Mobile Self Efficacy in Canadian Nursing Education Programs

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Abstract

The purpose of this study was to assess the self-efficacy of nursing faculty and students related to their potential use of mobile technology and to ask what are the implications for their teaching and learning in practice education contexts. We used a cross-sectional survey design involving students and faculty in three separate nursing education programs in Western Canada. Fifty-six faculty members and students completed the survey in March, 2010. Results showed a high level of ownership and use of mobile devices among our respondents. Their overall average mobile self-efficacy score was 72.11 on a scale of 100, indicating that they are highly confident in their use of mobile technologies and prepared to engage in mobile learning.

Keywords

Self-efficacy, motivation, mobile learning, nursing education, practice education

Previously, we (Authors, 2009a, 2009b) have argued that, in nursing education, new approaches and tools are needed to support the teaching and learning of nursing students at a distance and that mobile learning (m-learning) could potentially be highly effective in this instructional context. Koole (2009; Koole, McQuilkin & Ally, 2010) defines m-learning as a process resulting from the interaction of mobile technologies, human learning capacities, and the social aspects of learning. In the nursing education context, it supports learning that is more situated, experiential and contextualized within the specific instructional domain and affords the use of up-to-date and accurate content (Kukulska-Hulme & Traxler, 2005). In nursing practice education, m-learning has the potential to bring the instructor, peers and resources together virtually at the point-of-care, especially when indirect supervision models are used, to support the students' safety and evidence-informed practice.

1.1 Literature Review

In a recent study (Authors, 2009a), we concluded that it was feasible and desirable to implement the use of mobile learning in nursing practice education in particular, but we also determined that such use must be fully integrated into the curriculum to be effective. In addition, our research indicated that it was necessary to move beyond descriptive studies and to base further research in this area on established theory.

This paper reports on a study that is situated as a precursor to a planned longitudinal study examining the applicability of the Community of Inquiry model (Garrison, Anderson & Archer, 2001) to mobile learning contexts. As such, the study was intended to provide further information on the current state of the use of mobile technology in nursing education and on its potential implementation in practice education. We sought to understand the predisposition of faculty and students to make use of this new technology in their teaching and learning.

In particular, we were interested in our respondents' level of motivation to engage in m-learning. In our previous study (Authors, 2009a), nursing students reported feeling quite comfortable with mobile devices. They found them easy to use and to be useful in their practice education courses. However, despite these positive assessments, when offered the opportunity to use mobile devices in their courses, they used them sparingly and limited this use to one or two nursing resource applications. Our results also revealed that our respondents' expressions of confidence in their ability to learn how to use mobile devices were based on previous experience with desktop computing rather than with mobile devices per se. Therefore, we turned to the literature on motivation; specifically the concept of self efficacy (Bandura, 1997), for guidance and to delve more deeply into how well nursing students and faculty were prepared to use mobile learning in their courses.

Self-efficacy refers to the personal beliefs of individuals that they are capable of learning and performing particular behaviors. As such, it is not a generalized trait, but is domain specific (Bandura, 1997; Schunk, 2008). Students' perceptions of self-efficacy have been found to influence their decisions about the choice of activity in which they engage, their emotional responses (e.g., stress and anxiety) when performing the behaviors, and their persistence in carrying out these actions (Bandura, 1997; Compeau & Higgins, 1995; Schunk, 2008). As such, self-efficacy has been shown to be an important mediator of many forms of achievement behaviour (Schunk, 2008).

Individuals' self-efficacy judgments differ on three interrelated dimensions: magnitude, strength, and generalizability (Bandura, 1997, 2006; Compeau & Higgins, 1995). Magnitude refers to the level of task difficulty individuals believe they can attain, i.e., those with high self-efficacy will see themselves as able to accomplish difficult tasks and those with low self-efficacy will see themselves as only able to execute simple forms of the behaviour. Self-efficacy strength refers to the level of the confidence that individuals have regarding their ability to perform a tasks (e.g., their ability to learn and use mobile devices). Finally, self-efficacy generalizability reflects how much an individual's judgment is limited to a particular domain of activity. In mobile learning, the domain includes the characteristics of the specific mobile technology with which users interact (Koole, 2009; 2010). Thus, individuals with high mobile self-efficacy generalizability would expect to be able to competently use a variety of different devices, while those with low computer self-efficacy generalizability may perceive their capabilities as limited to particular devices, especially those with which they have had experience.

