



## Current Status of Nursing Informatics Education in South African Universities

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### ABSTRACT

*This paper investigates the extent of inclusion of nursing informatics (NI) and nursing informatics-related modules in undergraduate nursing programmes in South African higher education institutions. The study adopted a content analysis of websites of accredited public universities. Nursing programmes were located through the websites of the included institutions, as guided by the South African Nursing Council. Data was collected on modules that are related to NI/components of NI, the module contents and the year/semester of study. Eleven (11) accredited institutions from seven Provinces were identified and included in the study. The universities provided their curriculum on their websites with variation in details which may have been considered a likely limitation in this study. Results showed that none of the universities has "nursing informatics" as a module, 37% offered components of NI as modules, mostly in the first year of study. Of the 37%, 75% are from Western Cape Province and 25% from Gauteng. The observed NI components identified in this study were not completely related to the specific technologies that address modern day nursing, which is the concern of nursing informatics. The implication is that the low availability of either NI as a full module or its components does not in any way match the current expected practice of nursing in the global job market for NI competent nurse professionals. It was concluded that there should be a call for the appraisal of the current nursing education curriculum in South Africa to accommodate "Nursing Informatics" as a subject.*

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### INTRODUCTION

Healthcare system is progressively more technology-dependent (Harerimana & Mtshali, 2019, p. 1; Arone and Cunha in Tanabe and Kobayashi, 2013, p. 941). Nurses are attested to constitute the highest group among healthcare professionals (Lipke, 2014). Supporting this, (Darvish *et al.*, 2014, pp 14-15) and Tanabe and Kobayashi (2013, p. 941) assert that nurses relate more with patients, so the use of technologies for their duties will enhance their professional performance. Consequently, Gonen, Sharon and Lev-Ari (2016) call for nursing professionals to be computer literate, and to learn the use of ICTs. Globally, the explosion in health information technologies has made it mandatory

to integrate informatics into the teaching of undergraduate health programmes, so that professionals can be educated about information and communication technology resources. It is expected that this will enable them to efficiently and responsibly use information and information and communication technologies, since according to Sanches *et al.* (2011), the digital revolution in the practice of nursing is linked to standardised and quality practices as a result of the use of information and computer technologies (ICTs). Informatics, owing to development in ICTs, has become a major ingredient in the advancement of nursing.

The above assertions have led to the emergence of nursing informatics (NI), which the



American Nurses Association (ANA) in Darvish *et al.* (2014, p.11) describes as a specialty that incorporates nursing science, computer science, and information, science to manage and communicate data, information, and knowledge in nursing practice. The author notes that nursing informatics facilitates the integration of data, information, and knowledge to support patients, nurses, and other providers in their decision-making in all roles, and settings. McCormick *et al.* (2007, p.19) observe that this backing is achieved through the use of information structures, processes, and technologies. NI has also been reported to be the combination of nursing, information, and computer sciences for the management of data, in order to generate the required knowledge for informed decision-making in the practice of nursing (Murphy, 2010). Shedding more light on the specifics of nursing informatics, Masouras (2016) report that nurses are supposed to be able to use the computer to perform word processing and spreadsheet functions, and to explore databases and health information systems. In other words, the integration of ICTs into nursing education is very essential (Harerimana & Mtshali, 2018; Rouleau *et al.*, 2017) so that nurses-in-training can acquire the relevant competencies in the use of computer and information technologies in their professional practice (Harerimana & Mtshali, 2019; Wilkinson *et al.*, 2013).

Glasgow, Colbert, Viator & Cavanagh (2018) and Austria (2017) opined that this will be made possible when ICT is embedded in institutional nursing curriculum. In response to this, Lipke (2014) suggests that ICT skills should be inculcated into nurses right from their nursing school training. This view is supported by Darvish *et al.* (2014, pp 14-15) in the NACNEP recommendation that nurses can be made to accept the use of information technology through, among others, the provision of fundamental informatics subjects in schools of nursing. Gifford *et al.* (2012) noted that education and training can bring technology and healthcare together. In 2006, the Technology Informatics Guiding Education Reform (TIGER), action plan for healthcare delivery organizations developed a professional nursing model to promote the achievement of competency in informatics. The

TIGER recommendations include: allowing informatics tools, principles, theories, and practices to be used by nurses, in order to make healthcare safer, effective, efficient, patient centered, timely, and equitable; and transparently interweaving enabling technologies into nursing practice and education, such that information technology becomes the stethoscope for the twenty first century (O'Connor, 2017; Yang *et al.*, 2014; Sensmeier & Anderson, 2009; Bickford, 2009)

