CrossMark

Exploring changes in nursing students' attitudes towards the use of technology: A four-wave longitudinal panel study

Ahmad Tubaishat [a,*], Ma'en Aljezawi [b], Omar M. Al-Rawajfah [a], Laila Habiballah [c], Laila M. Akhu-Zaheya [d]

[a] Department of Adult Health Nursing, Faculty of Nursing, AL AL-Bayt University, Mafraq, Jordan
[b] Department of Community Health Nursing, Faculty of Nursing, AL AL-Bayt University, Mafraq, Jordan
[c] Department of Nursing, Irbid National University, Irbid, Jordan
[d] Department of Adult Health Nursing, Faculty of Nursing, Jordan University of Science and Technology, Irbid, Jordan

ARTICLE INFO

SUMMARY

Background: It is essential for nursing students to be equipped with the necessary technology skills throughout and after their study period. Their acceptance of this technology depends largely on their attitudes towards technology.
Objectives: To explore the evolution in nursing students' attitudes towards technology, and to determine whether there was a change in participants' formal education in technology over their four years of study.
Methods: A longitudinal panel study was conducted in a single school of nursing in Jordan. A total of 140 students were followed over their four years of undergraduate study. They completed the same tool (the Technology Attitude Scale) each year, to capture any changes in their attitudes towards technology across the years.
Results: In all four waves of data collection, students showed positive attitudes towards technology, with the highest attitude scores being in their final year (M = 6.19, SD = 0.72). As the students spent more time on their nursing education, they were found to have a more positive attitude. Thus, a strong positive relationship existed between this formal education in technology and attitudes: as the students' education in technology increased, their attitudes were more positive.
Conclusion: A remarkable development in students' attitudes towards technology is reported in this study. The positive attitudes displayed by the students should be enhanced by providing technology-related subjects during their studies in nursing schools at a very early stage.

© 2015 Elsevier Ltd. All rights reserved.

Introduction

The healthcare industry worldwide is facing a major revolution due to its increasing adoption of information technology (IT), exemplified by the use of electronic health records (Booysen, 2009). Very great benefits are cited in the literature for the application of IT to healthcare. For instance, it can reduce costs and improve the effectiveness and efficiency of health services (Nkosi et al., 2011). From another perspective, it is thought to help to keep patients and their nurses safe, by reducing errors to the minimum through the use of bar coding and computerized charting for drug administration (Iliyasu et al., 2005). Nurses can also save time and effort by using electronic records, allowing them to focus on direct patient care (Willmer, 2005).

In light of this transformation and its advantages, it is essential for nurses and nursing students to have up-to-date IT skills to use in their daily practice (Eley et al., 2009). According to the American Association of Colleges of Nursing (2008, p. 18), baccalaureate graduates in nursing must achieve "competence in using both patient care technologies and information management systems". Some scholars have stressed that prospective student nurses should be examined for their technology skills before enrolling in nursing schools, due to the importance of these skills to their profession (Deltsidou et al., 2010).

The integration of IT into nursing curricula and practice is thus a necessary step (McNeil et al., 2006), resulting in the increased use in nursing education of terms such as 'nursing informatics' and 'tele-nursing' (Nkosi et al., 2011). However, while nursing informatics competencies have started to be introduced into the nursing curricula of several countries (Bakken et al., 2004), the integration of nursing and IT is still in its infancy (Perry and King, 2009).

The adoption of IT is an important step in the integration process, while a key factor in successful adoption and usage is users' acceptance of this technology (Tubaishat, 2014), which will in turn be affected by their attitudes (Dillon et al., 2005). It has been suggested that nursing students' attitudes to technology affect their uptake of IT, how ready they are to learn computer applications, and eventually how they will use technology to improve their patients' care and safety (Detmer, 2005).

* Corresponding author at: Department of Adult Health Nursing, Faculty of Nursing, AL AL-Bayt University, P.O. Box 130040, Mafraq 25113, Jordan. Tel.: +962 2 629 7000x2880; fax: +962 2 629 7052.
E-mail address: atubaishat@aabu.edu.jo (A. Tubaishat).

The concept of attitude is at the core of much research and theory. It is widely explored in the behavioural and social sciences, which are concerned with the prediction of behaviour, changes in attitude, social perceptions and decision making, as well as inter- and intra-group attitudes (Ajzen, 2001). Attitude may be defined in several ways. One reported definition is that attitude symbolizes an enduring summary and general estimation of feelings about performing a behaviour (Lee, 2012). It has attribute dimensions such as like–dislike, good–bad and harmful–beneficial (Bohner and Dickel, 2011).

The framework for this study is provided by the fundamental concepts of the theory of reasoned action (TRA) (Ajzen and Madden, 1986), which has formed the basis of the majority of research into the prediction of behaviour from attitudinal variables (Ajzen, 2001). According to Ajzen and Madden (1986), individuals operate in harmony with their intentions regarding their behaviour, while their attitudes to behaviour decide their intentions. Thus, attitude has a major role in the explanation and prediction of behavioural intentions. The attitudes addressed in the current work are subjects' feelings of like or dislike about the use of technology, a definition congruent with Lee (2012). Participants' beliefs about the consequences of using technology during their studies, and their liking or dislike of these consequences, are seen to have shaped their attitudes towards technology.

