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Psychometric Properties and Reliability of the Turkish Version of the Technology Attitudes Survey and Nursing Students' Attitudes Toward Technology

Arzu Akman, RN, MSN
Abant Izzet Baysal University Bolu Health School, Department of Nursing, Turkey

Firdevs Erdemir, RN, PhD
Professor, Adiyaman University, School of Health, Department of Nursing, Turkey

Mustafa Agah Tekindal, MS
Baskent University Faculty of Medicine, Department of Biostatistic, Turkey

Correspondence: Arzu Akman, Abant Izzet Baysal University Bolu Health School, Department of Nursing, Golkoy Kampusu 14280 Bolu /Turkey e-mail: akmnar@gmail.com

Abstract

Background: Recent developments in computer and information technologies led to significant changes to the nursing profession. Nurses should possess sufficient knowledge, skills and critical thinking regarding information technologies to offer modern, evidence-based healthcare. Current educational circumstance and its consequences must be evaluated to enable an effective and comprehensive education, and the students' opinions and attitudes must be considered regarding curriculum development.

Aims: to evaluate the psychometric properties of the Turkish Technology Attitude Survey', and to assess senior nursing students'opinions concerning informatics education and their attitudes towards technology.

Methodology: This descriptive and cross-sectional study was conducted at the Nursing Departments of five universities in Ankara, Turkey. Data were collected by a questionnaire developed by the researchers and Technology Attitude Survey. A total of 238 students have completed these forms. Descriptive statistics, parametric and nonparametric tests and exploratory factor analysis were used in data analysis.

Results: Virtually all students consider that educational programs encourage them to use information technologies, 22.3% evaluate their informatics education to be sufficient, while 50.4% were willing to choose a nursing informatics course during their undergraduate program. The Technology Attitudes Survey was found to be a valid and reliable scale in evaluating nursing students' attitudes towards technology. Moreover, a significant difference was observed between the students' computer-internet usages and their attitudes towards technology, and their opinions about having an informatics education in the curriculum.

Conclusions: Consequently, the preparation of an informatics education model for nursing education programs is suggested, and scientific activities should be improved to raise students'awareness of informatics education.

Key Words: Technology; Attitude; Nursing students; Nursing informatics

Introduction

As a result of rapid developments in information technologies and their widespread use in healthcare sector, computer-information literacy and informatics skills have become major prerequisites for nurses,. However, nurses are found to adopt both positive and negative attitudes towards computers and other information technologies in some studies in the relevant literature (Simpson & Kenrick, 1997; Getty et al., 1999; Stricklin et al., 2003; Erdemir & Akman, 2005; Lee, 2005; Chan, 2006; Kaya, 2011). Negative attitudes are considered to be a

significant obstacle for the use of information technologies, which provide an individualized and qualified care by enabling patient privacy and safety (Getty et al., 1999; Erdemir & Akman, 2005; Lee, 2005; Kaya, 2011). These attitudes might be explained by the fact that nurses often do not have sufficient knowledge and skills to use computers and other technological tools (Getty et al., 1999; Lee, 2005; Kaya, 2011). Therefore, it is suggested that basic elements of nursing informatics, including computer and information literacy skills, as well as general informatics competences, such as knowledge interpretation and use of information technologies in nursing, should be added to the nursing curricula (McNeila et al., 2004; De Gagne et al., 2012). International Medical Informatics Association also suggests that students should have at least some education on health and medical informatics in order to efficiently use information technologies in their educational and professional lives (IMIA, 2000). As experiences, attitudes and choices regarding technology may affect students‘ abilities to use of information technologies efficiently in their education and professional lives, education programs should provide them not only with the relevant knowledge and skills to use and manage basic information technologies, but also with experiences that can positively affect their opinions and attitudes (Sinclair & Gardner, 1999; Stamler et al., 1999; McNeila et al., 2004; Roussos, 2007; De Gagne et al., 2012).

