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Analysing Nursing Students' Perception on the Utilization of E-Learning Platform in Rwanda: A Descriptive Study

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Abstract: *Analysis on the perception of e-learning by nursing students was conducted in a selected school' campuses in Rwanda using the Demand-Driven Learning Model (DDLM)[1]. A quantitative survey was used based on the constructs from DDLM model (Content (PCUE); delivery (PDCE), Service (PSPE), Structure (PSOE), outcomes (POFE), and evaluation (PEDE), data from three campuses of the selected nursing school. Stratified and simple random sampling was used to select the participants. A total of 227 nursing students participated in this study. Overall the results from this study indicate a positive perception of e-learning platform based on DDLM constructs, and a significant correlation was seen between them: the content, delivery, services, outcomes, structure, and evaluation. A Pearson's correlation was run to assess the relationship between various constructs of DDLM in e-learning platform. There were statistically significant relationships between the following constructs related to DDLM: PCUE and PDCE (r=.923, n=227, p<.000); PCUE and PSPE (r=.911, n=227, p<.000); PCUE and POFE (r=.918, n=227, p<.000); PCUE and PSOE (r=.912, n=227, p<.000); PCUE and PEDE (r=.792, n=227, p< .000); PDCE, and PSPE (r=.936, n=227, p< .000); PDCE and POFE (r=.915, n=227, p< .000); PDCE and PSOE (r=.895, n=227, p< .000); PDCE and PEDE (r=.802, n=227, p< .000); PSPE and POFE (r=.943, n=227, p< .000); PSPE and PSOE (r=.924, n=227, p< .000); PSPE and PEDE (r=.836, n=227, p< . 000); POFE and PSOE (r=.960, n=227, p< .000); POFE and PEDE (r=.807, n=227, p<.000), PSOE and PEDE (r= .836, n=227, p< .000) (Table 9). The findings add to the growing body of knowledge of online learning. By using this model to evaluate perceptions of quality of e-learning by nursing students has led to insights and recommendations in order to enhance an effectively e-learning platform.*

Keywords*: E-learning platform; Rwanda, Demand Driven Learning Model, e-learning in nursing education; Nursing students.*

I. Introduction

In practice, the successful introduction of e-learning requires not only the construction of software and hardware facilities but also executives' support and commitment, design of proper instructions, introduction of teaching strategies and assessment by professionals[2]. E-learning is commonly referred to the intentional use of networked information and communications technology in teaching and learning [3, 4]. A number of other terms are also used to describe this mode of teaching and learning. They include online learning, virtual learning, distributed learning, network and web based learning. Fundamentally, they all refer to educational processes that utilize information and communications technology (ICT) to mediate asynchronous as well as synchronous learning and teaching activities [4, 5]. On closer scrutiny, however, it was clear that these labels refer to slightly different educational processes and as such they cannot be used synonymously with the term e-learning [4, 5].

In this study the term e-learning is used to refer to the use of ICT in teaching and learning process. The advent of the e-learning and its rapid development from a text-only medium to an expanding multimedia communication system has offered new and diverse opportunities for learning at any time and in any place. The technological revolution is challenging the common conceptions of the teaching-learning process as more and more training is being made available online [6]. Unquestionably, e-learning to become a universally accepted and effective method of learning there must be standards and guidelines for its design, development, delivery, and evaluation. Moreover, these standards and guidelines need to align with specific learner needs and program goals [6]. Effective e-learning must be driven by sound pedagogical principles, be flexible to adjust to the needs and goals of the learners, and provide a community. Clearly, the mere use of the e-learning as an educational tool does not automatically imply effective learning. Indeed, the cornerstone of quality e-learning lies in its design. Designing e-learning involves planning the learning experience so the desired outcomes are achieved and then identifying a blueprint to guide development and overall program implementation. On-going assessment of the e-learning also needs to be considered [6].

The main objective for this paper is to describe the perception of the nursing students on the utilisation of e-learning platform, at selected nursing school' campuses in Rwanda, using DDLM model.

II. Literature Review

According to UNESCO [7], the application of the Internet in education is understood as the usage of Internet technologies to solve various educational tasks, namely, teaching, learning and management of the educational process. Dryli and Kinnaman[8] argue that the Internet enables students to find information and experts, as well as allowing users to think critically and creatively, become collaborative and cooperative, and solve problems. The systematic analysis of experiences in using the Internet in education implies that the types of such application provide an opportunity for comparisons and generalizations that can be preliminarily identified and defined [7]. At the same time, due to the accumulated experience in the use of the telecommunication technologies in education, one should note two main approaches in selection of the grounds for segmentation of this project-domain [7]. The technology-oriented approach is most widespread. For example, the statistical study on the use of the electronic communication in open learning and distance education, conducted by UNESCO in 1995 [9], has used the matrix based on the types of the applied telecommunication media to collect information on interactive technologies in educational programmes: telephone, fax, audio-conference, video-conference, electronic mail, access to databases [7]. According to King and Arnold [10] technology has allowed for higher education institutions to offer blended and fully online courses. Blended learning is becoming an increasingly popular method of content delivery in higher education, especially at the graduate level because of the scheduling flexibility and the ability to meet the needs of a greater number of students [Ho, Lu and Thurmaier, 2006 cited in 10]. According to King and Arnold [10] blended courses are defined as those that combine in-class and online instruction with 30% to 70% online content. This percentage may vary by universities. The blended model includes both face-to-face (physical) and asynchronous (virtual) instruction [10-13]. Blended courses have the potential to incorporate the strengths of synchronous and asynchronous learning [14, 15].

According to Blake [16] e-learning methods are increasingly used in higher education to support learning in pre- and post-registration healthcare subjects. Although new technologies are central to teaching and learning strategies, e-learning is not currently accepted universally by academic staff. In a study conducted by Blake [16] on E-learning & information communication technology (ICT) in nursing education, it was found that staff opinions were divergent with most acknowledging the benefits of e-learning but many also expressing concerns over barriers such as lack of time, resources or technical support. Staff did not fully utilize the range of technologies available. The same author argues that most staff exhibited positive attitudes towards the pedagogical value of technology in teaching and learning, though some remained hesitant or lacking in confidence to embark on e-learning teaching developments. The importance of informatics competency in nursing practice is well supported throughout the literature. The American Association of Colleges of Nursing (AACN) in 2008 suggested introductory level nursing informatics competencies for the Bachelor of Science in Nursing (BSN) curriculum. New innovations for use of instructional technology should be developed and researched in nursing education. The study showed that student nurses should be able to communicate through technology, understand the use of Windows applications and have the ability to search databases. Research by Chaffin and Maddux [17] concluded that integrating computer technology into the nursing curriculum will assist the student in understanding the basic skills and specialized charting at the patient's bedside. Research studies examined which specific technology knowledge and skills were being taught in the nursing programs and to what extent faculty are prepared to teach technology skills throughout the curriculum. Nursing programs are challenged to decrease the gap between theory and practice in order to deliver evidence based practice in a world of information technology [18]. Bond [19] determined computer informatics should be implemented as criteria into the nursing profession. It is essential to provide students computer skills they will need throughout their education and in their practice as nurses [18].

A survey of nurse educators expressed the lack of integration of the library system and electronic databases, indicating that students tend to gravitate to consumer information web sites opposed to research based journal articles [20]. Students do not have the knowledge to navigate through databases for information needed. Using tutorial modules and a post quiz for understanding were suggested in this study. The students improved their ability to search databases, use evidence based practice in their learning environment, and critique articles for clinical knowledge. Concerns in the literature express the lack of computer knowledge of faculty teaching the courses and uncertainty of how to integrate informatics into the curriculum. Many faculty polled in the study were unsure what would actually be needed to provide a competency for the nursing student on informatics [18]. Faculty and students often react with ambivalence to the new technologies [21]. On the one hand, they want to preserve the benefits associated with traditional classroom learning, while on the other, they may feel increasing pressure (from themselves or others) to experiment with the Internet [Dede, 1996; Russel, 1996 cited in 21]. There appears to be little interest among traditional college students (those who are from 18-

22 years old) to abandon the classroom and take courses online. Only 6% of students took online courses for college credit, and of those, only half (52%) thought the online course was worth their time, and another half said they believed they learned less from the online course than they would have from an on-campus one [22]**.**Based on this finding, it is clear that for students already enrolled in traditional college courses, online education has a long way to go before it might challenge the traditional classroom. Regarding study habits, the finding showed that 73% of college students said that they used the Internet as the primary site of their information searches rather than the library. The convenience of the Internet is tempting students to rely very heavily on it when searching for academic resources [Pew Internet and AmercanLife Project, 2002 cited in, 22].

