

# The Importance and Impact of Nursing Informatics Competencies for Baccalaureate Nursing Students and Registered Nurses

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## **Abstract:**

**Purpose:** This study was conducted to determine and compare the importance of informatics competencies for baccalaureate nursing students and registered nurses.

**Method:** Qualitative descriptive study design focused with convenience sampling technique. Data were collected on December- 2015 through a written survey distributed and completed by 70 nursing students and 50 nurses from the G'city. Data were analyzed by descriptive statistics, t-test, x 2 -test, ANOVA and Pearson's correlation coefficient

**Results:** Survey scores indicated that Nursing students were competent in informatics than nurses. Comparison of competency scores revealed that nursing students and Nurses differ significantly in overall informatics competency. This difference may reflect that students' perceived and lacked competence in two areas, "informatics skills" and "Clinical informatics role. Also nurses' differ in levels of clinical nursing experience with informatics skills and the learning format.

**Conclusion:** These findings provide insight about the strengths and weakness of the informatics competencies of nursing students and nurses. Also indicates that participants had a deficit in informatics skills. It is important to establish nursing informatics skills for nursing students and nurses by continuing education, training and classroom teaching with practical classes. Also need to integrate IT based NI into the nursing theory and practical session in order to improve Nursing Informatics skills.

**Keywords:** Nursing informatics, Informatics competency, Nursing student, Nurses, Nursing Education

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## I. Introduction

Nursing Informatics is a new specialty in nursing; however, many undergraduate schools have yet to incorporate this in their nursing curriculum. Graves and Corcoran (1989) defines nursing informatics as "a combination of computer science, information science, and nursing science designed to assist in the management and processing of nursing data, information, and knowledge to support the practice of nursing and the delivery of nursing care." With technology increasingly being an integral part of nursing, nurses, more than ever, are expected to provide safe, competent and quality care. Nurses are engaged with information systems and different digital tools used for their clinical practice as a foundation for evidence-based care, decision-support, and electronic health record. Unfortunately, not all graduating (and current practicing nurses) are fully prepared to use these digital tools to support their practice

To ensure that nursing graduates are competent in the era of electronic healthcare delivery, it is essential to integrate informatics into clinical nursing curricula. Before nurse educators present informatics-related nursing content to the students, it is important to assess nursing students' current level of informatics competencies (Gassert, 2008; Hebda & Calderone, 2010). Incorporating this assessment to gauge informatics competency is essential for student learning. The assessment provides feedback that can be used to adjust teaching methods or content of the informatics curriculum to students' various needs. .

To increase the proportion of baccalaureate-prepared nurses in the workforce to 80% by 2020, as recommended by the Institute of Medicine (2011), many nursing schools have added baccalaureate programs. Consequently Nursing students to registered nursing programs are growing fast, contributing a significant portion of nurses to the current nursing workforce.

To date, many studies have compared informatics competencies of nursing students. Students in nursing programs have different educational backgrounds and nursing practice experience; Also Nurses are having different workplace experiences, so, they might have different preparation levels in informatics. Nursing students have a baccalaureate or higher degree in another field and varied background knowledge of computers and computer applications. These students are having similar or little more knowledge than skills. But Nurses might not have been exposed to computers from their previous degrees and job experiences..” Thus, the nursing curriculum needs to reflect this variation while advancing the students toward proficiency in informatics competencies.

### **1.1. Purpose Of The Study**

The purpose of this study was to ascertain nursing students' and nurses' self-reported basic computer skills, Informatics knowledge and Informatics skills and experiences with Nursing Informatics and compare the informatics competencies among nursing students and Nurses.

### **1.2 Research Question**

- ✚ What kind of nursing informatics competencies are needed for nursing students and nurses?
- ✚ Are they aware of the different information system tools to support their clinical Practice?
- ✚ Comparison of the informatics skills among nursing students and Nurses. What are the necessary informatics competencies would include in nursing practice?

