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"I can do it": Does confidence and perceived ability in learning new ICT skills predict pre-service health professionals' attitude towards engaging in e-healthcare?

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Abstract. Background: There are many factors affecting health professionals' willingness to engage in e-health. One of these factors is whether health professionals perceive themselves to be able to learn new skills, and have the confidence in mastering these new Information and Communication Technology (ICT) skills. **Objective:** This study examined how health students' confidence and perceived ability for learning new ICT skills affect their attitude towards engaging in e-health. **Methods:** A survey was conducted to explore students' attitude towards using e-health and their perceived self-efficacy and confidence to learn new ICT skills. Multiple regression analysis was used to examine the relationship between confidence and self-efficacy, and attitude towards engaging in e-health controlling for participants' age, gender, and prior IT learning experience. **Results:** The three scales measuring attitude, confidence and self-efficacy showed good internal consistency with respective Cronbach's Alpha scores of 0.835, 0.761 and 0.762. Multiple regression analysis showed a significant relationship between confidence, self-efficacy and prior IT learning experiences with attitude towards e-health after adjusting for the effect of each other ($F_{3,350}$ =17.20, $p<0.001$). **Conclusion:** Self-efficacy and confidence in learning new ICT skills together with previous ICT training either at or outside their university studies are significant factors associated with students' attitude towards using e-health. Enhancing students' level of self-efficacy in learning new ICT skills may be the key to the success of implementation of e-health initiatives.

Keywords. E-health, allied health personnel, self-efficacy, health graduates, health students

Introduction

The World Health Organisation (WHO) defines e-health as "the transfer of health resources and healthcare by electronic means…It encompasses the delivery of health information, for health professionals and health consumers, through the Internet and telecommunications"[1]. The Australian Government's recent National e-health Strategy report stated that for healthcare services to be sustainable, the sector must become more e-health enabled[2]. Healthcare professionals working at the coalface are key to the successful implementation of e-health initiatives. There are many factors affecting health professionals' willingness to engage in e-health, these include their attitude towards the effectiveness of e-health in providing patient care, whether they have

adequate ICT training in adopting e-health, whether they perceive themselves to be able to learn new skills, and in turn have the confidence in mastering these new ICT skills[3].

Through semi-structured interviews with Occupational Therapists working in rural New South Wales, Chedid and colleagues[3] found that individual barriers to implementing e-health included mistrust in ICT. The health professionals who participated in the study reported a fear that the technology would not work when needed and a belief that telehealth is not as good as face-to-face patient care[3]. This is in contrast to research demonstrating equivalence in working alliance between computer-mediated communication and face-to-face therapy in psychology[4].

One explanation for Chedid and colleagues's[3] findings is perceived self-efficacy. Perceived self-efficacy refers to an individual's perceived ability to perform a particular task. In this case, that task is to effectively use ICT in health delivery. In support of this explanation, education research shows that teachers' ICT self-efficacy (i.e. their perceived confidence in using technology) predicted prospective ICT integration into the classroom. That is, teachers who were confident in their ability to use ICT were more likely to report intentions to integrate technology into their classroom[5]. Such results suggest that providing training in ICT may enhance self-efficacy and better facilitate the integration of technology into practice.

For allied health students entering the e-health-enabled workplace, it is particularly important to be informed and prepared to make evidence-based judgments about e-health. Research has shown that for practicing health professionals, there is a clear link between self-efficacy and e-health adoption[6,7]. There is little research examining such a link with allied health students. Acknowledging that student's professional identities are still developing while at university and that most have had an upbringing in a technological society, it is unclear whether ICT self-efficacy predicts attitudes towards engaging in e-health in students as it does in clinicians. The aim of this study was to examine the relationship between allied health students' confidence and self-efficacy to learn new ICT skills and their attitude towards engaging in e-health.

1. Methods

1.1. Study Design and Participants

This study employed a cross-sectional design with self-report online questionnaire. All students enrolled in the Faculty of Health Sciences of the University of Sydney in semester 2, 2013 were invited to participate in the research. There were no exclusion criteria. Participation was voluntary; students who completed the questionnaire were entered into a draw for the chance to win an iPad Mini or one of 25 coffee vouchers.

1.2. Study Variables

The study variables were students' attitude towards engaging in e-health, confidence and perceived ability in learning new ICT skills. Other study variables included gender and age of participants and whether they had previously undertaken any ICT related units of study before or as part of their university studies.