The Context of the Study

Rwanda is a country of a thousand hills, located in Sub-Saharan Central Africa in the Great Lakes region [23]. The population for 2014 is estimated at 12.2 million, and increased from 11.8 million in 2013 [24]. The capital of Rwanda is Kigali. The Rwanda's economy is growing steadily due to community-driven initiatives that are responding to the needs of the population [25]. Statistics for 2011 reported approximately 700 physicians, 8000 nurses, and 300 midwives providing care for over 11 million people [26]. Rwanda falls below the minimum level of the World Health Organization's recommended health care providers per 1,000 people [27]. Until 2012 more than 90% of the nurses have the lowest level of nursing training available (equivalent to secondary-school qualifications, or A2 level: diploma), and A1 (advanced diploma) nurses represent less than 10% of the total pool of nurses. A2 nurses are relatively evenly spread throughout the country, though there are still disparities between districts, with a number of under-served districts in the South, West and Northern Provinces. On average there is about 1 nurse for a population of 1,500 [28: 12-13].

Starting e-learning in nursing schools became as a solution to the rapid upgrading of thousands of nurses from A2 to A1 which required a very different approach. There were existing health workers who were required to upgrade their skills rapidly, and schools were expected to make this possible without a significant increase in faculty. The strategy proposed here reflected that unique situation, emphasizing the training of existing educators and introducing innovative programs, such as e-learning, to allow for the continuing education of practicing professionals [29: 151]. According to Rwanda Human Resource for Health Program [29] the e-learning program for nurses and midwives is a strong example of the Government of Rwanda's approach to facilitating skill upgrades in health workers in a manner that will maximize recruitment and retention of trainees. The e-learning program is designed to adapt to the learning needs of nurses and midwives who are already working, but who are in need of further training. The curriculum design is catered to these stipulations, making the program attractive to these targeted candidates and making it highly likely that they will successfully graduate. The implementation of e-learning platform which started in 2012 in Rwandan nursing and midwifery schools has brought positive impact to nursing education [30]. The Law N° 71/2013 of 10/09/2013) established the University of Rwanda (UR) and some public10 universities were merged in the country to form one institution of higher learning, UR. This law allows the university to develop high education quality and innovative teaching and research for addressing the problems of the population, the students, the nation, the region and globally[31, 32]. These changes have also affected public nursing and midwifery schools. The provincial nursing and midwifery school programs have come under the administrative umbrella of the University of Rwanda, and College of Medicine and Health sciences. Based on the literature and the research context, it was judged necessary to analyse nursing students' perception on the utilization of e-learning platform in Rwanda using DDLM, in order to enhance its better utilisation.

Demand Driven Model to Guide the Analysis Nursing Students' Perceptions on the Utilization E-Learning

This paper presents the analysis of nursing students' perception on utilisation of e-learning platform using Demand Driven Model (DDLM). The DDLM was originally conceptualized using a thorough review of the distance education literature [1]. The DDLM has five main components: the quality standard of ''superior structure,'' three consumer demands (content, delivery, and service) and learner outcomes. It is important that these constructs are operationally defined to allow easy application of the DDLM by practitioners and researchers. Quality assurance in the DDLM is implied through on-going program evaluation and continual adaptation and improvement [1]. The quality standard proposed in the DDLM is intended to enhance WBL programs in order for learners to further their education while working and meeting family responsibilities. The DDLM is founded on the observation that employee and employer have similar goals and the employer should benefit when employees participate in DDLM-based programs that exhibit the desired qualities [1]. The DDLM was formulated from a constructivist theoretical paradigm to meet the learner's (consumer's) demands for quality content, delivery, and service within an evolving technological environment [1]. An extensive literature covers the use the Demand-Driven Learning Model (DDLM) in education [6, 33-38].In this paper, this model which contains constructs which can explain facilitation of teaching and learning in an e-learning system, and

can assist in establishing the needs related to e-learning system in nursing education, and based on empirical evidences, to develop a conceptual framework for effective utilization of e-learning system.

Consumer (Learners) demands

Consumers in DDLM-based learning programs demand appropriate and quality content, delivery, and service [1].

Content

According to MacDonald et al. [1] high-quality content is considered to be comprehensive, authentic/industry-driven, and researched. MacDonald et al.[34] state the course content should be comprehensive (that is presented objectively and through unbiased language) and matches the level of the learners, and has appropriate breath and width. There should be an accessibility to these course contents and others services; and how fast they get feedback on assignments, fast responses to e-mails, and timely assistance as recommended by MacDonald et al. [1]. Content has faithfully to reflect problems and issues that arise in the workplace, and in the Rwandan community. The course content would be grounded in accessible and validated, empirical research. In this study, the construct of the content was used to assess the perception of nursing students on the content used in e-learning platform.

Delivery

According to MacDonald et al. [1], high-quality delivery is defined as delivery that carefully considers usability, interactivity, and tools. The user interface of DDLM-based programs is carefully designed and tested to ensure that it is usable. To ensure this, Web pages have strong navigational support and standard Web conventions are adhered to. Web page information is also kept up to date and no dead ends and stale links are allowed. Care is also given to use the appropriate Web page length and new Web technology is used only if it supports consumer needs [1, 37]. There should be an interaction between learners, the learner and facilitator, and between the learner and the content. This interaction is perceived by MacDonald, et al.[1] to be a critical aspect of delivery, and therefore DDLM-based programs are designed to ensure the incorporation of activities encouraging interactivity [1, 37]. The DDLM identifies technology as intellectual tool kits that help learners build interpretations that are more meaningful and representations of the world [1, 37]. In this study, the construct of the delivery was used to assess the perception of nursing students on the delivery on e-learning platform.

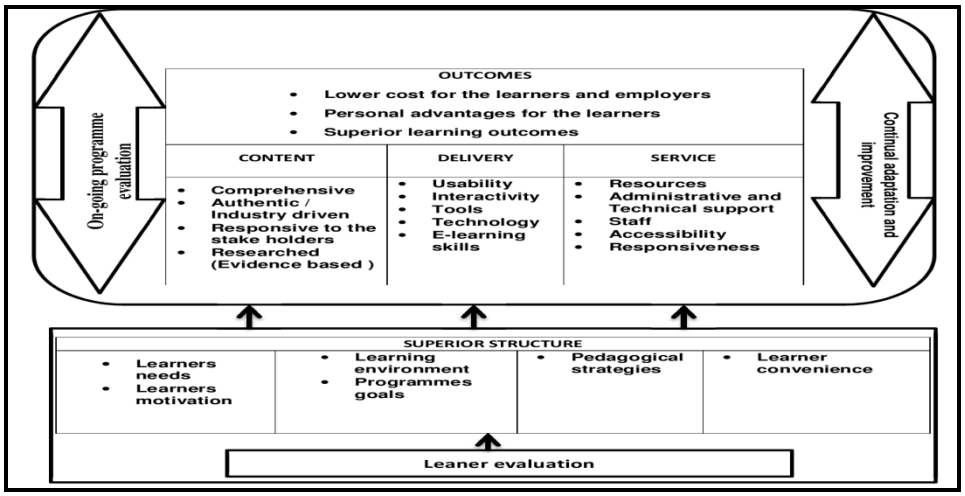

Figure 1: Demand Driven Learning Model adapted from MacDonald, Stodel, Farres, Breithaupt and Gabriel [1].

Service

According to MacDonald et al. [1] the DDLM defines high-quality service as service that provides the resources needed for learning as well as any administrative and technical support needed. Such service is supported by skilled and empathic staffs that are accessible and responsive. DDLM service includes resources, administrative and technical support, staff, accessibility, and responsiveness [1, 37]. In DDLM based programs, resources help learners determine what their learning needs are and how those needs can best be met. Learning resources are presented in a number of forms to allow learners to examine concepts from multiple perspectives [1, 37]. Resources also encourage learners to be reflective and aware of their own thinking and learning processes; such reflection, combined with how learners comes to view and incorporate new information into the context of their lives, promotes development. Finally, resources are chosen to encourage social negotiation,

which allows insight and the elaboration of concepts and ideas, to occur [1, 37]. In DDLM-based programs, the learning facilitators and technical support personnel are qualified and experienced in their fields of specialisation. The learning facilitators create a positive learning experience for each learner and are empathic to individual learner needs [37]. In this study, the construct of the service was used to assess the perception of nursing students of the services in e-learning platform.

Learner outcomes

High-quality WBL programs provide outcomes such as lower costs for learners, learning institutions, and employer and other personal advantages for the learner, while achieving learning objectives [1]. Learning outcomes also include personal benefits for the learner, because he/she does not experience the personal stress resulting from financial risk, leaving a job, or moving themselves or their whole family to be close to an academic institution, and by providing a program in which learners are satisfied with the learning experience and acquire new and relevant skills and knowledge, from which they can apply new knowledge and skills in their workplace, and add value to the services delivered by them [1, 37]. In this study, the construct of the outcome was used to assess the perception of nursing students on the outcomes from e-learning platform.

Superior structure as the quality standard

According to MacDonald et al. [1] cited by Maneschijn[37], in the DDLM, a superior structure is achieved by anticipating the needs of the learners and considering what motivates learners. This requires a collaborative and productive learning environment that has convenient access and where curricula are designed according to program objectives. The quality of web-based learning is monitored through a system of regular evaluation of learners. MacDonald et al. [1] state that superior structure is proposed as the high-quality standard for WBL. Consumers (Learners) in all learning programs demand high-quality content, high-quality delivery, and high-quality service. The following considerations define superior structure: a) anticipation of learner needs, b) learner motivation, and c) the establishment of a collaborative, productive learning environment [1, 37]. DDLM-based programs meet the specific needs of individual learners by meeting the demands of learners for content, delivery, and service. For example, programs are tailored to a learner's needs for specific content, media, and applications of technology. Programs also address individual learning styles and preferences, background experience, and knowledge, while providing appropriate assessment and feedback [37]. In this study, the construct of the structure was used to assess the perception of nursing students on the structure on e-learning platform.