## **II. Review Of Literature**

### **Nursing Student's Informatics Competencies:**

According to Stagers and Gassert (2000), informatics competency is defined as the integration of knowledge, skills, and attitudes in the performance of various nursing informatics activities within prescribed four levels of nursing practice, beginning nurse, experienced nurse, informatics nurse specialist, and informatics innovator. Informatics competencies and recommended interventions to improve these competencies of baccalaureate nursing students have been well studied.. Overall, baccalaureate nursing students are competent (Desjardins, Cook, Jenkins, & Bakken, 2005) or have moderate informatics and technology knowledge, attitudes, and skills (Fetter, 2009; McDowell & Ma, 2007). Looking back to the 1990s, a study to assess computer literacy found baccalaureate nursing students' had "some" experience in using microcomputers, personal computers, and students rated themselves lowest on care documentation and planning, valuing informatics knowledge, skills development, and data entry competencies (Fetter, 2009).

After formal training and hardware provision was given, modest improvements were found in basic computer knowledge and skills, but fewer gains in advanced skills and information literacy for nursing students at the baccalaureate (McDowell & Ma, 2007) and post- baccalaureate (Cole & Kelsey, 2004) levels. In two surveys of nurse executives and deans and directors of undergraduate and graduate programs, the nursing executives reported that new graduate nurses needed to be familiar with nursing-specific software such as computerized medication-administration systems (McCannon & O'Neal, 2003) and recommended improving incorporation of these skills into nursing curricula (McNeil et al., 2003).

Although nursing students nationwide reported positive attitudes toward technology, they reported little formal education in using technology applications (Maag, 2006). Furthermore, first-year baccalaureate nursing students rated themselves higher on their computer skills than their actual performance of those skills, suggesting that actual competency levels are lower than self-reported levels (Elder & Koehn, 2009).

In summary, the review reveals that baccalaureate nursing students have competent (Desjardins, Cook, Jenkins, & Bakken, 2005) or moderate informatics and technology knowledge, attitudes, and skills (Cole & Kelsey, 2004; Fetter, 2009; McDowell & Ma, 2007). These studies, however, included groups of baccalaureate students and Nurses are reported the findings in an aggregate form. Thus, this study was undertaken to compare the informatics competencies of nursing students' and nurses.

## **III. Method**

### **3.1 Sample and Setting**

Qualitative descriptive study design focused with convenience sampling technique for this study, selected samples were 120 (70- nursing students) from K' university and hospitals (50 nurses) in G' and B' city. Data were collected on students' informatics competencies by survey from 1<sup>st</sup> December to 15th December 2015. Competencies were assessed using the 20-item Self-Assessment survey of Basic computer skills, Informatics knowledge and Nursing informatics skills. Each item is self-rated on a 5-point Likert scale.

### **3.2 Ethical Consideration:**

The approval for the study obtained from K' University IRB-No.69. Survey questionnaire prepared carefully and reviewed CVI from nursing professionals. Informed consent taken and study, purpose and procedures were explained to the participants before administering survey.

### **3.3 Data Analysis:**

Nursing Students' and Nurses' informatics competencies and characteristics Data were analyzed by descriptive statistics, t-test, x 2 -test, ANOVA and Pearson's correlation coefficient with SPSS, version 21.0.

#### IV. Results

##### 4.1: Sample characteristics

The sample comprised 70 nursing students and 50 nurses from K' University and G&B city. All students were age group between 20-29years and Sex of the students was 35% male and 64% female. The majority of students (82%) were in the listened Nursing informatics lecture not practical, 18% were attended practical class. Other than informatics knowledge acquired by mass media (11.4%), Health professional (5.7%), and from the subjects were (82%). Total students mean and SD scores were 40.9±7.7 and range between 20-29 age group. The general characteristics of nurses shown age group 20-29years were 80% and 29-40 years were 20%. All the nurses were female, and experience of informatics education of nurses 88% were attended nursing informatics continuing nursing education, 12% did not attend any nursing informatics education. Sources of informatics experiences of nurses were mass media (24%), subjects (8%), health professionals (62%) and others (6%). Also the mean and SD scores of nursing students and nurses were 28.9±6.2 and 4.8±7.5 for experience of informatics education.