In a study conducted by Yang *et al.* (2012), it was found out that education level is a major factor affecting informatics competency, thereby underlining the essence of the knowledge of nursing informatics in nursing education for the current nursing economy; so that nurses can be skillful in technological and front-line clinical practice for a high level patient care and safety. Juliani and Kurcgant (2009, p. 518) conclude that education continues to be an essential feature of computer science in nursing, and that the use of technology will continue to facilitate information access. According to McCormick (2007, pp 21-22), future nursing informatics will be guided by education; hence, educational programmes must prepare nursing students to work in teams from different walks of life. This, the author surmised demands that nursing informatics be made a major component of nursing education, especially as it is becoming more obvious that more students now seek nursing informatics curricula.

While the use of ICT is continually recognised, studies reveal that most nurses are not up-to-date, where technologies that can impact their healthcare delivery is concerned (Okeyo, 2016; Cetin *et al.*, 2015). For instance, Sanches *et al.* (2011) reported that even though the importance of informatics in healthcare delivery has been widely recognised, they are yet to be fully integrated into undergraduate/graduate nursing curricula in many national higher education institutions. A study conducted in the US by Kobayashi and Leite (2015) revealed that less than 35% of the respondents agreed that nursing informatics skills were included in their curriculum. The authors argue that teaching informatics will enhance the professional practice of health workers. The low level of informatics



knowledge of the students enrolled in undergraduate courses demonstrated the necessity for the introduction of computer use in the training of the nurse professional. In a Rwandan study, Aurore, Valens, Lune and Nyssen (2016) assessed the health informatics competencies of undergraduate healthcare professionals, and revealed that there is a very low inclusion of health informatics in the college of medicine and health sciences curriculum.

The integration of informatics into nursing education has become a global concern, and the use of technology in nursing education is essential to prepare nurses that will be dynamically digital-compliant as technology

continues to advance. Therefore, this researcher seeks to find out the preparedness of nursing school graduates to meet up with the informatics knowledge that the practice of nursing demands, outside the four walls of a classroom. As a result, the study aims at ascertaining the extent to which South African public universities include nursing informatics-related subjects in their institutional nursing programmes. The main research question of the current study, is, "To what extent is nursing informatics a part of the curriculum of nursing Schools in South Africa?" The next section discusses the review of existing NI modules in universities offering nursing education outside South Africa.

**Table 1:** Synthesis of overarching course components of NI Module from various non-South African universities offering nursing education

S/N	Course components of NI Module
1	Automated staffing and workload systems
2	Benefits and limitations of different communication technologies and their impact on safety and quality
3	Clinical decision support tools
4	Clinical imaging
5	Components of hardware and software.
6	Consumer health informatics
7	Data management and analytics fundamentals of Nursing Informatics
8	Database management
9	Electronic health records (EHR)
10	Electronic medical record (EMR)
11	Essential information that must be available in a common database to support patient care
12	Ethics and legal aspects of informatics nomenclature in informatics
13	Health data storage and exchange
14	Healthcare IT system analysis and improvement
15	Impact of informatics on professional practice
16	Importance of information and technology skills in safe patient care
17	Informatics and inter-professional collaboration
18	Informatics competencies
19	Informatics in health care education/research
20	Information & communication technologies (ICTs)
21	Information resources for nurses and consumers
22	Information technology project management
23	Introduction to informatics
24	Methods in technology evaluation & usability
25	Navigating the digital library
26	Next generation nursing systems
27	Nursing systems management/administration
28	Point of care and clinical use of information systems
29	Protection of personal health Information



S/N	Course components of NI Module
30	Simulation
31	Social media
32	Social networking
33	Technology and information management and the quality and safety of patient care
34	Telehealth/Telemedicine
35	The Internet
36	Theoretical issues for health care Informatics
37	TIGER Initiative
38	Time, effort and skills required for computers, databases and other technologies to become reliable and effective tools for patient care
39	Wireless and Telehealth technology

(Sources: University of Texas, Tyler, 2020; Purdue University, 2019; University of Texas El-Paso, 2012; Athabasca University, 2020; University of Pittsburg, 2020; University of Texas Health Science Center, 2020; Lincoln University, 2020).