Evaluation

In line to this, for the purpose of this study, a sixth construct that is evaluation has been amended from the structure, and it containing items related to the perception on the evaluation done in e-learning. The construct of the evaluation was made clear which in the original DDLM is under superior structure, and was added to the existing 5 constructs from DDLM based on the context of the study, to assess the perception of nursing students on the evaluation done on e-learning platform, although it was made a standalone, it is still part of the superior structure.

On-going program evaluation

According to MacDonald et al. [1] there should be an on-going program evaluation. Advice from key stakeholders and constituents is continually solicited, and diverse groups explore together how to improve program content, program delivery, and learning. This continual evolution of operational definitions for DDLM constructs will ensure longevity and validity of the superior structure standard proposed for WBL [1].

Continual adaptation and improvement

MacDonald et al. [1] argue that within any program designed to conform to the high-quality standard of superior structure, modifications are made on a continual basis. Evaluation effort should include measurement of learning objectives specific to the WBL. These evaluation points form an essential component of routine program delivery.

III. Methodology

Research Design

A quantitative, non-experimental, descriptive design was used to explore the utilization of e-learning among nursing students. The descriptive design was selected to obtain more information about the characteristics of the items being researched [39]. Polit and Beck [40], state that the purpose of the descriptive studies is to describe and document aspects of a situation as it occurs. The descriptive approach was used in this study to describe the relationship among variables, instead of assuming cause and effect relationship. By using

the descriptive design, more information was gathered regarding the characteristics of the nursing students in selected campuses.

Setting and the Population

The study was conducted in a selected nursing school in Rwanda, and three campuses (A, B and C) were purposively selected to participate in this study. The population of nursing students were from 2nd and 3rd year in each campus. The populations were 118 in campus A, 98 in Campus B, and 101 in campus C. The sampling technique was stratified for each of three campus, then simple random sampling in each of the three campuses. The criteria for inclusion in the study were that participants were students of 2nd and 3rd year. Based on the confidence interval of 95% in Campus A the sample size was 91, in the Campus B the sample size was 79 and 81 in campus C. The response rate was 95.6% in campus A, 91.1% in campus B, and 83.9% in Campus C. The overall response rate was 90.4% (Table 1). A total number of 227 of nursing students participated to this survey.

Table 1: Population, sample size, number of those who returned the questionnaires and the response rate

Campus	Population of nursing students	Sample size Based on 95% CI	Number of participants who responded to the questionnaires	Response rate
Campus A	118	91	87	95.6%
Campus B	98	79	72	91.1%
Campus C	101	81	68	83.9%
TOTAL	317	251	227	**90.4%**

Data collection and analysis

A quantitative survey was used based on the constructs from DDLM model (content, delivery, service, structure, outcomes, and evaluation) adopted from MacDonald et al.[1]. Evaluation construct related items were added compared to the five initial constructs used by MacDonald et al.[1] which made all the constructs six. **70**items on five Likert scale from 1=strongly disagree to 5= strongly agree, and they covered content, delivery, services, and structure, and evaluations. Nine items were considered for content with a .967 Alpha Cronobach's reliability test. Nine items were considered for the delivery with a .966Alpha Cronobach's reliability test. Seven items were considered for services with a .969 Alpha Cronobach's reliability test. Twelve items were considered for the outcomes with a .979 Alpha Cronobach's reliability test. Twenty four items were considered for the structure with a .992 Alpha Cronobach's reliability test; and nine items were considered for evaluation with a .964 Alpha Cronobach's reliability test. All the scales had a high reliability which ranged from .964 for evaluation to .992 for the structure (n=227). Data was collected after the purpose of the study was explained and getting their consent forms signed. The research team was present during data collection, and they answered to emerging questions from the participants for clarification. The quantitative data analysis was done once all questionnaires were gathered, and SPSS 23 was used.

Ethical consideration

Since this study was part of a PhD research project, ethical clearance was acquired from the University of KwaZulu-Natal Research Ethics Committee with protocol number HSS/1294/014D. Further clearance (No1637/12.00/2015 and Permission (No1636/12.00/2015) to conduct the study was obtained from the Rwandan Ministry of Education, and the permission was also obtained from the selected school at University of Rwanda (UR) where the study was conducted. Individual participants gave informed consent to participate in this study and their ethical rights were respected. Data was collected in 2015.

IV. Findings of the study

Introduction

This section presents the findings from the study. To reiterate the main aim of this study was to analysis the utilisation of e-learning platform in the selected school in Rwanda. The research question that guided this study was: What is the perception of the users of the e-learning platform at a selected nursing school' campuses in Rwanda? Results are presented in tables and graphs. Descriptive statistics and Pearson Correlation have also been used.

Socio-demographic characteristics of the participants

Of 227 nursing students who participated in this study; regarding the gender; the majority 64.3%(n=146) were females and 35.7%(n=81) were male. Of 227 participants the minimum age was 28 years old and the maximum age was 50 years old of the 227 nursing students. The mean age was 36.09 years; the standard deviation (SD) was 4.434). All of them were enrolled in nursing program for advanced diploma. Out of

227 participants, the majority 68.3%(n=155) were enrolled in the 2nd year, and 31.7(n=72 were from the 3rd year. It was noted from the findings that all students who were enrolled in e-learning and participated in this study were in General nursing 100%(n=227) The findings displayed in table 4.1 indicated that out of 227 nursing students who participated to this study; 38%(n=87) were from campus A, 31.7%(n=72) were from campus B, and 30%(n=68) were from the campus C (

Table **2**).

Table 2: summary of socio demographic characteristics of nursing students (n=227)

Socio demographic characteristics	Variables	Freq.	%
Gender	Male	81	35.7%
	Females	146	64.3%
Age group	28-33 years	71	31.3
	34-39 years	107	47.1
	40-45 years	44	19.4
	46-51 years	5	2.2
Program of enrolment in 2015	Nursing program	227	100%
Level of the study	2nd year	155	68.3%
	3rd year	72	31.7%

Perception of the nursing students on the use of e-learning platform

The perception of the students on e-learning based on DDLM covered: The content, delivery, services, structure, outcome and evaluation.

Perception of content on e-learning platform

The finding from this study revealed that regarding the content used in e-learning, the majority had a positive prevention while relatively small percentage had a negative perception, and some others were neutral. In order to make the results more meaningful five likert scale on figure was put into three categories, Positive perception (strongly agree and agree), Neutral, and negative perception (disagree and strongly disagree). The findings from this study revealed that, out of 227, the majority, 71.8%(n=163) had a positive perception while 19.4%(n=44) had a negative perception that the content included knowledge applicable on e-learning in life. It was found that 70.0%(n=159) had a positive perception while 20.7%(n=47) had a negative perception regarding the content on e-learning was relevant to their jobs. The study further revealed that 69.6%(n=158) had a positive perception while 22.5%(n=51) had a negative perception that they had the prerequisite knowledge and skills for the course in e-learning; 68.7%(n=156) had a positive perception while 23.3%(n=53) had a negative perception that they were well informed about the course objectives in e-learning. It was noted from the findings that 68.7%(n=156) had a positive perception while 18.9%(n=43) had a negative perception that reading materials are relevant to the course in e-learning. The findings demonstrated that 68.3%(n=155) had a positive perception while 22.9%(n=52) had a negative perception that the content covers current technology use in e-learning; 67.8%(n=154) had a positive perception while 23.3%(n=53) had a negative perception that they were aware of the prerequisites for the course in e-learning; 67.4%(n=153) had a positive perception while 18.9%(n=43) had a negative perception that there are strong links between theory and practice in e-learning. Regarding the perception of nursing students that the course lived up to their expectation in e-learning, 66.5%(n=151) had a positive perception while 24.7%(n=56) had a negative perception (

Table **3**).

Table 3: Perception of content on e-learning platform (n=227)

CONTENT	Strongly disagree	Disagree	Neutral	Agree	Strongly agree
I am aware of the prerequisites for the course	38(16.7%)	15(6.6%)	20(8.8%)	109(48.0%)	45(19.8%)
I had the prerequisite knowledge and skills for the course	22(9.7%)	29(12.8%)	18(7.9%)	112(49.3%)	46(20.3%)
I was well informed about the course objectives	43(18.9%)	10(4.4%)	18(7.9%)	96(42.3%)	60(26.4%)
The course lived up to my expectations	39(17.2%)	17(7.5%)	20(8.8%)	114(50.2%)	37(16.3%)
The course is relevant to my job	37(16.3%)	10(4.4%)	21(9.3%)	86(37.9%)	73(32.2%)
Reading materials are relevant to the course	30(13.2%)	13(5.7%)	28(12.3%)	112(49.3%)	44(19.4%)
There are strong links between theory and practice	33(14.5%)	10(4.4%)	31(13.7%)	97(42.7%)	56(24.7%)
The content includes knowledge applicable in life	37(16.3%)	7(3.1%)	20(8.8%)	91(40.1%)	72(31.7%)
The content covers current technology use	33(14.5%)	19(8.4%)	20(8.8%)	108(47.6%)	47(20.7%)

The overall perception of nursing students of the contents used in e-learning for the items mentioned above were put into nine items, computed and the score was calculated. The responses ranged from 1=strongly

disagree, 2=disagree, 3=neutral, 4=agree and 5=strongly agree. The minimum score was 9 and the maximum score was 45. The higher score indicated a positive perception on the content used in e-earning and the lower score indicated a negative perception on the content used in e-learning. The mean response was 31.982, the median and the mode were 36 and the standard deviation was 1.062(Figure 5). The 1st quartile was 25, 2nd quartile was 36 and the 3rd quartile was 40. These results indicate that the majority of nursing students had a relatively high perception on the content used in e-learning.