Specifically, while a significant body of research exists on learners' feelings of self efficacy concerning computer technology, online learning and even podcasting (e.g., Compeau & Higgins, 1995; Hodges, Stackpole-Hodges, & Cox, 2008; Johnson, 2005; Kao & Tsai, 2009; Koh & Frick, 2009; Liang and Wu, 2010; Loftus, 2009), this concept does not appear to have been examined in a mobile learning context.

1.2 Methodology

The purpose of this study then was to assess the level of self-efficacy of nursing faculty and students related to their potential use of mobile technology and to ask what might be the implications for their teaching and learning in practice education contexts. We used a cross-sectional survey design involving students and faculty in three separate nursing education programs in Western Canada by: a Post Licensed Practical Nurse to Bachelor of Nursing (Post LPN) program and an Advanced Nursing Practice (ANP) offered by a university in one province and a Bachelor of Science in Nursing (BSN) program offered by a community college in collaboration with a local university in another province. At the time of the survey, there were 240 students and 33 faculty members in the post-LPN program and 675 students and 18 faculty members in the ANP program. There were also 137 students and 21 full time and sessional faculty members in the BSN Program. Therefore, there were 1124 potential participants.

To investigate these issues, we developed an online survey instrument to gather demographic information and mobile use data and to administer a mobile use self-efficacy questionnaire. Bandura (1997, 2006) stresses that self-efficacy should measure particularized judgments of capability that may vary across specific realms of activity.

The mobile self efficacy questionnaire used in this study was based on a computer self-efficacy instrument developed by Compeau and Higgins (1995) and slightly modified for a mobile learning context. The modification consisted of changing the stem of the question from "I could complete the job using the software package..." to read, "If I had a mobile device such as a smart phone or 3G phone (e.g., iPhone), I could use it in my Nursing instruction…" See Appendix A for the mobile self-efficacy questions. Respondents were asked to answer each question by first answering yes or no and then completing a Likert-style scale of 1 – 10 for their level of certainty about each yes answer. Bandura (2006) also stresses the need for item homogeneity within a domain-relevant scale and advises authors to calculate a Cronbach's alpha coefficient to assess the internal consistency reliability of the scale. For our survey results, alpha was 0.761 indicating that the mobile version of the scale can be considered reliable.

1.3 Results

1.3.1 Demographic information

Fifty-six faculty members and students completed the survey in March, 2010, for a response rate of 4.98%. Table 1 provides the breakdown of respondents by program type, status as faculty or student, age and gender.

Table 1. Demographic Information

Factor	Grouping	N	%
Program	Post LPN	17	30.4
	ANP	26	46.4
	BSN	13	23.2
Status	Faculty	12	21.4
	Students	44	78.6
Age group	18 - 25	3	5.4
	26 - 29	10	17.9
	30 – 39	11	19.6
	40 – 49	19	33.9
	50 – 59	12	21.4
	60+	1	1.8
Gender	Male	4	7.1
	Female	52	92.9

The Advanced Nursing Practice program provided nearly half of the respondents in this study. In addition, nearly

77% of our respondents were reported being 30 years or more in age and a full 57% over 40 years, indicating that the a substantial majority were mature adults. Ninety-three percent were female, while only 7% were male.

1.3.2 Mobile Ownership and Use

In order to more fully understand our respondents' mobile self-efficacy scores, it was important to learn if they owned mobile devices, since the familiarity of ownership would clearly impact their assessment of their capability to use such a device. All 56 respondents indicated they owned a mobile device of some sort.

Table 2 shows the types of mobiles owned by faculty and students in each nursing program. Twenty-three percent reported owning a simple classic mobile phone, while 27% had a cell phone with a camera or MP3 player built in. Eighteen percent indicated they possessed a smart phone (e.g., a Blackberry), while 21% had a 3G phone (e.g., an Apple iPhone). Eleven percent chose the "other" category and reported having a variety of devices, some of which would have fit as well under the smart phone category, but also included the Apple iPod touch and intention to purchase the Apple iPad, which was not yet on the market at the time of the survey.