1.3. Materials

A survey which had 22 questions was constructed for this study. The survey was administered online using Survey Monkey (SurveyMonkey.com).

Students' attitude toward e-health was measured using a modified version of the "efficiency of ICT in care" scale of the Information Technology Attitude Scales for Health (ITASH), designed and validated by Ward and colleagues[8]. The original scale was a 4-point Likert scale (strongly agree, agree, disagree and strongly disagree) with 17 items designed to assess healthcare workers' attitudes towards efficiency of ICT in patient care[7]. There were 16 items in the modified subscale with a possible score ranging from a minimum of 16 to a maximum of 64. The wording of the original scale was modified to capture students' attitude toward engaging in e-health. Items were reverse coded when required so that a high score suggested a positive attitude towards e-health in patient care.

Students' confidence and self-efficacy in learning new ICT skills was assessed using questionnaire items from the "Digital Information Literacy Report" developed by Hegarty and colleagues [9]. For confidence, responders indicated whether they felt "extremely unconfident", "unconfident", "confident" and "extremely confident". For Self-efficacy, the available responses were "extremely unlike me", "unlike me", "like me" and "extremely like me". Items were reverse coded when required so that a high score suggested high level of confidence and self-efficacy. Possible scores for confidence ranged from a minimum of 6 to a maximum of 24 (six questions in total); possible scores for self-efficacy ranged from a minimum of 10 to a maximum of 40 (ten questions in total). Items for the 3 scales are shown in table 1.

Table 1. Items making up attitude towards e-health, confidence and self-efficacy in learning new ICT skill scales.

Attitude Towards eHealth[8]

Items	
1.	Engaging in eHealth would improve patient/client care.
2.	The information I get from electronic health records help me give better care to patients.
3.	Using ICT make my communication with other health professionals faster.
4.	I worry that the use of eHealth applications in healthcare delivery may undermine patient confidentiality.
5.	I believe that eHealth can help us deliver individualised care.
6.	Using ICT would make my communication with other health professionals less reliable.
7.	The cost of implementing eHealth would be better used to employ more staff.
8.	The time I spend with patients would reduce because of the time I would spend working with eHealth tools.
9.	I think we are in danger of letting eHealth take over traditional healthcare practices.
10.	eHealth helps to improve the way healthcare is delivered.
11.	The speed with which I can access information using eHealth applications will help me give better care to patients.
12.	Time spent on eHealth is out of proportion to its benefits.
13.	Use of electronic health records would be more of a hindrance than a help to patient care.
14.	I feel there are too many eHealth devices around now.
15.	Engaging in eHealth would make healthcare staff less productive.
16.	Engaging in eHealth is more trouble than it's worth.

Confidence in Learning New ICT Skills[9]

How confident would you be……
….if there was no one around to tell you what to do as you go
….if you only had an instruction manual for reference
….if you could call someone for help if you got stuck
….if someone else had helped you get started
….if you had a lot of time to learn how to do the task
….if there was someone giving you step by step instructions

Self-Efficacy in Learning New ICT skills[9]

In learning to use a new computer technology or online tool, I am more likely to ….
….expect that I will experience many problems
….doubt my ability to solve the problems that may arise
….need to ask others for help
….try and persist on my own until it works correctly
….give up quickly if it doesn't work
….put a lot of effort into getting it right
….immediately ask someone else if it doesn't work straight away
….get someone else to do it for me or fix it
….spend extra time trying to understand what to do
….get frustrated and annoyed at my lack of progress

1.4. Procedure

Participants were recruited at the beginning of the semester through a series of face to face in-class invitations. Advertisements were also posted on the eLearning sites of all health degree programs offered at the faculty. Participating students were instructed to read the information statement and provided their consent by completing the survey. Students were given the option to provide their student Identification (ID) number if they wished to enter into a draw to receive a prize. Students were informed that their ID numbers would be replaced by a randomly generated record number upon completion of the draw.

1.5. Data Analysis

Data were analysed using SPSS v20. Internal consistency of attitude, confidence and self-efficacy scales were examined using Cronbach's Alpha. Pearson correlation (for continuous variables) and independent-samples T tests (for categorical variables) were used to examine the bivariate relationship between each of the study variables with attitude towards e-health. Multiple regression analysis was conducted to examine the relationship between variables that were found to have a significant bivariate relationship with attitude towards engaging in e-health at the p=0.05 level.