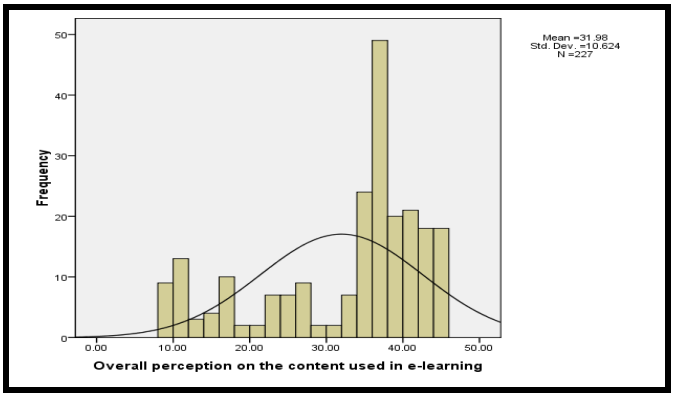

Figure 2: Perception on the content used in e-learning (n=227)

Perception on the delivery in e-learning platform

The perception of the respondents about the delivery of the content on e-learning platform was put into nine items, which are the following: delivery is concise and uncluttered; uses appropriate style for display; features aesthetically pleasing graphics; provides descriptions to all links; provides materials that stimulates curiosity; has a useful function; support face to face lecture; uses appropriate technology; features reasonably fast download of files.

The finding from this study revealed that regarding the delivery used in e-learning, the majority had a positive prevention while relatively small percentage had a negative perception, and some others were neutral. In order to make the results more meaningful 5 likert scale on figure was put into three categories, Positive perception (strongly agree and agree), Neutral, and negative perception (disagree and strongly disagree). The findings from this study revealed that, out of 227, the majority 72.2%(n=164) had a positive perception on the delivery in e-learning that it has a useful function; 72.2%(n=164) had a positive perception on the delivery in e-learning that it uses appropriate technology; 70.9%(n=161) had a positive perception on the delivery in e-learning that it features reasonably fast download of files; 70.0%(n=159) had a positive perception on the delivery in e-learning that it support face to face lecture; 67.0%(n=152) had a positive perception on the delivery in e-learning that it uses appropriate style for display; 66.5%(n=151) had a positive perception on the delivery in e-learning that it provides materials that stimulates curiosity; 64.8%(n=147) had a positive perception on the delivery in e-learning that it features aesthetically pleasing graphics; 63.0%(n=143) had a positive perception on the delivery in e-learning that it is concise and uncluttered; 60.4%(n=137) had a positive perception on the delivery in e-learning that it provides descriptions to all links.

Table 4: Perception on the delivery in e-learning platform (n=227)

DELIVERY	**Strongly Disagree**	**Disagree**	**Neutral**	**Agree**	**Strongly Agree**
Is concise and uncluttered	31(13.7%)	15(6.6%)	38(16.7%)	117(51.5%)	26(11.5%)
Uses appropriate style for display	23(10.1%)	17(7.5%)	35(15.4%)	127(55.9%)	25(11.0%)
Features aesthetically pleasing graphics	24(10.6%)	13(5.7%)	43(18.9%)	130(57.3%)	17(7.5%)
Provides descriptions to all links	25(11.0%)	17(7.5%)	48(21.1%)	111(48.9%)	26(11.5%)
Provides materials that stimulates curiosity	36(15.9%)	17(7.5%)	23(10.1%)	127(55.9%)	24(10.6%)
Has a useful function	28(12.3%)	22(9.7%)	13(5.7%)	115(50.7%)	49(21.6%)
Support face to face lecture	34(15.0%)	19(8.4%)	15(6.6%)	113(49.8%)	46(20.3%)
Uses appropriate technology	31(13.7%)	11(4.8%)	21(9.3%)	122(53.7%)	42(18.5%)
Features reasonably fast download of files	36(15.9%)	11(4.8%)	19(8.4%)	136(59.9%)	25(11.0%)

The overall perception of nursing students of the delivery of the courses used in e-learning for the items mentioned above were put into nine items, computed and the score was calculated. The responses ranged from 1=strongly disagree, 2=disagree, 3=neutral, 4=agree and 5=strongly agree. The minimum score was 9 and the maximum score was 45. The higher score indicated a positive perception on the content used in e-earning and the lower score indicated a negative perception on the content used in e-learning. The mean response was 31.32,

the median and the mode were 36 and the standard deviation was 9.626. The 1st quartile was 27, 2nd quartile was 36 and the 3rd quartile was 37. These results indicate that the majority of nursing students had a relatively high positive perception on the delivery of courses used in e-learning.

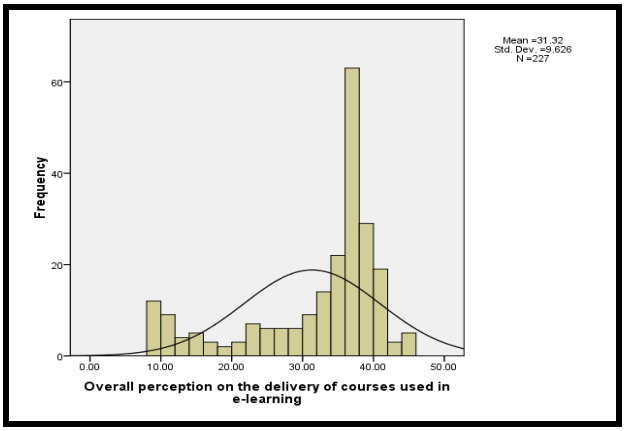

Figure 3: Perception on the delivery of courses in e-learning (n=227)

Perception on the services in e-learning platform

The perception of the respondents about the services offered in e-learning system were put into seven items which are the following: The instructor was well prepare; face to face instruction was helpful; the online resources are useful; the online support from peers were helpful; sufficient time was given to complete the project; comments are responded to within reasonable time; suggestions are quickly responded to.

The finding from this study revealed that regarding the services provided in e-learning included: The instructor was well prepared; Face to face instruction was helpful, The online resources are useful; The online support from peers were helpful; Sufficient time was given to complete the project; Comments are responded to within reasonable time; Suggestions are quickly responded to. It was found that the majority had a positive prevention while relatively small percentage had a negative perception, and some others were neutral. In order to make the results more meaningful 5 likert scale on figure was put into three categories, Positive perception (strongly agree and agree), Neutral, and negative perception (disagree and strongly disagree). the findings from this study revealed that out of 227, the majority; 70.9%(n=161) had a positive perception, while 24.2%(n=55) had a negative perception that face to face instruction was helpful; 70.5%(n=160) had a positive perception, while 25.6%(n=58) had a negative perception that the instructor was well prepared; 69.6%(n=158) had a positive perception, while 24.2%(n=55) had a negative perception that the online resources are useful; 69.2%(n=157) had a positive perception, while 22.9%(n=52) had a negative perception that the online support from peers were helpful; 67.4%(n=153) had a positive perception, while 22.9%(n=52) had a negative perception that comments are responded to within reasonable time; 62.1%(n=141) had a positive perception, while 18.9%(n=43) had a negative perception that suggestions are quickly responded to; 61.7%(n=140) had a positive perception, while 23.8%(n=54) had a negative perception that sufficient time was given to complete the project (

Table 5).

Table 5: Perception on the services in e-learning platform (n=227)

SERVICE	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
The instructor was well prepared	42(18.5%)	16(7.0%)	9(4.0%)	118(52.0%)	42(18.5%)
Face to face instruction was helpful	39(17.2%)	16(7.0%)	11(4.8%)	100(44.1%)	61(26.9%)
The online resources are useful	30(13.2%)	25(11.0%)	14(6.2%)	116(51.1%)	42(18.5%)
The online support from peers was helpful	30(13.2%)	22(9.7%)	18(7.9%)	114(50.2%)	43(18.9%)
Sufficient time was given to complete the project	30(13.2%)	24(10.6%)	33(14.5%)	118(52.0%)	22(9.7%)
Comments are responded to within reasonable time	30(13.2%)	22(9.7%)	22(9.7%)	132(58.1%)	21(9.3%)
Suggestions are quickly responded to	28(12.3%)	15(6.6%)	43(18.9%)	120(52.9%)	21(9.3%)

The overall perception of nursing students for the services delivered in e-learning, seven items mentioned above were computed and the overall score was calculated. The responses ranged from 1=strongly disagree, 2=disagree, 3=neutral, 4=agree and 5=strongly agree. The minimum score was **7** and the maximum score was **35**. The higher score indicated a positive perception on the services offered in e-earning and the lower score indicated a negative perception on the services used in e-learning. The mean response was 24.19, the

median and the mode were 28 and the Standard Deviation was 8.155. The 1st quartile was 20, 2nd quartile was 28 and the 3rd quartile was 29. These results indicate that the majority of nursing students had a relatively high positive perception on the services delivered in e-learning (Figure 4).