**Table 1. General Characteristics of Nursing students and Nurses (N=120)**

Characteristics	Categories	Nursing students (70)		Nurse (50)	
		N (%)	M±SD	N (%)	M±SD
Age	< 20-29years	70 (100)	40.9±7.7	40 (80)	28.9±6.2
	< 29~40years			10 (20)	
Sex	Male	25 (35.7)	9.6±11.5	0	4.8±7.5
	Female	45 (64.3)		50 (100)	
Experience of informatics education	Yes	58 (82)	9.6±11.5	6(12)	4.8±7.5
	No	12(18)		44(88)	
Source of Informatics Knowledge	Mass media	8 (11.4)	9.6±11.5	12(24)	4.8±7.5
	Subjects	58 (82)		4 (8)	
	Health Professional	4 (5.7)		31(62)	
	others	0		3(6)	

##### 4.2 Nursing Informatics Competency Scores Of Nursing Students And Nurses

The Nursing Informatics competency scale were used and Cronbach's alpha for the total scale was .95, and subscale alphas ranged from .93 for "Basic computer knowledge and skills" to .89 "informatics education" and "Informatics skills". Nursing information competence of the study subject's nursing information capabilities average rating of subjects was 3.3 ± 1.0 points out of 5 points. The ratings for each area informatics knowledge competencies 3.4 ± 0.9, computer skills competency 3.3 ± 1.0, informatics skills capacity 3.0 ± 0.9 data access 3.3 ± 1.0, education 3.1 ± 1.1, R 3.0 ± 1.0, showed the capacity of the total participants influence With competence indicated by a minimum score of students were competent in informatics.

Nursing Informatics Competency according to Subjects' Informatics Characteristics of participants shown in Table 2 and 3 were Experience of informatics education Yes (3.3±0.5) and No (3.3±0.4). F (0.37) and p value as (0.716). In Perception of need for education the results of mean scores revealed that computer skills of nursing students and nurses were (3.3±0.4, 3.1±0.8) and not (3.1±0.3, 1.6±0.7) . Information knowledge of students and nurses mean score as shown as (3.3±0.4, 1.8±0.6) and no (3.1±0.3, 2.8±0.9). Also informatics skills education of students and nurses were shown yes (3.3±0.4, 2.2±0.7) and no (3.4±0.6, 3.7±0.7). It revealed that, there was no significant difference between Experience of informatics and perception need of education of the other general characteristics of nursing information competency among nursing students and nurses'.

**Table 2. Nursing Informatics Competency scores of nursing students (N=70)**

Characteristics	Categories	Nursing informatics competency of Nursing students		
		M±SD	t or F or r	p
Experience of informatics education	Yes	3.3±0.5	.37	.716
	No	3.3±0.4		
Perception of need for education	Computer skills	Yes	1.80	.074
		No		
	Informatics knowledge	Yes	1.48	.141
		No		
Informatics skills education	Yes	3.3±0.4	-.44	.658
	No	3.4±0.6		
Level of demand for nursing informatics education	Computer skills		.08	.39
	Informatics knowledge		.51	< .001
	Informatics skills -education		.78	< .001

Level of nursing informatics education result indicates that computer skills ( $r=.08$   $p<.039$ ) computer skills informatics knowledge ( $r=.51$ ,  $p<.001$ ) and informatics skills education ( $r=.78$ ,  $p<.001$ ). It showed a positive correlation between the nursing information competences. Information relevant eligibility information with other nursing-related characteristics, information education status, did not show significant differences depending on whether the need for education.

**Table 3. Nursing Informatics Competency scores of Nurses' Informatics Characteristics (N=50)**

Characteristics	Categories		Nursing informatics competency of Nurses		
			M±SD	t or F or r	p
Experience of informatics education	Yes		2.8±0.5	.75	.91
	No		3.3±0.6		
Perception of need for education	Computer skills	Yes	3.1±0.8	0.09	< .001
		No	1.6±0.7		
	Informatics knowledge	Yes	1.8±0.6	1.40	< .001
		No	2.8±0.9		
	Informatics skills education	Yes	2.2±0.7	1.8	< .001
		No	3.7±0.7		
Level of demand for nursing Informatics education	Computer skills			.09	.091
	Informatics knowledge			.49	< .001
	Informatics skills education			.53	< .001

Level of nursing informatics education results of nurses indicates that computer skills( $r=.09$   $p<.091$ ) computer skills informatics knowledge ( $r=.49$ ,  $p<.001$ ) and informatics skills education ( $r=.53$ ,  $p<.001$ ). It showed a positive correlation between the nursing information competences. Information relevant eligibility information with other nursing-related characteristics, information education status, did not show significant differences depending on their clinical experience and managerial skills.

### 4.3 Comparison of Competency Scores by Nursing Students and Nurses

Nursing students reported the highest knowledge of computer skills and practice of informatics competency scores Nurses. Based on the scores were significantly differences in competency subscales, “Basic computer skills”(  $p=.091$ ) and “informatics knowledge” ( $p < .001$ ) and Informatics skills education ( $p < .001$ ) were not significant. Data analysis shows the difference in all students and nurses ( $p < .001$ ) (Table 2 and 3).