2. Results

A total of 356 students completed the survey. The participants consisted of 250 (70.2%) undergraduate students and 106 (29.8%) postgraduate students. There were 76 males (21.3%) and 280 females (78.7%), with a mean age of 22.9 (SD=6.2). The

majority of students (78.9%) did not have any prior IT learning experience either at or outside the university studies.

The three scales showed good internal consistency as measured by Cronbach's Alpha. The respective Cronbach's Alpha scores for attitude, confidence and self-efficacy were 0.835, 0.761 and 0.762. On average, the participating students had an above mid-point attitude towards e-health (mean=48.2, IQR=6), and an above mid-point level of confidence (mean=18.9, IQR=4) and self-efficacy (mean=28.2, IQR=4) in learning new ICT skills. The variables: prior IT learning experience, confidence and self-efficacy were found to have a significant relationship with attitude towards using e-health. These variables were entered into the multiple regression model. Results of the bivariate analyses were presented in Table 2.

Table 2. Results of bivariate analyses of relationship between each study variables with attitude towards e-health.

	Mean (SD)	Proportion	Test Statistics	P
Age	22.9 (±6.2)	-	r = 0.022	0.686
Gender	-	Female = 78.7%	t = -0.214	0.831
UG or PG	-	UG = 70.2%	t = -1.638	0.102
IT Prior Experience	-	No = 78.9%	t = -2.590	**0.010**
Confidence	18.9 (±2.4)	-	r = 0.237	**<0.001**
Self-Efficacy	28.2 (±3.6)	-	r = 0.326	**<0.001**

The multiple regression analysis showed that there is a significant relationship between confidence, self-efficacy and prior IT learning experiences with attitude towards e-health after adjusting for the effect of each other ($F_{3,350}$ =17.20, $p<0.001$). These variables were statistically significant in predicting 12.8% of the variation in students' attitude towards e-health. Tests of the interaction terms between prior IT learning experience and confidence, as well as prior IT learning experience and self-efficacy were not significant. These results suggested that the three variables associated with attitude towards engaging in e-health independently. The formula below presented the relationship between the three variables with attitude towards using e-health.

$$\hat{y} = 31.4 + 1.3 \text{ Prior IT learning experience} + 0.3 \text{ Confidence} + 0.4 \text{ Self-Efficacy}$$

Where $\hat{y}$=Attitude toward engaging in e-health

3. Discussion

The results from this study suggest that previous exposure to IT training, self-efficacy and confidence in learning new ICT skills are associated with students' attitudes towards engaging in e-health. The observed relationships are positive and significant, as well as independent. These results provide support for the hypothesis that self-efficacy and confidence are significant factors influencing the attitude of students after adjusting for their prior learning ICT experiences. This is the first study to explore the attitude of health professional students towards using e-health. The results of this study are comparable to those obtained in education research[5].

These results could be interpreted in light of Bandura's social cognitive theory[10,11]. Self-efficacy, defined as the self-perceived ability to perform a task successfully, plays a pivotal role in the actual outcome of the task or performance. The underlying mechanism lies in the probable connection between self-efficacy, confidence, and a positive attitude towards the task. As demonstrated from the results of this study, self-efficacy was positively related to attitude. This association is likely to be the result of a direct relationship between self-efficacy and attitude, as well as an indirect relationship that could be mediated by confidence. A higher level of self-efficacy enhances a greater sense of confidence and is conducive to a more positive attitude toward the subject matter. As a positive attitude is an important motivational factor in learning and performance, a positive attitude toward using e-health for healthcare might lead to a higher likelihood of implementation. The direct and indirect effects of self-efficacy on attitude and consequent behaviour warrants further investigation.

In reports recently published by the WHO[12] and Gray and colleagues[13], recommendations were made about how to prepare clinicians to engage in an e-health-enabled work environment. The results of these studies suggest that in designing e-health curriculum for clinicians, it is important to incorporate educational content and teaching methodologies that enable students to acquire a sense of confidence and self-efficacy in using ICT. In our study, self-efficacy was shown to be an independent factor after adjusting for prior ICT learning. This suggests that those students who perceive that they are able to use new ICT tools and technologies have more positive attitudes towards engaging in or using e-health for providing healthcare delivery. Thus, enhancing self-efficacy of allied health students is likely to lead to the adoption, implementation and use of new technologies in the health workplaces.

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