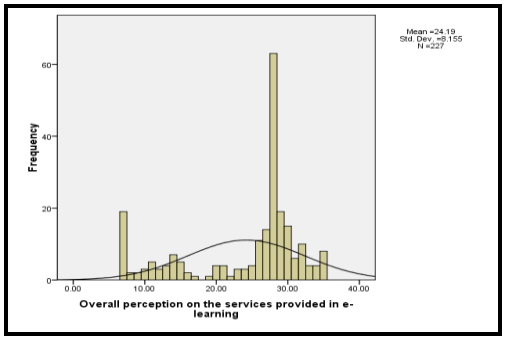

Figure 4: Perception on the services provided in e-learning (n=227)

Perception on the outcome in e-learning system

The perception of the respondents about the outcomes of e-learning were put into 12 items, which are the following: The online support from peers were helpful; The course project is in line with their expectations; they have gained more knowledge about technology; they have acquired proficiency in using internet; they have developed new skill in ICT, their attitude has changed; they will be able to use the new skill throughout their career; they have applied the new knowledge in their life; they initiated new ideas from the new knowledge, Interactive blogging was essential in the course; The assessment criteria is fair; they completed the required tasks for the project.

In order to make the results more meaningful 5 Likert scale on figure was put into three categories, Positive perception (strongly agree and agree), Neutral, and negative perception (disagree and strongly disagree). The findings from this study revealed that out of 227; 74.0%(n=168) had a positive perception, while 19.4%(n=44) had a negative perception that their attitudes has changed, 73.6%(n=167) had a positive perception, while 18.1%(n=41) had a negative perception that they have acquired proficiency in using internet, 73.6%(n=167) had a positive perception, while 21.6%(n=49) had a negative perception that they will be able to use the new skill throughout their career, 73.1%(n=166) had a positive perception, while 22.9%(n=52) had a negative perception that they have applied the new knowledge in their lives; 72.7%(n=165) had a positive perception, while 19.4%(n=44) had a negative perception that they have developed new skill in ICT; 72.2%(n=164) had a positive perception, while 17.2%(n=39) had a negative perception that the course project is in line with their expectations; 72.2%(n=164) had a positive perception, while 19.4%(n=44) had a negative perception that they have gained more knowledge about technology; 72.2%(n=164) had a positive perception, while 24.7%(n=56) had a negative perception that they initiated new ideas from the new knowledge; 66.5%(n=151) had a positive perception, while 18.9%(n=43) had a negative perception that they completed the required tasks for the project; 66.1%(n=150) had a positive perception, while 20.3%(n=46) had a negative perception that the online support from peers were helpful; 65.6%(n=149) had a positive perception, while 23.8%(n=54) had a negative perception that interactive blogging was essential in the course; 65.2%(n=148) had a positive perception, while 25.1%(n=57) had a negative perception that the assessment criteria is fair (

Table **6**).

Table 6: Perception on the outcome in e-learning system (n=227)

OUTCOME	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
The online support from peers were helpful	32(14.1%)	14(6.2%)	31(13.7%)	101(44.5%)	49(1.6%)
The course project is in line with my expectations	23(10.1%)	16(7.0%)	24(10.6%)	124(54.6%)	40(17.6%)
I have gained more knowledge about technology	28(12.3%)	16(7.0%)	19(8.4%)	101(44.5%)	63(27.8%)
I have acquired proficiency in using internet	29(12.8%)	12(5.3%)	19(8.4%)	123(54.2%)	44(19.4%)
I have developed new skill in ICT	30(13.2%)	14(6.2%)	18(7.9%)	110(48.5%)	55(24.2%)
My attitude has changed	36(15.9%)	8(3.5%)	15(6.6%)	103(45.4%)	65(28.6%)
I will be able to use the new skill throughout my career	39(17.2%)	10(4.4%)	11(4.8%)	102(44.9%)	65(28.6%)

I have applied the new knowledge in my life	37(16.3%)	15(6.6%)	9(4.0%)	98(43.2%)	68(30.0%)
I initiated new ideas from the new knowledge	35(15.4%)	21(9.3%)	7(3.1%)	110(48.5%)	54(23.8%)
Interactive blogging was essential in the course	35(15.4%)	19(8.4%)	24(10.6%)	123(54.2%)	26(11.5%)
The assessment criteria is fair	24(10.6%)	33(14.5%)	22(9.7%)	122(53.7%)	26(11.5%)
I completed the required tasks for the project	25(11.0%)	18(7.9%)	33(14.5%)	117(51.5%)	34(15.0%)

The overall score on the perceived outcomes from e-learning by nursing students was calculated, and 12 items mentioned above were computed. The responses ranged from 1=strongly disagree, 2=disagree, 3=neutral, 4=agree and 5=strongly agree. The minimum score was 12 and the maximum score was 60. The higher score indicated a positive perception on the outcomes from e-earning and the lower score indicated a negative perception on the outcomes from e-learning. The mean response was 42.92, the median and the mode were 48 and the Standard Deviation was 13.875 (Figure 5). The 1st quartile was 36, 2nd quartile was 48 and the 3rd quartile was 52. These results indicate that the majority of nursing students had a relatively high positive perception on the outcomes delivered in e-learning.

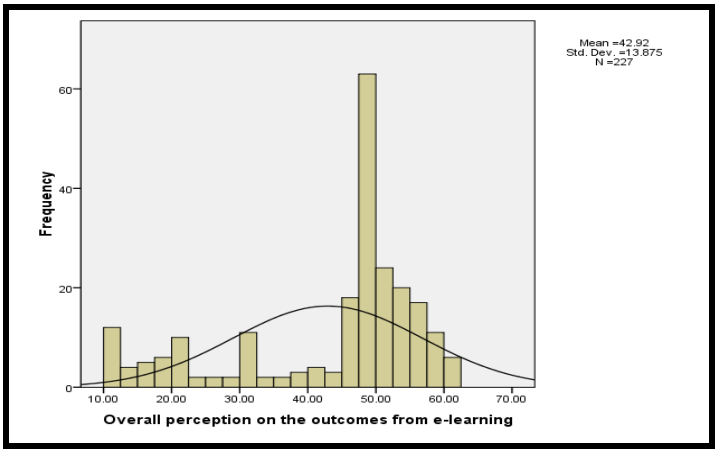

Figure 5: Perception on the outcome from e-learning (n=227)

Perception on the Structure of e-learning platform

Regarding the perception of the respondents about the structure of e-learning platform, 24 items were considered: free wireless connection is important for learning; the university provides free wireless connection; the course content meets their need; the course uses interactive technology; the course engages them in the learning experience; the course builds their confidence in problem solving; the course builds their confidence in planning, the course is interactive; the instructor act as a partner in learning, their opinions are considered in the course; the instructor was empathetic to their needs; the course creates a positive learning environment; the course content activities support learning goals; the instructor facilitates self-directed learning; the instructor makes his/her expectations clear; the instructor embeds learning in realistic contexts; the course allow me to make choices; the course provides sufficient practice opportunity; the course provides opportunities for self-reflection; the course provides opportunities for self-evaluation; the course supports exploratory learning; the course enhanced their learning; the course provides steps/links to further their learning; the course blog provides access to online resources.