The first step in assessing the current situation and developing new programs is to document the opinions of nursing graduates and students with regard to how informatics should be included in their programs whether their current computer lessons are sufficient and their attitudes towards the use of technology in general (Sinclair & Gardner, 1999; Jetté et al., 2010). Although there are many scales and studies for evaluating nurses' attitudes towards technology in the literature, it is remarkable that only few studies were conducted in order to determine the attitudes of nursing students. According to McCannon and O'Neal, (2003) novice nurses stated that it is important for them to have their own nursing database and acquire basic computer and internet skills, and that their information technologies lessons are not sufficient: they should include subjects such as patient records, nursing data, data bases and the usage of nursing information technologies. In their qualitative study, Levett-Jones et al., (2009) explored that the reasons nursing students resist the usage of information and computer technologies are an ineffective method of education, a lack of required skills and self-confidence, and an uncertainty of the importance of these technologies in clinical practices. In a study from Maag, (2006) conducted in order to determine the attitudes towards technology of undergraduate and postgraduate nursing students, most of the students were found to have positive attitudes, which increase in proportion to level of education. No other study has been conducted in Turkey to assess the attitudes of nursing students. This might be the result of the lack of a valid and reliable scale or tool to evaluate these attitudes.

Aims and Research Questions

The purpose of this descriptive and cross-sectional study is (1) to evaluate the validity and reliability of the Turkish version of the Technology Attitude Survey, a tool that can be used to determine the attitudes of senior nursing students towards technology in Turkey, and (2) to explore their opinions about the inclusion and efficiency of informatics education, as well as (3) their attitudes towards the use of technology.

Research Questions;

1. Is the Technology Attitude Survey a valid and reliable tool for the assessment of students' attitudes towards the use of technology in Turkey?
2. What are the opinions of the senior nursing students about nursing informatics education?
3. What are the attitudes of the senior nursing students towards the use of technology?

Methodology

Population and Sample

Three hundred forty nine senior students studying at the Nursing Departments of five universities (Başkent University: 33 students, Hacettepe University: 105 students, Gazi University: 60 students, Ankara University: 43 students, Gulhane Military Medical Academy: 108 students) in Ankara, the capital city of Turkey, constituted the population of this study. Finally 238 students have completed the questionnaire.

Instruments

Data was collected via a questionnaire and the Technology Attitude Survey (TAS).

Questionnaire

A questionnaire, developed by the researchers in light of the relevant literature (Sinclair & Gardner, 1999; McCannon & O'Neal, 2003; Magg, 2006; Koç, 2006; Yavuz, 2006; Akcan et al., 2007; Roussos, 2007) was used in order to collect data. The questionnaire consisted of 20 questions regarding the demographic characteristics of the students (age, gender and the school attended); their use of computer, internet and other available technologies at the school; and informatics education and nursing informatics education.

Technology Attitude Survey

The Technology Attitude Survey, which was reviewed and determined to be valid and reliable by Margaret Maag (2006), consists of 15 positive and negative statements regarding the use of technology. These statements can be examined under two subgroups: "confidence in and the benefits of using technology" (statements 1, 2, 3, 4, 6, 8, 10, 11, 13 and 15) and "lack of self-efficacy in the use of Technology" (statements 5, 7, 9, 12 and 14). The scale is a 6-point Likert scale with choices ranging from strongly disagrees to strongly agree. The maximum and minimum scores that can be obtained from the analysis are 90 for a positive attitude, and 15 for a negative attitude. This study examined the validity and reliability of the Turkish version of the Technology Attitude Survey.

Procedures

Translation and Validation of TAS

To ensure language validity, two teachers of nursing translated the TAS instrument from English to Turkish. The translated version of TAS was back translated into English by two independent people competent in English. For content validity, any statistical analysis was done but these translated instruments were examined in terms of consistency and conformity to Turkish, and the Turkish version was decided to be equal to the original survey by two teachers of nursing. For internal consistency, the Cronbach's alpha α reliability coefficient was calculated and for construct validity factor analysis was conducted via the Varimax rotation.

Pilot Study

The clarity of the items of the scale was evaluated by conducting a pilot study conducted with 10 students from two universities (five students each) and necessary changes about the questionnaire were applied as a result of this evaluation.

Data Collection

Firstly, students were informed of the aim of the study and the principle of confidentiality of personal data. Then, instruments were distributed to all students who volunteers to take part in the study and were collected in the same day.

Ethical Considerations

Permission to use the TAS was obtained from Margaret M. Magg. Approval for this study was taken from the Baskent University Institutional Review Board and the Ethics Committee. Besides, legal permissions were taken from five universities where the research was conducted, conditional upon the confidentiality of all participants' personal information. Informed consent was obtained from students.