## METHODOLOGY

The study adopted content analysis of the websites of the included institutions. The researcher first obtained the list of universities that are accredited to offer the new nursing programmes from the website of the South African Nursing Council (<https://www.sanc.co.za/neis.htm>). The South African Nursing Council (SANC), is the body entrusted to set and maintain standards of nursing education and practice in the Republic of South Africa. It is an autonomous, financially independent, statutory body, initially established by the Nursing Act, 1944 (Act No. 45 of 1944), and currently operating under the Nursing Act, 2005 (Act No. 33 of 2005). It has as its vision, *Excellence in professionalism and advocacy for health care users*. In 2016, the council phased out legacy qualifications; and implemented nursing qualifications aligned to the higher education qualifications sub-framework (HEQSF), with a view to review the competency framework for nurses and midwives, by infusing new scopes of practice for nurses and midwives, and presenting an opportunity to harmonize new nursing qualifications with health service needs. In the light of this, no students will be allowed to enroll into any Legacy qualification after the 31<sup>st</sup> of December 2019. Universities are thereafter

accredited to award all bachelor of nursing under the new nursing programmes. Against this backdrop, this study identified eleven universities, from seven provinces (Table 2) as accredited from SANC website (<https://www.sanc.co.za/pdf/NEIs/Universities%20accredited%20to%20offer%20the%20new%20nursing%20quals%20Dec2019.pdf>). The nursing programme curricula of all the websites of the identified universities were analysed. Data was collected based on:

1. Informatics-related subject name (computer, health information management/system and information technologies, all of which are components of nursing informatics as defined by ANA (Darvish *et al.*, 2014, p. 11)
2. Course code
3. Course content
4. The year/semester of study

## FINDINGS

Findings will be presented using a mix of narratives, tables and charts. The list of universities accredited to offer the new nursing programme and their provinces is presented in Table 2.



**Table 2:** Universities Accredited to offer the New Nursing Programmes

Province	Number of Universities	Accredited Universities
Western Cape	3	University of Stellenbosch Cape Peninsula University of Technology University of Western Cape
Eastern Cape	1	Nelson Mandela University
Free State	1	University of Free State
Gauteng	3	Tshwane University of Technology  University of Pretoria University of Johannesburg
Northwest	1	University of North West
Limpopo	1	University of Limpopo Turfloop Campus
KwaZulu-Natal	1	University of KwaZulu-Natal

While Western Cape and Gauteng provinces have 3 accredited universities for the new nursing programme, Eastern Cape, Free State, Limpopo, KwaZulu-Natal, and Northwest

provinces have a university each, giving a total of 11 accredited universities. Table 3 illustrates the sources of the data collection for the current study.

**Table 3:** Data Sources

Accredited University	Nursing Dept.	Faculty	Programme offered	Min. Number of years	Data Source/website address
Univ. of Stellenbosch	Nursing & Midwifery	Medicine & Health Sciences	Bachelors Honors PGD Masters	4	Calendar <a href="http://www.sun.ac.za/english/faculty/healthsciences/Documents/CurrentDocs/CalendarEng.pdf">http://www.sun.ac.za/english/faculty/healthsciences/Documents/CurrentDocs/CalendarEng.pdf</a>
Cape Peninsula University of Tech.	Nursing Science	Health & Wellness Sciences	Bachelor Masters	4	Handbook <a href="https://www.cput.ac.za/storage/faculties/archive_docs/health_wellness/Handbook_HW_2020.pdf">https://www.cput.ac.za/storage/faculties/archive_docs/health_wellness/Handbook_HW_2020.pdf</a>
University of Western Cape	School of Nursing	Faculty of Community and Health Sciences	Foundation Bachelors Masters	5	<a href="https://www.uwc.ac.za/Pages/AllProgrammes.aspx">https://www.uwc.ac.za/Pages/AllProgrammes.aspx</a>
Nelson Mandela University	Nursing Science	Health Sciences /School of clinical care sciences	Bachelors Masters PhD	4	Prospectus <a href="https://www.mandela.ac.za/getmedia/718f41a0-3a08-4636-ba49-8910d4cb6da1/2020-HS-Prospectus?disposition=attachment">https://www.mandela.ac.za/getmedia/718f41a0-3a08-4636-ba49-8910d4cb6da1/2020-HS-Prospectus?disposition=attachment</a>