In order to make the results more meaningful 5 Likert scale on table below was put into three categories, Positive perception (strongly agree and agree), Neutral, and negative perception (disagree and strongly disagree). The findings from this study revealed that out of 227; 74.4%(n=169) had a positive perception, while 20.3%(n=46) had a negative perception that the course enhanced their learning; 73.6%(n=167) had a positive perception, while 19.4%(n=44) had a negative perception that the university provides free wireless connection; 73.6%(n=167) had a positive perception, while 23.8%(n=54) had a negative perception that the course builds their confidence in problem solving; 73.6%(n=167) had a positive perception, while 22.0%(n=50) had a negative perception that the course content activities support learning goals; 73.6%(n=167) had a positive perception, while 20.3%(n=46) had a negative perception that the course supports exploratory learning; 73.6%(n=167) had a positive perception, while 19.4%(n=44) had a negative perception that the course provides steps/links to further their learning; 73.1%(n=166) had a positive perception, while 20.3%(n=46) had a negative perception that free wireless connection is important for learning; 72.7%(n=165) had a positive perception, while 23.8%(n=54) had a negative perception that the course is interactive; 72.7%(n=165) had a positive perception, while 21.1%(n=48) had a negative perception that the course creates a positive learning

environment; 71.8%(n=163) had a positive perception, while 18.9%(n=43) had a negative perception that the course engages them in the learning experience; 71.8%(n=163) had a positive perception, while; 22.9%(n=52) had a negative perception that the course builds their confidence in planning; 71.4%(n=162) had a positive perception, while; 18.9%(n=43) had a negative perception that the instructor act as a partner in learning; 71.4%(n=162) had a positive perception, while 18.5%(n=42) had a negative perception that the instructor makes his/her expectations clear; 71.4%(n=162) had a positive perception, while; 22.5%(n=51) had a negative perception that the course provides opportunities for self-reflection; 71.4%(n=162) had a positive perception, while 20.3%(n=46) had a negative perception that the course blog provides access to online resources; 70.5%(n=160) had a positive perception, while 20.7%(n=47) had a negative perception that the course uses interactive technology; 70.5%(n=160) had a positive perception, while 19.8%(n=45) had a negative perception that their opinions are considered in the course; 70.0%(n=159) had a positive perception, while 22.0%(n=50) had a negative perception that the course content meets their needs; 70.0%(n=159) had a positive perception, while 21.1%(n=48) had a negative perception that the course allow them to make choices; 69.6%(n=158) had a positive perception, while 17.6%(n=40) had a negative perception that the instructor facilitates self-directed learning; 69.6%(n=158) had a positive perception, while 24.2%(n=55) had a negative perception that the course provides opportunities for self-evaluation; 68.3%(n=155) had a positive perception, while 17.2%(n=39) had a negative perception that the instructor embeds learning in realistic contexts; 68.3%(n=155) had a positive perception, while 21.6%(n=49) had a negative perception that the course provides sufficient practice opportunity, and 67.0%(n=152) had a positive perception, while 22.9%(n=52) had a negative perception that the instructor was empathetic to their needs (**Table 7**).

Table 7: Perception on the structure of e-learning platform (n=227)

STRUCTURE	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
Free wireless connection is important for learning	41(18.1%)	5(2.2%)	15(6.6%)	80(35.2%)	86(37.9%)
The university provides free wireless connection	37(16.3%)	7(3.1%)	16(7.0%)	92(40.5%)	75(33.0%)
The course content meets my need	41(18.1%)	9(4.0%)	18(7.9%)	104(45.8%)	55(24.2%)
The course uses interactive technology	26(11.5%)	21(9.3%)	20(8.8%)	108(47.6%)	52(22.9%)
The course engages me in the learning experience	32(14.1%)	11(4.8%)	21(9.3%)	100(44.1%)	63(27.8%)
The course builds my confidence in problem solving	33(14.5%)	21(9.3%)	6(2.6%)	103(45.4%)	64(28.2%)
The course builds my confidence in planning	33(14.5%)	19(8.4%)	12(5.3%)	106(46.7%)	57(25.1%)
The course is interactive	30(13.2%)	24(10.6%)	8(3.5%)	115(50.7%)	50(22.0%)
The instructor act as a partner in learning	31(13.7%)	12(5.3%)	22(9.7%)	122(53.7%)	40(17.6%)
My opinions are considered in the course	31(13.7%)	14(6.2%)	22(9.7%)	126(55.5%)	34(15.0%)
The instructor was empathetic to my needs	34(15.0%)	18(7.9%)	23(10.1%)	108(47.6%)	44(19.4%)
The course creates a positive learning environment	32(14.1%)	16(7.0%)	14(6.2%)	109(48.0%)	56(24.7%)
The course content activities support learning goals	33(14.5%)	17(7.5%)	10(4.4%)	116(51.1%)	51(22.5%)
The instructor facilitates self-directed learning	27(11.9%)	13(5.7%)	29(12.8%)	111(48.9%)	47(20.7%)
The instructor makes his/her expectations clear	29(12.8%)	13(5.7%)	23(10.1%)	121(53.3%)	41(18.1%)
The instructor embeds learning in realistic contexts	29(12.8%)	10(4.4%)	33(14.5%)	113(49.8%)	42(18.5%)
The course allow me to make choices	27(11.9%)	21(9.3%)	20(8.8%)	116(51.1%)	43(18.9%)
The course provides sufficient practice opportunity	30(13.2%)	19(8.4%)	23(10.1%)	118(52.0%)	37(16.3%)
The course provides opportunities for self-reflection	29(12.8%)	22(9.7%)	14(6.2%)	118(52.0%)	44(19.4%)
The course provides opportunities for self-evaluation	25(11.0%)	30(13.2%)	14(6.2%)	112(49.3%)	46(20.3%)
The course supports exploratory learning	29(12.8%)	17(7.5%)	14(6.2%)	129(56.8%)	38(16.7%)
The course enhanced my learning	30(13.2%)	16(7.0%)	12(5.3%)	118(52.0%)	51(22.5%)
The course provides steps/links to further my learning	25(11.0%)	19(8.4%)	16(7.0%)	119(52.4%)	48(21.1%)
The course blog provides access to online resources	29(12.8%)	17(7.5%)	19(8.4%)	119(52.4%)	43(18.9%)

The overall score on the perceived structure of e-learning by nursing students was calculated, and 24 items mentioned above were computed. The responses ranged from 1=strongly disagree, 2=disagree, 3=neutral, 4=agree and 5=strongly agree. The minimum score was 24 and the maximum score was 120. The higher score indicated a positive perception on the structure of e-earning and the lower score indicated a negative perception on the structure of e-learning. The mean response was 86.19, the median and the mode were 96 and the Standard Deviation was 28.249(Figure 6). The 1st quartile was 65; 2nd quartile was 96, and the 3rd quartile was 104. These results indicate that the majority of nursing students had a relatively high positive perception on the structure of e-learning.

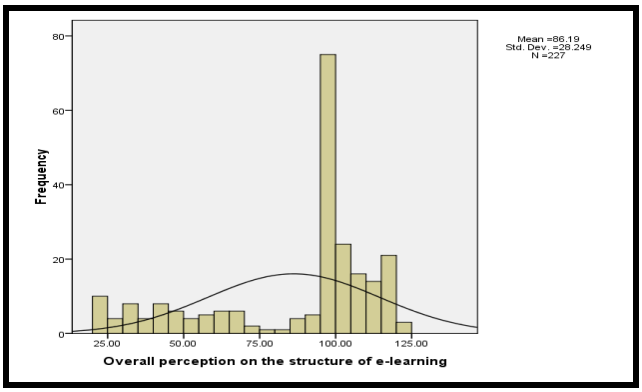

Figure 6: Perception on the structure of e-learning (n=227)

Perception of the respondents on the evaluation done in e-learning platform

The perception of the respondents on the evaluation done in e-learning platform comprised nine items which were: There is a relevancy of assignments, quizzes, and test; there is a quality of the questions asked in the quizzes; there is enough variety in the types of quizzes; the quiz feedback present new knowledge; the quiz feedback is timely and relevant; the quizzes are presented in adequate intervals; quizzes are appropriately test the material presented in the course; preference to have seen practice questions for all exams and to have practice questions posted earlier than two to four days before an exam; the practice questions actually make good learning tools. In order to make the results more meaningful 5 Likert scale on table below was put into three categories, Positive perception (strongly agree and agree), Neutral, and negative perception (disagree and strongly disagree). The findings from this study revealed that out of 227; the majority 70.9%(n=161) had a positive perception, while 22.0%(n=50) had a negative perception that the practice questions actually make good learning tools; 70.0%(n=159) had a positive perception, while 28.6%(n=65) had a negative perception that there is a relevancy of assignments, quizzes, and test; 69.2%(n=157) had a positive perception, while 23.3%(n=53) had a negative perception that there a quality of the questions asked in the quizzes; 66.1%(n=150) had a positive perception, while 23.3%(n=53) had a negative perception that there is enough variety in the types of quizzes; 61.7%(n=140) had a positive perception, while28.2%(n=64) had a negative perception that quizzes are appropriately test the material presented in the course; 61.2(n=139) had a positive perception, while 24.7%(n=56) had a negative perception that the quiz feedback present new knowledge; 60.4%(n=137) had a positive perception, while 27.8%(n=63) had a negative perception that i prefer to have seen practice questions for all exams and to have practice questions posted earlier than two to four days before an exam; 51.1(n=116) had a positive perception, while 32.2%(n=73) had a negative perception that the quizzes are presented in adequate intervals; 49.3(n=112) had a positive perception, while 27.8%(n=63) had a negative perception that the quiz feedback is timely and relevant (Table 8).

