers had high levels of perceived self-efficacy with regard to technology. They were motivated and trusted their capabilities to integrate technology into their learning approaches successfully. Two significant comments were:

I give myself 100%! I am fully informed of the latest developments of modern technologies and their uses.

Dealing with technology is not hard. I trust myself in this regard.

For the pre-service teachers who demonstrated higher levels of self-efficacy, much emphasis was on technology-related expertise that can be obtained through more access, familiarisation with technology, and self-motivated learning. Some comments showing this are:

For me, close and direct contact with technology has positively contributed to the enhancement of my self-efficacy.

I trust my abilities because I have a computer at home and I browse the Internet. I also have other advanced types of technological equipment that I can easily use such as a mobile and a *PlayStation*.

I am confident because I used to browse the Internet to get all the answers that I need. Also, I am familiar with technology as my parents have provided me with various types since childhood.

Interviews revealed the conservatism in their views regarding pedagogical practices, and their apparent reluctance to shift away from traditional pedagogical practices of strongly teacher directed teaching styles. The following excerpts from separate pre-service student interviews illustrate this pattern of traditional thinking. They also show their frustration with this continuing pattern of teaching or unwillingness of lecturing staff to revise their curriculum and teaching approaches to align with students' needs:

If faculty members use technology, I am going to use the technology as well. We copy their style and try to keep abreast of it and apply the same method.

The problem in the first place is faculty members who do not use technology. If they use it, they will be a good example for us to learn from... Simply, if technology is integrated in our preparation, we will incorporate it in our future classrooms.

Unfortunately, our curriculum largely depends on rote memorisation, which is not appropriate for many disciplines such as mathematics, my major. Understanding is really out of its interest.

To conclude, the data indicate skills and capabilities with ICTs that support high levels of personal self-efficacy. At the same time, interview comments highlight the levels of frustration largely shared by the pre-service students with the curriculum adopted in their learning context, and pressure to conform to old ways of learning and old

patterns of teaching. The rhetoric of change and the experience of actual practice appear conflicted. Overall, the study results indicate that pre-service teachers have the skill and capability to work effectively with a variety of ICTs and related tools. The teaching staff shared their views. However, the interview dialogue highlights that the gap between rhetoric and practice persists and is unlikely to be narrowed in the near future.

Discussion

Underlying this research study the basic premise is that to enhance technology integration into Saudi pre-service teacher education, a better understanding about pre-service teachers' perceived self-efficacy is very important, particularly in terms of ways they trust their ability to integrate ICTs into their approaches. Using data from the questionnaire's descriptive analysis, t-tests and ANOVA were conducted to understand pre-service teachers' perceived self-efficacy and the factors influencing it. The results can be summarised into four main points, as follows:

1. Saudi pre-service teachers (i.e. the study sample) have a very good level of general self-efficacy.
2. Their level of general self-efficacy was associated positively with computer access at university.
3. Their level of general self-efficacy was associated positively with computer experience.
4. Their level of general self-efficacy was associated positively with computer qualifications, but not with the type of these qualifications.

The results indicate high levels of trust in their abilities to integrate ICTs into the curriculum. Pre-service teachers appeared highly motivated in their readiness and willingness to increase the incorporation of ICTs into their pedagogical practices and curriculum activities. These results reflect the benefits from the technological transformation developments in Saudi Arabia and the large consumption of ICT resources in comparison with other countries in the Gulf region (e.g. Ministry of Education, 2005; Zeen-Aldeen, 2007; Hartley & Al-Muhaideb, 2007; Onsman, 2011). They can also be explained in terms of pre-service teachers' previous experiences with computers and ICTs during their high school study. The results are similar to those identified in the literature. For instance, studies by Liang and Tsai (2008), and Sam, et al. (2005) found that pre-service teachers with higher self-efficacy levels demonstrated more progress and ease in their use of ICTs, such as online learning environments or other activities, within their learning approaches.

Results reveal that higher levels of pre-service teachers' general self-efficacy are associated positively with computer access at university, computer experience and related computer qualifications, but not with the type of these qualifications. This outcome reflects earlier research by Abu-Jaber and Qutami (1998) who found that student self-efficacy was improved through increased computer experiences and proper training. In addition, Maninger and Anderson (2007) found that pre-service teachers' self-efficacy was significantly correlated with their technological expertise; while, Hakverdi, Gücüm and Korkmaz (2007) found that levels of computer use, whether educational or general, impact on pre-service teachers' self-efficacy. Therefore, increasing their involvement with computer training and practices can influence learners' perceived self-efficacy positively (Milbrath & Kinzie, 2000; Ndubisi,

2004). This in turn may increase effectiveness of the educational environment (Lancaster & Bain, 2007; Jungert & Rosander, 2010).