Accredited University	Nursing Dept.	Faculty	Programme offered	Min. Number of years	Data Source/website address
University of Free State	School of Nursing	Health Sciences	Bachelors Masters PhD	4	Rule book of courses <a href="https://apps.ufs.ac.za/dl/yearbooks/357_yearbook_eng.pdf">https://apps.ufs.ac.za/dl/yearbooks/357_yearbook_eng.pdf</a> ; <a href="https://apps.ufs.ac.za/dl/yearbooks/353_yearbook_eng.pdf">https://apps.ufs.ac.za/dl/yearbooks/353_yearbook_eng.pdf</a>
Tshwane University of Technology	Adelaide Tambo School of Nursing Science	Science	Bachelors Masters PhD	4	Prospectus <a href="https://www.tut.ac.za/ProspectusDocuments/2020/B_Nursing_2020.pdf">https://www.tut.ac.za/ProspectusDocuments/2020/B_Nursing_2020.pdf</a> ; <a href="https://www.tut.ac.za/ProspectusDocuments/2020/M_Nursing_2020.pdf">https://www.tut.ac.za/ProspectusDocuments/2020/M_Nursing_2020.pdf</a> ; <a href="https://www.tut.ac.za/ProspectusDocuments/2020/D_Science_Adelaide_2020.pdf">https://www.tut.ac.za/ProspectusDocuments/2020/D_Science_Adelaide_2020.pdf</a>
University of Pretoria	Nursing Science	Health Sciences	Bachelors Masters PhD	4	Yearbook <a href="https://www.up.ac.za/media/shared/368/Faculty%20Brochures/2020-2021/ug-fb-health-sciences-2020-21-final-21.11.2019.zp183062.pdf">https://www.up.ac.za/media/shared/368/Faculty%20Brochures/2020-2021/ug-fb-health-sciences-2020-21-final-21.11.2019.zp183062.pdf</a>
University of Johannesburg	Department of Nursing	Health Sciences	Bachelors Masters PhD	4	Yearbook <a href="https://www.uj.ac.za/faculties/health/Documents/01%20-%20Health%20Sciences%20Yearbook%202019%20-%20Final%20Draft%20(1).pdf">https://www.uj.ac.za/faculties/health/Documents/01%20-%20Health%20Sciences%20Yearbook%202019%20-%20Final%20Draft%20(1).pdf</a>
University of North West	School of Nursing	Health Sciences	Bachelors Masters	4	Yearbook <a href="http://studies.nwu.ac.za/sites/studies.nwu.ac.za/files/files/yearbooks/2020/Health_UG_2020.pdf">http://studies.nwu.ac.za/sites/studies.nwu.ac.za/files/files/yearbooks/2020/Health_UG_2020.pdf</a> ; <a href="http://studies.nwu.ac.za/sites/studies.nwu.ac.za/files/files/yearbooks/2020/Health_Sciences_PG.pdf">http://studies.nwu.ac.za/sites/studies.nwu.ac.za/files/files/yearbooks/2020/Health_Sciences_PG.pdf</a>
University of Limpopo Turfloop Campus	Nursing Sciences	Health Sciences /School of Health Care Sciences	Bachelors Masters PhD	4	Programme offered <a href="https://www.ul.ac.za/index.php?Entity=Nursing_under">https://www.ul.ac.za/index.php?Entity=Nursing_under</a> ; <a href="https://www.ul.ac.za/index.php?Entity=Nursing_post">https://www.ul.ac.za/index.php?Entity=Nursing_post</a>
University of KwaZulu-Natal	School of Nursing and Public Health	College of Health Sciences	Bachelors Masters PhD	4	Programme offered <a href="https://nursing.ukzn.ac.za/bnursingundergraduatedegree/">https://nursing.ukzn.ac.za/bnursingundergraduatedegree/</a> ; <a href="https://nursing.ukzn.ac.za/bachelorofnursingadvancedpracticebnap/">https://nursing.ukzn.ac.za/bachelorofnursingadvancedpracticebnap/</a>

It is obvious from the illustration above that all the accredited universities have established nursing education departments, with more under the auspices of the Faculty of Health Sciences. About 73% of the studied universities run the nursing programme from bachelors to doctoral level. It is also highlighted that to qualify as a nurse, a student has to spend a minimum of

4 years in the institution of study. Table 4 presents the results of the data collection for the study. All these point to the fact that nursing is considered to be vital to human existence, and that giving quality education and research to this set of professionals is not taken with levity in South African public universities. Giving this fact, one would expect that the subject of interest to





this study would also be given its rightful place in the education of nurses. Table 4 sheds light on the findings of the study as regards the inclusion

of components of nursing informatics in the curriculum of each of these institutions.