Table 8: Perception on the evaluation done in e-learning platform (n=227)

EVALUATION	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
There is a relevancy of assignments, quizzes, and test	44(19.4%)	21(9.3%)	3(1.3%)	90(39.6%)	69(30.4%)
There a quality of the questions asked in the quizzes	31(13.7%)	22(9.7%)	17(7.5%)	101(44.5%)	56 (24.7%)
There is enough variety in the types of quizzes	32(14.1%)	21(9.3%)	24(10.6%)	96(42.3%)	54(23.8%)
The quiz feedback present new knowledge	39(17.2%)	17(7.5%)	32(14.1%)	103(45.4%)	36(15.9%)
The quiz feedback is timely and relevant	40(17.6%)	23(10.1%)	52(22.9%)	91(40.1%)	21(9.3%)
The quizzes are presented in adequate intervals	42(18.5%)	31(13.7%)	38(16.7%)	94(41.4%)	22(9.7%)
Quizzes are appropriately test the material presented in the course	41(18.1%)	23(10.1%)	23(10.1%)	105(46.3%)	35(15.45)
I prefer to have seen practice questions for all exams and to have practice questions posted earlier than two to four days before an exam	39(17.2%)	24(10.6%)	27(11.9%)	84(37.0%)	53(23.3%)
The practice questions actually make good learning tools	33(14.5%	17(7.5%)	16(7.0%)	96(42.3%)	65(28.6%)

The overall score on the perception of the evaluation done in e-learning platform by nursing students was calculated, and nine items mentioned above were computed. The responses ranged from 1=strongly disagree, 2=disagree, 3=neutral, 4=agree and 5=strongly agree. The minimum score was 9 and the maximum score was 45. The higher score indicated a positive perception on the structure of e-earning and the lower score indicated a

negative perception on the structure of e-learning. The mean response was 30.53, the median and the mode were 36 and the Standard Deviation was 10.678 (Figure 7). The 1st quartile was 21, 2nd quartile was 36 and the 3rd quartile was 37. These results indicate that the majority of nursing students had a relatively high positive perception on the evaluation done in e-learning platform.

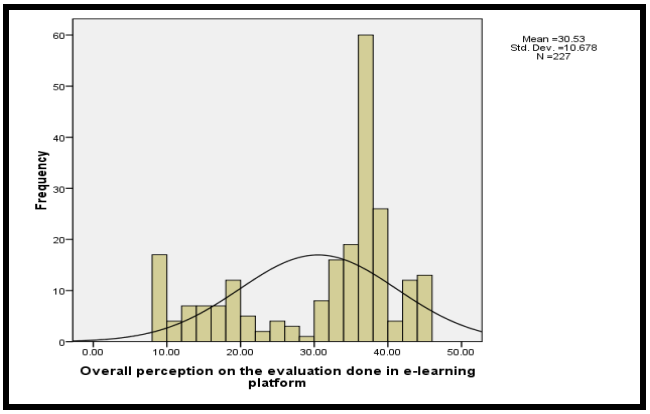

Figure 7: Perception on the evaluation done in e-learning platform (n=227)

A Pearson correlation between various constructs related to DDLM in e-learning

A Pearson's correlation was run to assess the relationship between various constructs of DDLM in e-learning platform. There were statistically significant relationships between the following constructs related to DDLM: PCUE and PDCE (r=.923, n=227, p<.000); PCUE and PSPE (r=.911, n=227, p<.000); PCUE and POFE (r=.918, n=227, p<.000); PCUE and PSOE (r=.912, n=227, p<.000); PCUE and PEDE (r=.792, n=227, p< .000); PDCE, and PSPE (r=.936, n=227, p< .000); PDCE and POFE (r=.915, n=227, p< .000); PDCE and PSOE (r=.895, n=227, p< .000); PDCE and PEDE (r=.802, n=227, p< .000); PSPE and POFE (r=.943, n=227, p< .000); PSPE and PSOE (r=.924, n=227, p< .000); PSPE and PEDE (r=.836, n=227, p< . 000); POFE and PSOE (r=.960, n=227, p< .000); POFE and PEDE (r=.807, n=227, p<.000), PSOE and PEDE (r= .836, n=227, p< .000) (Table 9).

Table 9: A Pearson correlation between various constructs related to DDLM (n=227)

	PCUE	PDCE	PSPE	POFE	PSOE	PEDE
PCUE	1	.923**	.911**	.918**	.912**	.792**
PDCE	.923**	1	.936**	.915**	.895**	.802**
PSPE	.911**	.936**	1	.943**	.924**	.836**
POFE	.918**	.915**	.943**	1	.960**	.807**
PSOE	.912**	.895**	.924**	.960**	1	.836**
PEDE	.792**	.802**	.836**	.807**	.836**	1

****.** Correlation is significant at the 0.01 level (2-tailed).

Key: **PCUE**: Perception on the content used in e-learning; **PDCE**: Perception on the delivery of courses used in e-learning; **PSPE**: Perception on the services provided in e-learning; **POFE**: perception on the outcomes from e-learning; **PSOE**: perception on the structure of e-learning; **PEDE**: Perception on the evaluation done in e-learning platform

A Pearson's correlation was run to assess the relationship between socio demographics characteristics of nursing students, and various constructs of DDLM in e-learning platform. There were relatively significant relationships between the following constructs related to DDLM: HOA and PDCE (r= .135, n=227, p=042); GND and PDCE (r=.140, n=227, p=.034); GND and PSPE (r= .157, n=227, p=.018) (Table 10).

Table 10: A Pearson correlation between various constructs related to DDLM and socio demographic characteristics of the nursing students (n=227)

	CPS	YST	HOA	GND	PCUE	PDCE	PSPE	POFE	PSOE	PEDE
CPS	1	.127	.060	.170*	-.022	.015	.041	-.058	-.045	.059
YST	.127	1	.001	-.065	-.015	-.034	.003	.027	.080	.049
HOA	.060	.001	1	-.126	.129	.135*	.093	.097	.110	.124
GND	.170*	-.065	-.126	1	.117	.140*	.157*	.124	.099	.087
PCUE	-.022	-.015	.129	.117	1	.923**	.911**	.918**	.912**	.792**
PDCE	.015	-.034	.135*	.140*	.923**	1	.936**	.915**	.895**	.802**
PSPE	.041	.003	.093	.157*	.911**	.936**	1	.943**	.924**	.836**
POFE	-.058	.027	.097	.124	.918**	.915**	.943**	1	.960**	.807**
PSOE	-.045	.080	.110	.099	.912**	.895**	.924**	.960**	1	.836**
PEDE	.059	.049	.124	.087	.792**	.802**	.836**	.807**	.836**	1

*. Correlation is significant at the 0.05 level (2-tailed).

**. Correlation is significant at the 0.01 level (2-tailed).

Key: **CPS**: Campus; **YST**: Year of the study; **HOA**: Age; **GND**: Gender; **PCUE**: Perception on the content used in e-learning; **PDCE**: Perception on the delivery of courses used in e-learning; **PSPE**: Perception on the services provided in e-learning; POFE: perception on the outcomes from e-learning; **PSOE**: perception on the structure of e-learning; **PEDE**: Perception on the evaluation done in e-learning platform

V. Discussion of the findings

The findings from this study revealed that nursing students had positive perceptions on the utilisation of e-learning with all six construct related to DDLM (the content, delivery, services, outcomes, structure and evaluation), and which were consisted of 70 questions. The results from this study indicated that based on the constructs of DDLM, a significant number of nursing students had a positive perceptions over the content, delivery, services, outcomes, structure and evaluation inline to e-learning. Regarding the content, the minimum score was 9 and the maximum score was 45. The higher score indicated a positive perception on the content used in e-earning and the lower score indicated a negative perception on the content used in e-learning. The mean response was 31.982, the median and the mode were 36 and the standard deviation was 1.062(Figure 2). And these results indicate a relatively high perception on the content.

Regarding the delivery the minimum score was 9 and the maximum score was 45. The higher score indicated a positive perception on the content used in e-earning and the lower score indicated a negative perception on the content used in e-learning. The mean response was 31.32, the median and the mode were 36 and the standard deviation was 9.626(Figure 3). These results indicate that the majority of nursing students had a relatively high positive perception on the delivery of courses used in e-learning. On the services, the minimum score was 7 and the maximum score was 35. The higher score indicated a positive perception on the services offered in e-earning and the lower score indicated a negative perception on the services used in e-learning. The mean response was 24.19, the median and the mode were 28 and the Standard Deviation was 8.155. These results indicate that the majority of nursing students had a relatively high positive perception on the services delivered in e-learning (Figure 4). Regarding the outcome, the minimum score was 12 and the maximum score was 60. The higher score indicated a positive perception on the outcomes from e-earning and the lower score indicated a negative perception on the outcomes from e-learning. The mean response was 42.92, the median and the mode were 48 and the Standard Deviation was 13.875 (Figure 5). These results indicate that the majority of nursing students had a relatively positive perception on the outcomes delivered in e-learning.