No significant differences were found in comparisons of either nursing students or nurses. However, students perceived themselves as more basic computer knowledge than nurses. These findings could not be compared to those in the literature because no relevant studies were found. However, our findings may reflect the greater nursing practice experience of Nurses to nursing students (62.6% had >5 years nursing experience), giving them greater exposure to informatics systems than sure students, of whom 74.4% had no nursing experience.

## V. Discussion

Nurses and nursing students were generally competent in informatics, but not in clinical based experience. The Informatics competency scale scores shows that, regardless of undergraduate students perceived they were competent in three areas, “Basic computer skills, informatics knowledge” and “informatics skills.” The findings indicate that participating nursing students were most confident in basic computer skills such as searching the Internet, word processing, systems-operations skills, as well as graphical and multimedia presentation, similar to previous reports (Desjardins et al., 2005; Fetter, 2009; Gassert & McDowell, 1995). Participants also fully recognized the value and positive impact of informatics on nurses and nursing practice, consistent with a nationwide survey of undergraduate and graduate nursing students (Maag, 2006).

Nursing students and Nurses were not confident in accessing or extracting information from clinical data sets (e.g., minimum data set), review of literature, electronic medical record system or as a clinician (nurse), participating in the selection process, and designing, implementing, and evaluating systems, or seeking available resources to help ethical decisions in computing. These findings are not surprising considering the undergraduate students’ limited exposure to clinical nursing practice, but many of the students have been exposed to many technologies throughout primary and secondary school and were anticipated to be more likely to rate themselves as proficient in using wireless devices (personal digital assistants, smart phones).

On questionnaires and in interviews, many nurses expressed that, in the clinical setting, they usually did not feel compelled to pursue more clinical information, and they did not perceive that this information was usually needed for patient care. Most participants said their supervisors did not require or encourage them to retrieve information from the literature, some of which was located on the patient floor, for use in patient care or to follow up on patient care questions. Nurses reported that nursing supervisors were often strongly encouraged by hospital administration to publish articles and training related informatics skills. Study found that, nurses did not have the time to access the databases on computers located away from the patient floors and if they were not too busy. This reinforced the earlier findings of Lathey and Hodge (2011) that convenience was the motivational factor in nurses' selection of a health information resource. Verhey (2009) also found lack of time to be a significant factor in searching for information for half of his nursing students. Future research is suggested to identify factors affecting competency knowledge, skills and attitude and comparison should be done. Identifying the predictors of informatics competency will help develop appropriate strategies to prepare informatics competent graduates and further yield valuable insight for informatics curriculum development (Hwang & Park, 2011).

## VI. Limitations

This study had several limitations. First, an inherent limitation of any study in which the participants were volunteers and the response rate was low (52%), increasing the potential for non-response bias. Combined with convenience sampling, there is a potential for selection bias, which may threaten internal validity of the study. Second, the study generalizability was limited because nurses were recruited from G and B' city as per researchers convenient and some of them are working and studying graduate at school. Third, informatics competencies were measured by self-report, rather than actual informatics education, knowledge and skills. Thus, students' actual informatics competencies might be lower due to over-reporting, as previously shown (Elder & Koehn, 2009). Further studies are suggested on informatics knowledge and skills, with direct measures of informatics competencies.

## VII. Conclusion

Establishing a baseline of informatics competencies in undergraduate nursing students is vital to planning informatics education and adequately preparing students to promote safe, evidence-based nursing care (Hebda & Calderone, 2010). The findings of this study indicate that nursing students and nurses were competent in informatics, but not proficient. Comparison of students in the informatics experience differed significantly in overall informatics competency, which may reflect students' experience in class room teaching, computer laboratory practice would improve clinical experience with informatics competence. Clinical nurses, on the other hand, usually had limited access to health informatics and relied on their own expertise, colleagues, and books on the patient floors. Also their opinion about nursing informatics skills only necessary for the managerial level, but interested in computer and informatics competencies. Both nursing students and registered nurses needed enhancement of their informatics knowledge and skills, particularly their clinical based data entry and evaluation, research database-searching skills. Neither the clinical nurses nor the nursing students made full use of the clinical information resources available to them.

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