Data Analysis

An exploratory factor analysis was conducted. The appropriateness of the data for the factor analysis and the valid sample number were evaluated via the Barlett's Test of Sphericity and the Kaiser-Meyer Olkin (KMO) test, respectively. Varimax was chosen as the factor analysis rotation method. The reliability coefficient was determined via Cronbach' s alpha. The additivity of the survey was evaluated via Tukey's Test of Additivity. First, descriptive statistics of discrete and continuous values were determined. For the comparison of continuous two-group variables in the data analysis, data which does and does not fulfill the parametric test preconditions were analyzed via independent 2-group t-test and the Mann-Whitney-U test, respectively. For the comparison of continuous three-or-more-group variables, data which does and does not fulfill the parametric test preconditions were analyzed via the independent one-way analysis of variance and the Kruskal Wallis test, respectively. Tukey's test and Dunn's test were used for the comparison of significant variables obtained as a result of the one-way analysis of variance and the Kruskall Wallis test, respectively. All the above-mentioned parametric tests were proved to fulfill the preconditions such as normality and homogeneity of the variances, and then the analyses were conducted. The data obtained was evaluated with an SPSS 15 program.

Results

Demographic Characteristics of the Students and Their Use of Computer and Internet

All the students were females, and their average age was 22.4 ± 1.4 (range: 20-30). 82.8% of the students stated that they have never participated in any course related to informatics before; while 90.3% stated that they have computers and 86.6% stated that they have access to the internet, 76.1% stated that they often use computers for preparing homework/presentations

(89.9%) and for doing researches/searching (82.8%). 99.2% of the students stated that they have an e-mail address, and 36.6% stated that they check their e-mails everyday; while 73.9% stated that they communicate with their instructors via internet, and 86.1% stated that they have online library access network at their schools and 36.6% stated that they sometimes use this network. (Table 1)

Reliability and Validity of the Technology Attitude Survey (TAS)

Cronbach' s alpha coefficient of the TAS was.91. As total correlation of the statements in the survey varied between .899 and .909, no statement was removed from the survey.

Factor analysis was conducted via the Varimax method in the validity studies; as a result of this analysis, two factors were determined: (1) confidence in and the benefits of using technology and (2) lack of self-efficacy for use of technology. Factor 1 included statements 1, 2, 3, 4, 6, 8, 10, 11 and 13, and factor 2 included statements 5, 7, 9, 12, 14 and 15, as shown in Table 2.

The Kaiser-Meyer Olkin (KMO) coefficient was found to be .919, and Barlett's Test of

Sphericity value was found to be (χ^2=2409.231; p<0.001). According to these values, factor analysis results reflected the construct validity of the measuring tool.

The additivity of the Anova Tukey's test was found to be appropriate for enabling a total survey score by adding up the test results (F=42.044, p< .05).

As a result of the statistical analyses conducted, the survey was determined to be valid and reliable for the evaluation of the nursing students' attitudes towards technology.

Students' Opinions about the Informatics Subjects in their Curricula

In the examination of students' experiences regarding computer-use education, 55.2% of them stated that they had computer courses in the first grade of college, and more than half of them (52.9%) considered this education as insufficient. Most of the students (93.3%) stated that they require computer usage to prepare homework or projects, while 92.4% stated that they conducted web-based searches by keywords and 90.8% evaluated the information they obtained in terms of reliability.

Most of the students (87.8%) stated that education programs encourage them to use information technologies, 22.3% evaluated the informatics education to be sufficient, and half of them (50.4%) want the nursing informatics course to be included in the undergraduate program. (Table 3)

Students' Attitudes towards Technology

The average TAS score of the students was 75.34 (SD=13.74). Average scores of the subgroups were calculated to 53.01 (SD= 8.59) for "confidence in and the benefits of using

Technology", and 22.33 (SD=6.95) for "lack of self-efficacy in the use of technology".

The students' computer and internet usage habits, their opinions about the informatics education in the curriculum and attitudes towards technology were compared within the present study (Table 4). A significant difference regarding the TAS score averages was found between students and their opinions regarding whether they have a computer and internet access, how often they use their computers and e-mail services, the content of the computer lesson in their curriculum, the sufficiency of their informatics knowledge and whether the program encourages them to use information technologies.