**Table 4:** Data Collected from Universities' Websites

Accredited University	Module name <sup>2</sup>	Course Code	NI as a Module	NI Course component	Year/ Semester of Study
University of Stellenbosch	Praxis of Nursing and Midwifery Sciences taught under Essentials of Human Anatomy 171	13654/171	No	Information and communication technology	1
Cape Peninsula University of Technology <sup>1</sup>	Academic Literacy	LIT150S	No	Information literacy; Using and applying of information technology in theory and clinical practice	1 Sem. 1
University of Western Cape	Computer Literacy	CCL111 CCL121	No	Introduction to Windows; Microsoft Word; Microsoft PowerPoint; Microsoft Excel; Internet and GroupWise; e-Tools.	1 Sems.1 & 2
Nelson Mandela University	Computer Literacy	ITCL100	No	Not available	1 Sems.1 & 2
University of Free State	N/A	N/A	No	N/A	N/A
Tshwane University of Technology	Computer Literacy (1)	CPL105X	No	(1-2) Introduction of information literacy. Development of a search strategy and application of a search string to search engines and academic databases. Evaluation of information sources. Ethical and legal use of information. (3-4) This module introduces the student to basic principles of Health Information Management. Upon completion of this module, the student	1 Sem.1
	Academic Literacy (2)	ALI125X			2 Sem. 2
	**Health Information Management II (3) (prerequisite is Computer literacy)	HIM216P			3 Sem. 1
	Health Information Management III (4)				4 sem. 2
	Health Information Management IV (5)	HIM317P HIM418P			

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				will be able to understand, apply, analyse and audit records, documents and processes as integral part of health information management. The student is also introduced to the e-Health strategy of South Africa, information sharing and collaboration.	
University of Pretoria	***Academic Information Management	AIM 111 & AIM 121	No	Not available	1 – Semester. 1 & 2
University of Johannesburg	Not available	Not Available	No	Not available	Not Available
University of Northwest	Not available	Not Available	No	Not available	Not Available
University of Limpopo Turfloop Campus	Health Care Systems	MHCB 181	No		A year module under the postgraduate diploma in primary health care
University of KwaZulu-Natal	***Evaluation of Health Systems	NURS342	No	Not available	3- Sem. 2

**Author's Assumptions**

- i. Health Information Management. Considering that the prerequisite for this is Computer Literacy to have been taken in year 1, this author presupposes that the module will address some components of NI
- ii. Academic Information Management. Given that the management of information in the current knowledge economy is almost impossible without informatics tools, this author assumes that this module will address the technologies of information management in the modern economy.

- iii. Evaluation of Health Systems. It is, once again, assumed that in the current technology age, health systems, as implied in this content, will include health technologies that are essential to the practice of nursing in the modern economy.

This presentation revealed that only four of the eleven accredited universities vividly have a semblance of the components of nursing informatics. The study assumed that three institutions have NI contents, while the available websites of the remaining four institutions did not show the inclusion of any module that relates to NI.



## IMPLICATION

This study set out to determine the extent to which nursing informatics, an attested effective and efficient healthcare management tool, is a part of the education curriculum of nursing schools within accredited public universities in South Africa. The study reveals

that all the modules in Table 3 are all core subjects for the award of the nursing degree, but only 37% of the accredited universities have modules that can be said to deal with nursing informatics concepts (Figure 1).