The TRA was chosen in this study because it has promising benefits for accurately predict and measure an individual's actual behavior. The main assumption of this theory that if a person has an intention to perform behavior (use of technology in our example) is the best predictor of behavior (Ajzen and Madden, 1986). The intention itself is predicted by the attitude towards the outcome of engaging in a behavior (e.g.: "technology is superior") and the belief of the importance of significant others in performing the behavior (e.g.: "peers think that we should use technology"). Then, it will be possible to change the attitude toward performing a specific behavior (attitude toward technology become more positive). Thus, TRA is supportive in understanding the effect of attitude as one of the major influential factors on actual behavior.

Research findings show that users' attitudes are a vital consideration in the successful use of technological applications, including computer systems and computer-based instruction (Dillon et al., 2005; Gunawardena and Duphorne, 2000; Joo et al., 2000). Those participants with a good sense of technology will be well prepared to use clinical information systems and clinical decision support systems in their future careers.

The term 'technology', when used in this study, refers to any kind of application including hardware, software, computers, databases, internet and email. Theoretically, 'technology' is a wide-ranging term used to denote hardware and software applications employed to store, create, exchange and use information (Nkosi et al., 2011).

A review of the literature reveals a paucity of research into the attitudes of nursing students to technology. Most studies appear to have had cross-sectional designs. Since attitudes can change with time, it would be useful to explore such changes, using a longitudinal approach. In this study, there is a distinct difference from other work, that it was conducted using a longitudinal design, where to the best of the researchers' knowledge, such design in this topic is lacking. This gives the current work the difference and the importance, which can increase the body of knowledge in the area of interest for the Jordanian and the international literature.

Nursing students' acceptance of technologies was searched as well and few studies were located. A descriptive study was conducted to explore the factors that affect students' acceptance of electronic heath record for nursing education, which was integrated within the curricula of one nursing school (Kowitlawakul et al., 2015). The findings of the study revealed that the attitude toward using the electronic heath record for nursing education was the most significant factor on nursing students' acceptance of that technology. However, this study employs a descriptive design which is different from the one that used in the current

work, and they applied the concepts of technology acceptance model, while in our study we use the TRA.

Another study was conducted to investigate the factors that affect intentions to use a clinical imaging portal (Chow et al., 2013). A number of 128 nursing students participated in the survey. The results showed that the most influential factor that affects the behavioral intention to use the portal is the attitude of the students toward use it. Again this research employs the cross-sectional design.

The primary aim of this study was to measure nursing students' self-reported attitudes towards technology use in order to determine whether these changed over time. A secondary aim was to measure any changes in formal education in technology that the students received during their four years of study.

Methods

Design

To achieve the aims of the study, a longitudinal panel design was employed. Panel research is appealing as a method of studying change and establishing the temporal sequencing of phenomena (Polit and Beck, 2013). It was considered the most suitable design here, because it inherently permits the same students to be followed over four waves of data collection, starting on admission to the course in their first year of study and continuing until their fourth and final year, with the same data about their attitudes towards technology being collected by means of the same data collection tool, to detect any changes that might occur. An equal time interval of one year was set between successive waves of data collection.

Setting and Sample

One school of nursing at a public university in Jordan was conveniently chosen. Thus, the target population of this study was nursing students in Jordan, while the accessible population was nursing students in the selected university. The sample initially comprised first-year nursing students, who were then followed through their four years of study. In Jordan, the baccalaureate nursing programme lasts four years. To be included in the study, participants had to be full-time undergraduate nursing students who had enrolled in the first semester of their first year and had agreed to participate.

Since the sample size was likely to decrease by attrition over the four years of the study, it was essential to calculate the minimum sample size required to detect significant differences across the four years if any existed between groups. The G* power test was thus used to calculate sample size (Faul et al., 2007). The required sample size in each wave, based on a medium effect size (0.3), power level of 0.8 and alpha of 0.05, with four measurements, was 74 participants in each measurement. Thus, all 167 students in their first year were invited to participate, in order to overcome the attrition problem. In the event, there remained 79 participants in the fourth wave, thus slightly exceeding the limit determined by the power analysis.

Data Collection Procedures

Data were collected on four occasions, with one-year intervals between them. Nursing students in their first year were identified through the courses taken at this level. Thereafter, the same students were approached again during the first semester each year, up to their fourth year, and asked to complete the same questionnaire, in order to detect any differences in their attitudes towards technology. The first wave of data collection started for the first-year students on admission to their first semester. Thus, it was decided that the consecutive waves of data collection would occur at the end of the first semester of each year.

After the Ethical Review Board of the nursing school had given its approval, the research team distributed the questionnaire to students on