Table 1. Computer and Internet Usage Characteristics of the Students

Participating in an IT course	**N**	**%**
Yes	41	17.2
No	197	82.8
Having a computer in place of residence		
Yes	215	90.3
No	23	9.7
The frequency of computer usage		
Often	181	76.1
Rarely	57	23.9
The purpose of using computer		
To write assignment / prepare presentation	214	89.9
To search	197	82.8
To chat	66	27.7
Other	7	2.9
Having an internet network in place of residence		
Yes	206	86.6
No	32	13.4
Having an e-mail address		
Yes	236	99.2
No	2	0.8
The frequency of e-mail usage		
Everyday	87	36.6
2-3 days /week	86	36.1
1 day/week	56	23.5
Other	9	3.8
Communicating with instructors via internet		
Yes	176	73.9
No	62	26.1
Having online library access network at school		
Yes	205	86.1
No	22	9.2
I do not know	11	4.7
The frequency of usage of online library network/ database		
Often	42	17.6
Sometimes	87	36.6
Rarely	61	25.6
Never	48	20.1

Table 2. TAS Items and Factor Analysis

Items	**Factor 1** Confidence in and the benefits of using technology	**Factor 2** Lack of self-efficacy in the use of technology
Knowing how to use technology is a necessary skill for me.	.848	.080
I like using technology.	.845	.266
I feel confident with my ability to learn about technology.	.799	.196
Learning about technology is worthwhile.	.857	.237
Working with technology makes me feel nervous.	.162	.757
I will use my knowledge of technology in many ways as a student.	.765	.241
Technology makes me feel stupid.	.157	.810
It is important to know about technology in my future career.	.826	.113
I'm not the type to do well with technology.	.269	.772
Using technology will facilitate my learning.	.818	.366
I know if I work hard to learn about technology, I will do better.	.482	.164
I think using technology will be difficult for me.	.249	.726
Knowing about technology will make me a better student.	.741	.240
I feel uncomfortable using most technology.	.150	.805
Technology really won't make my performance as a student any better.	.197	.656

Extraction Method: Principal Component Analysis.
Rotation Method: Varimax with Kaiser Normalization.
a Rotation converged in 3 iterations.

Table 3. Students' opinions on nursing informatics Subjects in their curriculum

The years of computer course	**N**	**%**
Preparatory class	4	2.1
1. class	107	55.2
2. class	40	20.6
3. class	42	21.6
4. class	1	0.5
The opinions on adequacy of their computer course		
Sufficient	67	28.2
Insufficient	126	52.9
Not sure/ Undecided	45	18.9
Preparation assignments / project required using computer		
Yes	222	93.3
No	16	6.7
Conducting web-based research by using keyword		
Yes	220	92.4
No	18	7.6
Assessing the reliability of information obtained on the web		
Reliability icons	216	90.8
Up-to-dateness	120	50.4
Search engines	8	3.4
Never think about it	13	5.5
Is the curriculum encourage to the use of information technology		
Yes	209	87.8
No	3	1.3
Partly	26	10.9
The adequacy of nursing informatics education in the curriculum		
Definitely insufficient	33	13.9
Insufficient	90	37.8
Not sure/ Undecided	61	25.6
Sufficient	53	22.3
Definitely sufficient	1	0.4
The opinions on nursing informatics course take part in the undergraduate program		
It should be included as a separate course	120	50.4
It should be integrated into to other courses	98	41.2
Not sure/ Undecided	17	7.1
Not necessary	3	1.3

Table 4. Comparison Students' Computer-Internet Usage Characteristics and opinions on nursing informatics education TAS

		N	Mean	Std. Deviation	Std. Error Mean	
Participating in an IT course	Yes	41	75.902	13.095	2.045	.892
	No	197	75.294	13.916	0.994	
Having a computer in place of residence	Yes	215	75.921	13.978	0.953	.003*
	No	23	69.913	9.986	2.082	
The frequency of computer usage	Often	181	76.669	13.988	1.040	<0.001*
	Rarely	56	71.571	11.727	1.567	
Having an internet network	Yes	206	76.189	13.718	0.956	.002*
	No	27	69.556	12.765	2.457	
The frequency of e-mail usage	Everyday	87	77.793	12.391	1.328	.002*
	2-3 days per week	86	75.454	16.048	1.731	
	1 day per week	56	71.839	11.590	1.549	
	Other	9	72.333	11.079	3.693	
Communicating with instructors via internet	Yes	176	75.739	13.462	1.015	.609
	No	61	75.098	12.876	1.649	
The opinions on adequacy of their computer course	Sufficient	67	79.687	12.122	1.481	.006*
	Insufficient	126	73.119	13.670	1.218	
	Not sure/ Undecided	45	75.089	14.933	2.226	
Is the curriculum encouraged to the use of information technology?	Yes	209	75.785	13.939	0.964	.025*
	No	3	63.667	6.028	3.480	
	Partly	24	72.083	12.047	2.459	
The adequacy of nursing informatics education in the curriculum	Definitely insufficient	33	74.667	10.376	1.806	.006*
	Insufficient	90	76.100	13.976	1.473	
	Not sure/ Undecided	59	70.966	14.954	1.947	
	Sufficient	53	79.113	13.005	1.786	
	Definitely sufficient	2	78.000	13.896	1.545	

