

Psychometric Properties of 'Attitude towards e-Learning Scale' among Nursing Students

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ABSTRACT As nursing schools embrace e-learning during and beyond the COVID-19 crisis, academic nursing institutions must first assess the attitude or perception of students to achieve successful transition and transformation to e-learning. However, there is limited information about the psychometric properties that measure the attitudes towards e-learning among nursing students in the Philippines. The objective of the study is to determine the validity and reliability of the attitudes towards e-learning scale Filipino nursing students. This descriptive cross-sectional study included 111 Filipino nursing students in selected public and private universities were selected through purposive sampling. The attitude toward e-learning scale was assessed for construct validity through exploratory factor analysis using varimax rotation and internal consistency reliability using Cronbach's α and -item-total correlation. The nine-item attitude towards e-learning scale was loaded on one component with factor loadings ranging from -0.907 to 0.893, explaining 61.92 percent of the total variance. The KMO test revealed a value of 0.900, while Bartlett's test was 644.380 (df =55, p=0.000). The corrected item-total correlation of each item varied in between 0.409 to 0.854, and the Cronbach's alpha coefficient of the 9-item scale was 0.917. The 9-item instrument was valid and reliable in assessing the attitude towards e-learning among nursing students. Further studies should be done in order to test it among varied health science students.

INTRODUCTION

The emergence of the COVID-19 pandemic has led to a temporary closure of schools and universities worldwide to fight the spread of coronavirus and maintain safe social or physical distancing affecting over billions of children and students worldwide (Li and Lilani 2020). In this time of crisis, technology plays a vital role in creating fertile opportunities for transformation in teaching and learning (Raheem and Khan 2020). Voutilainen et al. (2017) define e-learning as the learning of nursing students realized in an online environment. Another definition of e-learning is the use of computer-based technologies and the internet to facilitate learning and teaching (Ruiz et al. 2006; Mahmoud et al. 2015).

With this, much emphasis was given on the integration and increasing frequency in the use of educational technology and e-learning strategies in higher education (Williams et al. 2011)

as it offers better access to learning resources online (Regmi and Jones 2020) where factors such as geographical location and time elements of traditional face-to-face teaching can otherwise make it difficult (McKenzie and Murray 2010). In some other countries, nursing education has seen a progressive shift towards e-learning (Betihavas et al. 2016). However, in a developing country like the Philippines, e-learning or online learning is not the ideal or preferred choice of teaching and learning; thus, it has not been well received by nursing academic institutions before the pandemic.

The challenges in the shift to online educational delivery are influenced by several factors, such as the prevailing attitude toward e-learning and pedagogy of students (Carolan et al. 2020). Research into student attitudes is essential in assessing whether students' consider the use of technology in education is useful, beneficial, and acceptable for their learning (Wong and Fong 2014). Although there are prior studies conducted to measure nurses (Chong et al. 2016; Xing et al. 2018; Xing et al. 2020) and students (Ali et al. 2016; Opeyemi et al. 2019; Abbasi et al. 2020) attitude or perception toward e-

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learning, there is limited information about the psychometric properties that measure the attitudes towards e-learning in the Philippines.

Objective of the Study

The study was conducted in order to determine the validity and reliability of attitudes towards e-learning scale among Filipino nursing students.

MATERIAL AND METHODS

Research Design and Participants

The study utilized a descriptive-cross sectional study and was conducted in between April 2020 to June 2020. A purposive sample of 111 nursing students enrolled in selected public and private colleges of nursing in the Philippines were included in the study. The number of participants was based on the criteria set by Comrey and Lee (1992 as cited by Soriano and Calong Calong 2019a) wherein a minimum of 10 observations per variable is needed in order to conduct an explanatory factor analysis. Following this criteria, a sample size of 110 is needed.

Research Instrument

Demographic Information Questionnaire:

The questionnaire forms includes the demographic characteristics of the participants such as age, sex, and average hours spent on the internet daily.

Attitudes toward e-Learning Scale: This is a unidimensional tool consisting of 11 items, which was developed by Zabadi and Al-Alawi (2016). The statements are rated using a five-point Likert scale with verbal interpretations ranging from 1=strongly disagree, 2=Disagree, 3=Undecided, 4=Agree, and 5=strongly agree. The higher the scores means, the higher the attitudes toward e-learning.

Data Analysis

In order to analyzed the gathered data, SPSS version 21.0 (IBM Corporation, Armonk, NY) was used. For the demographic characteristics, descriptive statistical analyses was employed while

internal consistency was determined using Cronbach's alpha coefficient and item-total correlations in order to measure the attitudes towards e-learning. The acceptable value for item-total correlation is 0.30 or higher (Ferketich 1991 as cited by Soriano 2019) while Cronbach's alpha coefficient of 0.70 or higher is considered acceptable (Polit and Beck 2014 as cited by Soriano and Calong Calong 2019b).

Exploratory factor analysis using principal component analysis (PCA) with varimax rotation was used in order to determine the instrument's construct validity. Components with eigenvalue of more than 1.0 was used to examine the factors in each sub-scale. Kaiser-Meyer-Olkin (KMO) test of 0.60 (Li and Lopez 2007) was used to assess the adequacy of the samples while Bartlett's test of sphericity was used in order to assume factorability of correlation matrix (significant at $\alpha < 0.05$, Tabachnick and Fidell 2007). For the factor loadings, a coefficient of 0.60 and higher was the criteria used to retain an item in a scale (Bagozzi et al. 1991).