Table 2. Own a mobile? Crosstabulation by Program

	Type of mobile					
Program	Phone only	Phone & camera	Smart phone	3G phone	Other	Total
Post LPN	6	5	2	1	3	17
ANP	3	6	5	9	3	26
BSN	4	4	3	2	0	13
Total	13	15	10	12	6	56

Table 3 shows the level of mobile ownership by age grouping. Since the age groups varied in size and two age groupings (18-25 and 60+) were considerably smaller than the other groups, calculating percentages would be misleading. However, it is interesting to note that majority of 3G mobiles were owned by respondents in the middle age grouping (individuals aged 30-49).

In addition to learning what types of mobile devices our respondents owned, it was also important to detail in what ways and how much they used their in their daily lives as well as in teaching and learning in order to explain their levels of mobile self efficacy. Table 4 shows what mobile features our respondents reported using on a weekly basis. Note that this was an open choice question allowing respondents to select more than one feature such that the total number of choices for each item does not equal the number of respondents.

Table 3. Own a mobile? Crosstabulation by Age

	Type of mobile					
Age Group	Phone only	Phone & camera	Smart phone	3G phone	Other	Total
18-25	0	1	1	1	0	3
26-29	2	3	3	1	1	10
30-39	2	2	2	4	1	11
40-49	5	5	2	6	1	19
50-59	4	4	1	0	3	12
60+	0	0	1	0	0	1
Total	13	15	10	12	6	56

Regardless of other choices, it is perhaps not surprising that nearly all (91%) of our respondents reported using their mobiles weekly for telephone services. The exception likely would have been those owning an Apple iPod Touch, which can afford email and Internet access via WiFi connectivity, but does not function as a mobile telephone. In addition, half of our respondents reported also using their mobiles to do email, browse the Internet and text message, and 34% used health applications on their devices weekly.

Table 4. Mobile Features used once / week by Program

Program	Phone	Camera	Email	Internet	SMS	Audio msg	Word Pro	Health apps
Post LPN	15	2	4	2	4	1	2	2
ANP	23	9	19	17	17	1	2	16
BSN	13	5	4	7	7	2	3	1
Total	51	16	27	28	28	4	7	19

To more fully determine how our respondents made use of their mobiles in their teaching and learning, we asked them to indicate which features or applications they used at least one time to support their learning as a student or teaching as a faculty member. Perhaps the most significant answer to this question was that nearly 36% of our respondents reported not using their mobiles in any way in their teaching and learning. Of those who did use their devices in some manner for this purpose, 53% used them for email, 50% for health applications and 47% used the telephone. One third of respondent also indicated using their mobiles

for word processing, which is interesting given the limited capabilities of most mobiles in this regard.

Table 5. Mobile Features used in nursing by program

Program	Phone	Camera	Email	Internet	SMS	Audio msg	Word Pro	Health apps	Not used
Post LPN	3	1	4	3	0	1	4	2	9
ANP	7	1	11	12	5	1	5	15	6
BSN	7	2	4	6	2	0	3	1	5
Total	17	4	19	21	7	2	12	18	20

1.3.3 Self Efficacy

All of our respondents reported owning a mobile device and most used it weekly at least to make telephone calls. How did such evident familiarity with the domain of mobile use translate into feelings of self-efficacy? The overall average mobile self-efficacy score was 72.11. A univariate ANOVA (Table 6) when testing at $\alpha \leq .05$ level showed no statistically significance main effects between the mean self–efficacy scores and program, faculty vs. student, or age grouping. This was also the case for gender. There was however, a statistically significant interaction between program type and age grouping.

Table 6. Univariate ANOVA

Source	df	Mean Sq.	F	Sig.
Program	2	995.815	2.362	.111
Faculty-Student	1	66.527	.158	.694
Age	5	386.861	.917	.482
Gender	1	274.148	.650	.426
Program * Faculty-Student	2	707.400	1.678	.203
Program * Age	7	1113.562	2.641	.028
Faculty-Student * Age	1	952.885	2.260	.143
Age Group * Gender	1	193.600	.459	.503
Error	32	421.685		

Table 7 outlines the mean mobile self-efficacy scores by program type. All program means were negatively skewed, indicating that self-efficacy scores in each group tended to be clustered above the mean. The self-efficacy scores were highest on average in the ANP program and lowest in the Post LPN program. However, the Post LPN group had one score of 0, which appears to be an outlier, since the next lowest score was 19, also in this group and the scores in the group are negatively skewed.