*p < .05

Discussion

It was found that most of the senior nursing students have a computer and internet access, and often use computers and internet as a requirement for their education programs and their responsibilities as students. The students were found to use computers mostly for the purpose of information access, and they evaluated the information obtained in terms of reliability and accuracy. Jetté et al., (2010) stated that most students had computers, internet access and e-mail addresses; however, lacked knowledge about, how to analyze the quality of web sites related with health, data security and also spreadsheet and presentation programs.

Mcdowell and Ma, (2007) conducted research on first-year and senior students, and determined that the skills students frequently exercise, such as word processing, electronic mail and World Wide Web, improved in an eight-year period, while no significant difference was observed between the skills they only occasionally practice such as spreadsheet experience, database experience, and use of statistical programs. The students judged their informatics education to be “slightly sufficient” and their computer course to be “insufficient”. The findings of a study by Koç,

(2006) which was conducted in order to determine the opinions of nursing students about nursing education and computer use in nursing practices, supported the findings of the present study. It is stated that almost all nursing schools in Turkey included a course related with basic computer skills in their curriculum, 34.6% of which was taught in the first year of the program (Yavuz, 2006). However, these courses in nursing education programs, and the program as a whole, should be reexamined in light of the fact that not every student applying to nursing school is competent in informatics skills.

Almost all students stated that they should have a nursing informatics lesson in their curricula.

In a study by Akcan, (2007) conducted to evaluate students' opinions about a nursing informatics course, it was determined that the participants did not know what nursing informatics is, and 86.2% of them stated that the nursing education should include a "Nursing Informatics" course. However, most of the students participating in the aforementioned study (83.3%) were found to have no idea about the ways in which nursing informatics can be used in nursing practices.

These findings showed that most nursing students are aware of the importance of having informatics knowledge and skills in nursing practices.

Although most students stated that they communicate with their instructors via internet, complete homework requiring the use of computers, and think their curricula encourage them to use information technology, few of them evaluated the informatics education in their curricula to be sufficient.

Most of the students were found to report positive attitudes towards technology in the present study; however, a significant difference was observed between their attitude scores and their opinions regarding the scope of the computer lesson in their curriculum, the sufficiency of their informatics knowledge and whether the program encourages them to use information technologies. Similarly, Bembridge et al., (2011) stated that newly graduated nurses did not take a lesson on information and informatics technologies, but acquired relevant knowledge and skills with the help of some homework assigned within the program, and that this circumstance may result a feeling of unpreparedness among the nurses for using information and informatics technologies and incompetent in basic skills such as using software and data bases in their first year. These results are not surprising, as the content of educational programs determine the knowledge, skills and attitudes of the students. Therefore, important factors such as the vision, support and experiences of the school managers and the instructors, and the technical incompetence at the schools should be considered in the preparation of the curricula, as they may either positively or negatively affect the knowledge-skills and attitudes of the students (Fetter, 2009).

Conclusion

The findings of the present study show that the students surveyed often use information technologies, think that an education in nursing informatics is necessary, and have positive attitudes towards the use of technology; however, it was also concluded that they think the education programs are insufficient, as they lack informatics education. Nursing Informatics lessons should be included in nursing education, and information technologies should be used in order to train nurses who will adapt with technology as it develops, apply what they learn to their practices, think critically and possess the relevant knowledge and skills.

Limitations

The results of the study were obtained from five nursing schools in Ankara, and they cannot be generalized to students of all nursing schools in Turkey. Additional studies should be carried out at other schools.

Recommendations

In the light of the findings of the present research, it may be suggested that;

- An informatics education model within a certain framework in certain standards should be prepared and included in nursing education programs,
- Nursing students should be encouraged to access to certain information from different sources, evaluate the information obtained, share it electronically, and to prepare and present presentations, so that they can actively use information technologies.

• Nursing students should be encouraged to use information technologies in clinical practice fields, thus helping them feel better prepared to use information technologies.

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