Limitations and recommendations

In brief, whilst a case may be made for generalising these findings to other settings in Saudi Arabia and the Islamic world, there is need for a broadening of the inquiry. A major limitation is the gender bias. Cultural attitudes exclude male researchers conducting research in colleges for women students, especially face to face interviews. Hence, it is not possible to comment on the transferability of findings to women. This point of separation in community experience is a cultural signifier of the inherent conservatism in the nation that goes to the heart of any effort aimed at curriculum reform (Onsman, 2011). Whilst gender difference is not the theme of this paper, this issue is a manifestation of the bigger issues to be faced in the educational reform process within Saudi Arabia.

On a more general note, the correlations demonstrated imply new roles for leadership in promoting and facilitating access to and integration of ICTs into the pre-service teachers' curriculum. These conclusions demand rethinking existing practices including the need for university decision makers and leaders to better understand the beliefs, learning styles, preferences and approaches regarding ICTs held by their staff, students and themselves. These new and emerging roles describe well what Toma (2007) observed in the US context: "Activities emerging on the periphery of American universities and colleges of all types have challenged traditional conceptions of governance, particularly how to properly involve faculty." (p. 57)

To achieve change in practical terms, pre-service teachers' experiences should be increased through more exposure to computers and ICTs and the facilitation of their use. Furthermore, providing them with proper access to computers and ICTs, as well as technical support, has the potential to enhance their levels of self-efficacy and confidence to make pedagogical changes. Increasing their training and providing them with more computer and ICTs related knowledge and skills, through available courses and open workshop sessions, are essential for enhancing their self-efficacy levels, as well as creating motivation and more positive attitudes towards ICTs.

The Saudi context highlights the dilemma shared with change processes in diverse locations. Where traditional teacher centred practices are the prevailing model, it seems inadequate to merely and simply provide pre-service with technology-related literacy and limited activities, without ICTs being embedded effectively in their learning activities. Hence, the importance of leadership for facilitating improvements required in the curriculum change process, and its associated traditional pedagogical approaches (Robertson, et al., 2007). Without these changes, enhancement of the pre-service teachers' self-efficacy cannot function distinctively and effectively. The standard and traditional educational technology courses that the pre-service teachers undertake formally during their preparation require innovation and improvement, to reflect effectively the global trends and respond to their needs, preferences and learning styles as a digital generation living in a digital world. This is needed to increase their exposure, knowledge and experience to digital technology use, as well as pedagogical applications and implications. Increasing pre-service teachers' ICTs-based pedagogical practices has great potential for enhancing their self-efficacy levels, motivation and the way they trust their abilities to effectively integrate the wide capabilities of ICTs into their current learning approaches and/or future classrooms.

Conclusion

The new learning contexts associated with ICTs demand that teachers rethink their practices. This can be simultaneously daunting and challenging as the research suggests. Understanding pre-service teachers' self-efficacy can provide ways of boosting their levels of confidence and motivation.

The correlation between teaching practices and perceived self-efficacy in the context of emerging ICTs reflects current practices in educational settings in general, and pre-service teacher education in particular. Given the importance of teacher education outcomes for the future of public schooling, an ability to channel decision making into responsive practices that take account of global forces in the information revolution is of high importance. Developing nations such as Saudi Arabia and its nearby Islamic nations are currently working their way through this change process. They provide an interesting regional development context for the global trends, to gain insight into and strategies for improved understanding of 'old' and 'emerging' paradigms of professional practice.

Within an inherently conservative society, where the digital divide meets the gender divide and core social values and beliefs or immutable 'truths' about education, there are deep and largely unconscious behaviours to disturb. The challenge lies ahead in how best to broker a resolution to this dilemma. Traditional 'expert' driven methods where the teacher is perceived as the source of knowledge are largely incompatible with the interactive nature of ICTs and their powerful search engines. The knowledge revolution brought about through access to online technologies opens frontiers to knowledge in infinite directions. In an effort to inform pre-service teacher education, especially in Saudi Arabia, this study provides insight into the general perceived self-efficacy of pre-service teachers and the factors that influence the integration of technology into their curriculum.

Arguably, the same case can be made for pre-service teachers in the developed world. This leads to the third point which relates to leadership and policy development. There is a need to investigate the new roles of leadership in promoting and facilitating the integration of technology into the pre-service teachers' curriculum. Finally, and on a technical note, this study deals with general self-efficacy; therefore, studying self-efficacy in respect of specific ICTs tasks such as using Microsoft *Office* applications or various ICTs and Internet tools is required. As such, the findings provide a constructive starting point for further investigation into this rapidly changing culture of teaching and learning delivery. They focus the lens on situated contexts and culturally driven responses.

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