Table 7. Self Efficacy Scores by Program

Program	N	Mean	Median	S. D.	Min	Max*	Skew
Post LPN	17	61.29	64.00	24.32	0	90	-1.19
ANP	26	77.31	78.00	19.70	25	100	-1.23
BSN	13	75.85	77.00	23.43	25	100	-1.06
Averages	56	72.11	75.00	22.81			

* The maximum possible score was 100.

Interestingly, while the ANOVA (Table 6) showed no main effect for self-efficacy scores by program level, a Tukey HSD post hoc test (Table 8) showed a statistically significant difference between the mean scores for the Post LPN and ANP programs.

Table 8. Tukey HSD Post Hoc Test – Self-Efficacy * Programs

Program	Mean Diff.	Std. Error	Sig.	95% Confidence Lower	95% Confidence Upper
ANP - Post LPN	16.01*	6.405	.045	.27	31.75
ANP - BSN	1.46	6.975	.976	-15.68	18.60
BSN – Post LPN	14.55	7.566	.149	-4.04	33.14

* The mean difference is significant at the 0.05 level.

Faculty mobile self-efficacy scores (Table 9) were nearly 10 points lower on average, which would seem to indicate a substantial difference. However, since the results were negatively skewed, the differences in median scores were less pronounced and the ANOVA (Table 6) indicated that the difference was not statistically significant.

Table 9. Self Efficacy Scores: Faculty - Students

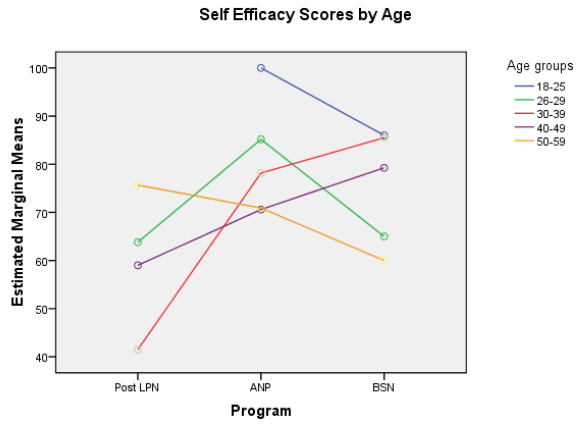
	N	Mean	Median	S. D.	Min	Max	Skew
Faculty	12	64.75	69.50	29.95	0	100	-.96
Students	44	74.11	76.50	20.42	19	100	-.99
Totals	56	72.11	75.00	22.81	0	100	-1.10

Table 10 provides the breakdown of mobile self-efficacy by age. While the 18-25 age group appears on average to have a much higher sense of self-efficacy than any other group, this may simply reflect the small numbers in the group. Again, an ANOVA (Table 6) indicated that the difference was not statistically significant.

Table 10. Self Efficacy Scores by Age Group

Age	N	Mean	Median	S.D.	Min	Max	Skew
18 - 25	3	90.67	95.00	12.10	77	100	-1.41
26 - 29	10	72.90	75.00	16.86	45	100	-.29
30 – 39	11	78.82	88.00	24.11	19	100	-1.64
40 – 49	19	67.74	71.00	26.41	0	100	-1.06
50 – 59	12	67.92	75.00	21.92	25	95	-1.14
60+	1	68.00	68.00	.	68	68	.
Total	56	72.11	75.00	22.81			

The one statistically significant effect revealed by the ANOVA was an interaction between self-efficacy scores by program and age combined. However, it is likely that this was an artefact of the small N of 3 in the 18 – 25 age group. All of three individuals had high self-efficacy scores. One was in the ANP program and the other two in the BSN program, both of which had substantially higher mean self efficacy scores than the Post LPN program. Figure 1 displays a cross plot of the self efficacy scores by age and program type and demonstrates that the 18-25 age group appears to be an outlier.