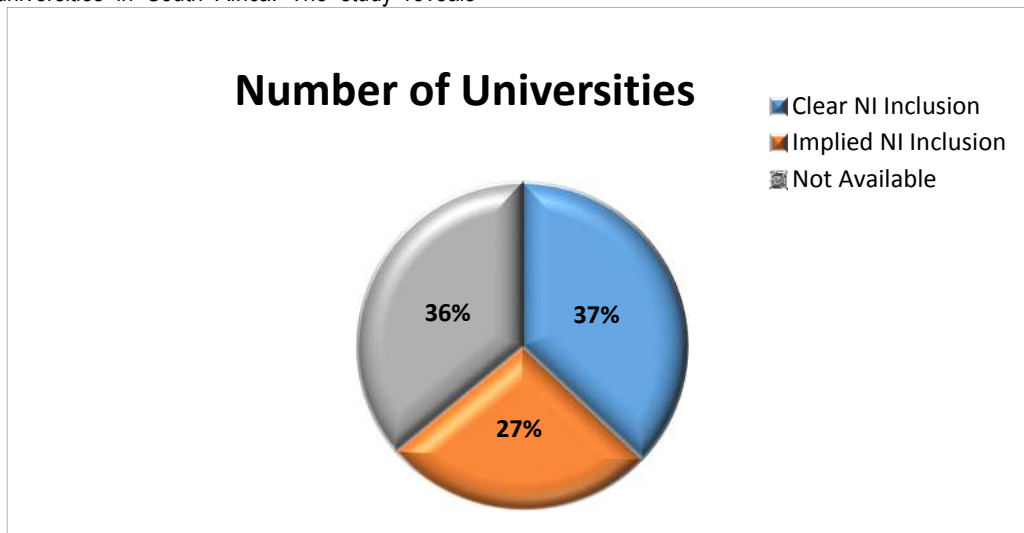


Figure 1: NI/NI Components inclusion in the curricula of universities

None of the universities has a module tagged, Nursing Informatics, which would have been a more concrete proof of the recognition of nursing informatics and its invaluable role in the growth, effectiveness and efficiency of the profession of nursing. Cape Town University of Technology used to have both Health Information System and Nursing Informatics in the curriculum under the phased out B.Tech Nursing programme as found on page 133 of the handbook. It would have made a positive difference to have these modules re-integrated into the curriculum of the new education system. This study concludes that until the nursing education curriculum addresses the technologies that will enhance the delivery of nursing healthcare, then it cannot be said that the efficient and effective benefits of nursing informatics is acknowledged. NI entails more than classes on computer appreciation and literacy. There is need for emphasis on NI contents that are applicable to our African

context, such as those identified in Table 1 of this study.

## DISCUSSION OF THE FINDINGS

One of the findings of the study indicates that nursing informatics is not included in the nursing curriculum in many universities in South Africa schools of nursing. Nursing informatics which has brought tremendous advancement and better improvement in delivery effective healthcare in various healthcare facilities. Adoption and use of nursing informatics in hospitals. The complexity of nursing informatics inclusion in nursing schools curriculum will give opportunity for nursing students to prepare to think critically and effectively and adoption of the technologies will promote effective and safe quality care. However, the finding of the study corroborated the finding of Nwozichi et al (2019) which revealed that most nursing schools curriculum in Southeast



Asia included nursing informatics into their nursing schools curriculum. Pugoy et al (2016) study in Philippines and Thailand revealed that nursing informatics is adequately included in the nursing school curriculum in the two countries Likewise the finding of the research corroborated the Neville et al ( 2015) in a study in Australian schools of nursing. The result revealed that nursing informatics is included the nursing schools curriculum.

The finding of the study contradict the study of Irinoye et al (2013) that most school of nursing in Nigeria failed to include nursing informatics as part of the curriculum . It should be of note that introduction of nursing informatics integration in nursing education will enhance effective teaching and learning of nursing students. The implication of non-inclusion of nursing informatics in the curriculum of nursing students lied on the fact that when they secured job as professional nurses they will find it to operate the resources. This may have negative impact on the health care delivery of the people.

#### CONCLUSION AND RECOMMENDATION

Nurse's science is a popular course of study in many South African universities, however, very universities in the country included the teaching of nursing informatics in their curriculum. Based on the finding of the study .The research recommended that nursing informatics should be recognized as a module that is essential in the education of nurses that will compete in the current technology-dependent economy. This implies that Department of Health should work with the Department of Education on the need to design a suitable module that will make teaching and learning nursing informatics part of the curriculum. In addition, the module should be made compulsory from the first year to the last years due to the fact that the importance of nursing informatics resources cannot be over-emphasized in effective healthcare delivery. For the better teaching of nursing informatics in the nursing schools curriculum in South Africa. There should be availability of the nursing informatics tools in various schools of nursing so that the student nurses will have access to it for demonstrations' and their practical classes.

However, the limitations of the study lied on the fact that the study is a web content which prone to the situation where there may be hidden contents , Based on this the research recommended that there is need for further research that will be done empirically in order to validate the current findings. In addition, the study recommended the need for other Africa countries to replicate the study in other to know the position of nursing informatics in the curriculum of nursing schools concerning the role of nurses in effective healthcare delivery. In addition, the study contributed to knowledge in the development of social informatics, literature and it will be useful for policy makers in health related services

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