RESULTS

Demographic Characteristics

The mean age of the respondents was 20.16 (± 0.58) years old and most of the respondents were female (65.77%). On the other hand, the average hours spent on the internet was 6.81 hours (± 3.35) (Table 1).

Table 1: Demographic characteristics of the participants (n=124)

Profile	n	%	Mean (SD)
Age			20.16 (0.58)
Sex			
Male	38	34.23	
Female	73	65.77	
Average hours spent on the internet			6.81 (3.35)

Construct Validity

For the construct validity of the instrument, an exploratory factor analysis was done using PCA with varimax rotation. The appropriateness of the data based on the factor analysis was determined using Bartlett's test and KMO measure of sampling adequacy. The KMO test revealed a value of 0.900, while Bartlett's test was

644.380 (df=55, p=0.000). Evaluation of the PCA leads to the deletion of item number 6 and 11 due to low factor loading. The remaining items were loaded on one factor which explained 61.92 percent of the total variance. The factor loadings range from -0.907 to 0.893 (Table 2).

Internal Consistency Reliability

For the reliability of the instrument, the item mean, standard deviation, scale if item deleted, item total correlation and Cronbach's alpha coefficients were determined. The item mean range from 2.28 to 3.07 while the corrected item-total correlation of each item varied between 0.409 to 0.854, and the Cronbach's alpha coefficient of the 9-item attitude toward e-learning scale was 0.917 (Table 3).

DISCUSSION

This study determined the construct validity and internal consistency reliability of attitudes

toward e-learning scale among nursing students. In assessing the psychometric properties of the instrument, the construct validity and internal consistency reliability were conducted. For construct validity, an exploratory factor analysis using principal component analysis with varimax rotation was done. The results revealed a KMO value of 0.900 while Bartlett's test was 644.380 (df=55, p=0.000). In assessing the adequacy of the samples in exploratory factor analysis, Li and Lopez (2007) recommended a value of 0.60 was needed and significant correlation must be noted in to assume the factorability of the matrix (Tabachnick and Fidell 2007). The set criteria were met upon in the results of exploratory factor analysis of the instrument. This indicates that the study showed adequate samples and suitability for factor analysis. For the factor loading, a value of 0.60 and higher was needed in order to retain an item in a scale (Bagozzi et al. 1991). Following this criteria, item number 6 and 10 were deleted due to factor loadings below the set criteria, reducing the 11-item

Table 2: Factor loadings of attitude towards e-learning scale

S.No. Item	Factor loading
1. I am interested in studying courses that utilize e-learning	0.752
2. I think that e-learning promotes my learning experiences	0.762
3. Presenting courses on the internet makes learning more efficient	0.700
4. I intend to use e-learning tools during the semester if available	0.632
5. I am positive about e-learning.	0.810
6. E-learning environment needs advanced technical knowledge on computer use.	-0.907
7. I would prefer to have courses on the internet rather than in the classroom or face-to-face.	0.781
8. Online learning is more comfortable and enjoying to me.	0.793
9. E-learning is a favorable alternative to the pen-paper based system	0.893
10. E-learning is not an efficient learning method	0.748
11. Over-all, I prefer e-learning and I believe that it is better than traditional method of learning.	0.492

Table 3: Cronbach's Alpha reliability properties of the 9-item attitude towards e-learning scale

S.No. Item	Mean (SD)	Cronbach's α if item deleted
1. I am interested in studying courses that utilize e-learning	3.07 (1.05)	0.910
2. I think that e-learning promotes my learning experiences	2.75 (1.05)	0.909
3. Presenting courses on the internet makes learning more efficient	2.58 (1.09)	0.910
4. I intend to use e-learning tools during the semester if available	3.31 (1.14)	0.913
5. I am positive about e-learning.	3.00 (1.02)	0.903
6. I would prefer to have courses on the internet rather than in the classroom or face-to-face.	2.28 (1.34)	0.910
7. Online learning is more comfortable and enjoying to me.	2.30 (1.19)	0.905
8. E-learning is a favorable alternative to the pen-paper based system	2.50 (1.14)	0.913
9. E-learning is not an efficient learning method	2.61 (1.20)	0.898

Note: Overall Cronbach's α for 10 items=0.917

scale to a 9-item scale which were loaded in one component. The remaining nine items in the instrument have factor loadings ranging from 0.632 to 0.893.

The reliability of the attitude towards e-learning scale among nursing students was 0.917, which showed an acceptable internal consistency. This value is higher than the recommended Cronbach's alpha coefficient for an instrument (0.70) (Polit and Beck 2014 as cited by Soriano and Calong Calong 2019b). Following this criterion, the 9-item scale had high internal consistency and is appropriate for use among Filipino nurse to assess their attitudes toward e-learning. Furthermore, the items in the instrument had item-total correlation ranging from 0.409 to 0.854, which demonstrated an acceptable value (higher than 0.30; Ferketich 1990 as cited by Soriano 2019).

Despite the findings of the study, several limitations were noted. First, only two nursing colleges were included in the study, limiting the generalizability of the results. Also, confirmatory factor analysis and other measures of validity and reliability were not done; thus, additional studies should be conducted further to determine the psychometric properties of this 9-item instrument.

CONCLUSION

The instrument was shown to be a valid and reliable instrument in assessing the attitudes toward e-learning scale among nursing students. Hence, the instrument can be used to determine the attitude or perception of students towards e-learning achieve successful transition and transformation to e-learning.

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