1.4 CONCLUSIONS

We noted previously that our earlier research (Authors, 2009) has shown that it was both feasible and desirable to implement the use of mobile learning in nursing practice education. M-learning has the potential to bring the instructor, peers and resources together virtually at the point-of-care to support the students' safety and evidence-informed practice. As such, this study was intended to assess the current state of the use of mobile technology in nursing education and, more specifically, to investigate the predisposition of faculty and students to make use of this new technology in their teaching and learning. In our previous study, nursing students had reported feeling comfortable with mobile devices and found them easy to learn, but also used them sparingly. Therefore, we turned to the literature on motivation; specifically the concept of self efficacy (Bandura, 1997) for guidance and to delve more deeply into how well nursing students and faculty were prepared to use mobile learning in their courses.

1.4.1 Demographics

We surveyed 56 nursing faculty and students across three different types of nursing programs in two provinces in western Canada. While the majority of our respondents were 30 years or older, they represented all age groups who could be, or are likely to be, involved in nursing education. Therefore, while the results have to be interpreted with caution in terms of generalizing beyond these programs, our study does provide a snapshot of how well nursing faculty and students are prepared to engage in mobile learning.

The results of the demographics portion of our survey, for instance, revealed that all respondents owned mobile devices and that the type of device owned ranged evenly across the different levels of mobile technology available. For instance, twenty-three percent reported owning a simple mobile phone with no other features, while nearly 40% had a smart phone or 3G device. Furthermore, the ownership of the more sophisticated mobiles was not restricted to one age group, but spread evenly across the groups.

Additionally, our respondents reported using their devices in a variety of ways on a weekly basis. While their highest level of use (91%) was for making telephone calls, those owning mobiles with a range of capabilities also employed a number of other features on a regular basis. Half of our respondents reported also using their mobiles for email, to browse the Internet and text message and 34% used health applications on their devices weekly. This is consistent with the use of mobile devices in Canada generally. A recent online poll (Ipsos Reid, 2009, May) revealed that seventy per cent of wirelessly connected Canadians are accessing the mobile Internet for personal e-mail and more than one quarter are browsing the web from their mobiles at least once a day.

At a minimum, then, we can state with some certainty that nursing faculty and students, as represented by our sample, are familiar with the use of basic mobile technology and that a substantive proportion are knowledgeable about devices providing a variety of functionalities. In terms of comfort with the device aspects of m-learning (Koole, 2009), our respondents appeared prepared to engage in mobile learning.

However, currently, our respondents are not using their mobiles as much in nursing education as in their personal life. Nearly 36% of our respondents reported not using their mobiles in any way in their teaching and learning. Of those

who did use their devices in some manner for this purpose, 53% used them for email, 50% for health applications and 47% used the telephone. It should be noted here that none of the nursing programs surveyed were formally integrating the use of mobiles into their curriculum. From our past work (Authors, 2009), we had concluded that such integration was necessary for mobile learning to be successfully implemented and these results appear to support that conclusion in that our respondents were not automatically making use of their mobile devices in their teaching and learning.

1.4.2 Self-efficacy

Self-efficacy refers to individuals' personal beliefs that they are capable of learning and performing particular behaviors. More specifically, self-efficacy appraisals reflect the level of difficulty individuals believe they can surmount. The stronger the sense of personal efficacy they possess, the greater will be their perseverance and the higher the likelihood that they will perform the chosen activity successfully. Individuals' self-efficacy judgments differ on three interrelated dimensions: magnitude, strength, and generalizability (Bandura, 1997; Compeau & Higgins, 1995).

Bandura (2006) describes the assessment of self-efficacy as follows:

> In the standard methodology for measuring self-efficacy beliefs, individuals are presented with items portraying different levels of task demands, and they rate the strength of their belief in their ability to execute the requisite activities. They record the strength of their efficacy beliefs on a 100-point scale, ranging in 10-unit intervals from 0 ("Cannot do"); through intermediate degrees of assurance, 50 ("Moderately certain can do"); to complete assurance, 100 ("Highly certain can do") (p. 312).

The average mobile self-efficacy score for our respondents, as a group, was 72.11 and these results were negatively skewed. This is a rating mid way between moderately and highly certain and reflects a reasonably high level of confidence in their ability to make use of mobile technology. Overall, then, if our sample is at all representative, it appears that nursing faculty and students, at least in western Canada, have a strong sense of mobile self-efficacy and this augurs well for the implementation of mobile learning in their curricula.

Furthermore, this level of self-efficacy was not restricted to specific program levels or age groups. The median self-efficacy across programs ranged from 68 for the Post LPN program group to a high of 78 for the ANP program group. As a main effect in an ANOVA, this difference was not statistically significant, although the difference was shown to be statistically significant with a more sensitive Tukey HSD post hoc test. The Post LPN program (Post Licensed Practice Nursing to Bachelor of Nursing) students are individuals who originally received a two year diploma in nursing and have returned to school to upgrade their credentials to the baccalaureate level. The ANP (Advanced Nursing Practice) program, on the other hand, is a post baccalaureate certificate. While our respondents' level of education data was not gathered, it is probable that students, and even faculty (who are all employed on a part time basis by the university), in the Post LPN program were comparatively less educated, and possibility less experienced, than in those in the Post LPN program. Higher levels of education and experience could well contribute to an individual's sense of self-efficacy in learning contexts.

The median self-efficacy scores by age ranged from a low of 68 to a high of 95, which would indicate that all age groups minimally demonstrated a stronger than moderate level of mobile self-efficacy. With a median score of 95, the 18–25 age group had an exceptionally high level of self-efficacy. However, this group was represented by only three individuals and it is uncertain how representative they may have been of their age group. Further, while the mean scores appeared to generally decrease with age, the second highest median score (88) was in the 30-39 age group and there was no main effect for age in the ANOVA. Therefore, we found no reason to assume there was a relationship between age and self-efficacy among our respondents.

Similarly, while faculty mobile self-efficacy mean scores (64.75) were nearly 10 points lower on average than those of the students (74.11), the median scores were closer (a median score of 69.5 for faculty and 76.5 for students). Moreover, the ANOVA once again indicated that the difference was not statistically significant.

Overall, then, the nursing faculty and students in our sample appeared familiar with current mobile technology and many of its features. They also demonstrated high levels of mobile self-efficacy. On this basis, it is reasonable to conclude that they are well prepared and strongly motivated to engage in mobile learning.

1.4.3 Future Research

Issues of learner motivation in general, and the construct of self-efficacy warrant further investigation in the domain of m-learning. In terms of the present study, given the large numbers of faculty and students available to us, the response rate for our survey at just under 5% was very disappointing and certainly well below the level needed to be confident that our sample was representative of the greater population of nursing students and faculty. Therefore, it would be highly worthwhile to repeat this study to attain higher sample sizes.

Further, our analysis of mobile self-efficacy focused mainly on an assessment of the strength of the relationship. It would be useful, both in terms of further analysis of our current data and for future studies, to explore the dimension of generalizability by conducting a microanalysis of the responses to specific items in the scale. For instance, in our

previous study (Authors, 2009), while we provided a 2 hour orientation to the mobile devices used in the study prior to their deployment, our respondents also reported being able to learn features of the devices on their own with the assistance of the device manual. Question 3 in our survey pertained to exactly that issue, stating, "If I had a mobile device such as a smart phone or 3G phone (e.g., iPhone), I could use it in my Nursing instruction...if I had only the device manual for reference." Question 9, on the other hand, relates more to direct instruction, stating, "If I had a mobile device such as a smart phone or 3G phone (e.g., iPhone), I could use it in my Nursing instruction... if someone showed me how to do it first.." Both questions detail the degree to which an individual feels confident learning and managing a mobile device without direct assistance from faculty or other. Such questions have strong implications for whether or not to integrate teaching the use of mobile technologies into the curriculum.

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Appendix A: Mobile Self-Efficacy Scale Questions

	If I had a mobile device such as a smart phone or 3G phone (e.g., iPhone), I could use it in my Nursing instruction.
Q1	...if there was no one around to tell me what to do as I go.
Q2	...even if I had never used a device like it before.
Q3	...if I had only the device manual for reference.
Q4	...if I had seen someone else using it before trying it myself.
Q5	...if I could call someone for help if I got stuck.
Q6	...if someone else had helped me get started.
Q7	...if I had a lot of time to complete the task for which the device was provided.
Q8	...if I had just the built-in help facility for assistance.
Q9	...if someone showed me how to do it first.
Q10	…if I had used similar devices before this one to do the same task.