On the structure, the minimum score was 24 and the maximum score was 120. The higher score indicated a positive perception on the structure of e-earning and the lower score indicated a negative perception on the structure of e-learning. The mean response was 86.19, the median and the mode were 96 and the Standard Deviation was 28.249(Figure 6).These results indicate that the majority of nursing students had a relatively high positive perception on the structure of e-learning. Regarding the evaluation, the minimum score was 9 and the maximum score was 45. The higher score indicated a positive perception on the structure of e-earning and the lower score indicated a negative perception on the structure of e-learning. The mean response was 30.53, the median and the mode were 36 and the Standard Deviation was 10.678(Figure 7).These results indicate that the majority of nursing students had a relatively high positive perception on the evaluation done in e-learning platform. It was noted that the relationship between various constructs of DDLM were statistically significant ($p< .01$) (Table 9).E-learning (electronic learning) is a combination of content and instructional methods delivered via computers to facilitate a building of knowledge and skills. It assists acquisition and comprehension of knowledge by both offline and online interactive technologies [41]. The magnificence of e-Learning is that it is a unique solution for delivering online learning for nurses despite geographical location, time, or distribution devices. It provides the ability to deliver both learning and information at will – dynamically and immediately. It allows participants to tap into the knowledge of experts and non-experts, and apply their learning beyond classroom walls and into the workplace [41]. E-Learning engages nurses by building interest and motivation while providing

opportunities for active participation and protecting organizational interest with documented training. However, optimal success comes from consistent engagement[41]

In this study other factors that were assumed to influence the utilization of e-learning courses by the staff such as age, and gender (Table 10), the results indicated that the age might have played an important role as a significant number is above 36 years of age, and the majority of the participants were females. It was found that there was a relationship with the perception on the delivery of courses used in e-learning and the gender and age of the participants. There was a relationship as well between the perceptions on the services provided in e-learning and the gender (Table 10).These who reported negative perception or were neutral toward e-learning by using DDLM, there are a number of reasons or challenges for that, such lack accessibility to internet/ Learning Management System (LMS), poor computer literacy, language barrier, issues related to interference design of LMS, and other factors as it will be presented in other following papers for this study.

The findings from this study provided important information on the perceptions on nursing students on the content, the delivery, services, outcomes, structure and evaluation which would in the process of teaching and learning facilitation in nursing education. Nursing education is the process whereby students are guided, assisted and provided with means which enable them to learn the art and science of nursing so that they can apply it to nursing care of people who need such care [Mellish et al., 1998 cited in 42, 43]. In order to achieve this, nursing education requires the adoption of facilitation methods based on identified methods [44]. Literature reveals there is recognition of the importance of the facilitation for teaching and learning in higher education [45-50].Although facilitation is becoming popular, a number of obstacles have been reported by Sithole[49], including: (1) Lecturers' lack of knowledge. (2) Use of teaching and assessment strategies that do not facilitate critical thinking in students. (3) Negative attitudes of lecturers and their resistance to change. (4) Inappropriate selection processes and poor educational background that did not facilitate critical thinking. (5) Inadequate socialization. (6) Cultural and instructional language incompetence. From the literature, it was found that facilitation is way of teaching which embraces reflective dialogue leading to critical reflective learning [51-55]. According to Brockbank and McGill [51] this way of teaching is initially facilitated by teachers leading to self-facilitation by student learners. Brockbank and McGill [51] provide some principles of person-centred teaching or facilitation: (1)The facilitator clarifies the purposes of the individuals and the general purposes of the group and relies on the desire of each student to implement those purposes which have meaning for him. (2) The facilitator endeavours to make available the widest possible range of resources for learning and regards himself as a flexible resource to be utilized by the group. (3) The facilitator remains alert to expressions indicative of deep or strong feelings and responds to expressions of feeling and accepts both intellectual content and emotionalized attitudes, giving each aspect the degree of emphasis it has for the individual and/or the group. (4) The facilitator, while recognizing and accepting his own limitations, takes the initiative in sharing feelings as well as thoughts, inappropriate ways.

Facilitation as a teaching and learning strategy was uncommon and innovative in nature and presented a challenge to the students as it was a new way of learning [44]. The authors argue that student support is very important on this aspect to prevent frustrations amongst students especially, those that have never used facilitation process. Different methods of support can be implemented and these can include scaffolding and mentoring. Off-campus contact with facilitators on social basis can be organized to provide emotional support for the students [44].It is argued by Fry, Ketteridge and Marshall [56] that teaching is often more about facilitation than providing subject expertise. The same authors stress the importance to let he students tell their own stories or identify their own perspectives, and teachers should share their own enthusiasm and difficulties concerning the subject.

According to Ţîru[50], there three main types of facilitation styles at the University level: the non-directive styles of facilitation, the appreciative style and the practice based style of facilitation: The non-directive style of facilitation: the facilitator adopts an impartial attitude regarding the content and students' learning activities. The facilitator suggests, does not plan when and how the student will act. The facilitator assures the activities in order to facilitate the self-development of the student, and she or he encourages debates among the students. The facilitator also supports the students in personal self-knowledge and acceptance [50].The appreciative style of facilitation: the facilitator is centred on valorising the best characteristics the best practices of the students, and offers permanent feedback for the students. The facilitator uses sustaining encouraging phrases for the students and motivates him to become better in every moment. The facilitator also believes that what the student suggests is the best way of doing it [50]. The activity based facilitation: the facilitator uses group work and is centred on group development. The facilitator determines the group to solve a given task, in a predefined period of time, and she/he is also involved in team-work for facilitating the learning process. The facilitator set-up tasks which sustain the pragmatic character of the learning process [50].It was found from a study conducted by Tiru[50] that educators may adopt different facilitation style depending on the students' year of the study and the specificity of the educational activity. Similarly McKimm and Jollie[57] argue that in education a teacher may play different sorts of roles, depending on the size of the group and the type of the technique and learning that is planned to take place. For example: (1) in mass instruction techniques the teacher may use conventional lectures and expository lessons, lab classes, television and radio broadcasts, video, cable television, films. (2) In individualised instructions the teacher may use directed study (reading books, hand-outs, discovery learning),

open learning, distance learning, programmed learning, mediated self-instruction, computer/web based learning, e-learning; one to one teaching and mentoring. (3) In group learning the teacher might use the following tutorials; seminars; group exercises and projects; games and simulations; role play; self-help groups; discussions[57].

Facilitation, mentoring, couching have been reported in various studies to be effective for teaching and learning [58-65]. This is in line with social constructivism or socio-cultural theory, in which individuals create or construct knowledge by attempting to bring meaning to new information and to integrate this knowledge with their prior experience in their communication with others [59, 60].With regards to mentoring in education, this is a complex process because mentors have numerous roles. Some of roles a mentor are those of role model, advisor, guide, leader, friend, expert, supervisor, assessor and coach [57, 66-68]. It is argued that mentorship is designed to socialize students into the nursing profession, promote their confidence, competence and foster their critical thinking ability [65]. Another concepts used in the facilitation of learning, is coaching. According to Perkins (1992) cited by Murphy et al.[60], coaching based on the cognitive apprenticeship model should be used to guide learners in developing task management skills. Specifically, coaching involves providing motivational prompts, monitoring, and regulating learner performance, provoking reflection, and perturbing learners' models [60].

The Internet is the world's largest network of Information, Communication and Services, the Internet is widely used in medicine and has made significant impact in research, training and patient care [69]. Among Health care professionals, knowledge about telemedicine, evidence based medicine(EBM) and problem based learning(PBL), good clinical practices, open access journals, Medline, Medscape, Cochrane reviews, e-medicine, MD-consult, ProQuest Medical Library (PML) etc have to be assessed [69]. The use of Internet in health care professionals and their education is to prepare students to meet the demands of an increasingly technological world [70].Health care professionals are considered to be among the more aggressive users of the Internet as compared to faculty members in many other disciplines and they find this resource indispensable [71]. Obst[72] surveyed German medical professionals and reported profound changes in their communication patterns as a result of their Internet use. Kaminer[73] explored the relationship of Internet use with certain variables such as computer usage, length of time of Internet use, expertise in Internet use, and perceived utility of the Internet. It was found that an overwhelming majority of the faculty members used a number of utilities frequently. He found that the Internet expertise was significantly related to the use of different services and there of their use. According to MedPac[74], IT allows health care providers to collect, store, retrieve, and transfer information electronically. However, more specific discussion of IT in health care is challenging due to the lack of precise definitions, the volume of applications, and a rapid pace of change in technology. The health care people seek health information for the reasons that they need to be updated for the current development in medical field all over the globe. They need to obtain answers to patient's specific questions and they need information for teaching materials for undergraduate (UG) and postgraduate (PG) and for research [69]. From its inception the Internet was a prime site for the dissemination of health information [75].

According to Spink (2001) cited in McLean, Kayas and Henderson[76] nearly 10% of web searches are for health or scientific information. For this reason accessible health information should be a high priority for those creating, organizing and disseminating information. As long ago as 1997 there were 25,000 sites devoted to aspects of health [77] and 21st century estimates suggest a much higher number, from 100,000 upwards [78]. Likewise there is some variability in estimates of the extent to which people use these facilities. According to Bovi[79], approximately 3 million Americans used the Internet for online consultations with a medical expert. For example, an early 21st century survey revealed that 41% of patients participating in the study were reluctant to spend time in physicians' offices to ask questions that could be answered through other means of communication, such as e-mail. The survey also concluded that 81% of the online population would like to receive e-mail reminders for preventive care and 83% would like follow-up e-mails after a visit to their physicians [Information Technology Association of America, 2001 cited in 79].

In a study conducted by Podichetty, Booher, Whitfield and Biscup[80], on internet use and effects among healthcare professionals, he found that most survey respondents (72%) said they use the Internet regularly for medical or professional updating. 81% of the physicians stated that they would take web based CME courses and 80% of the physicians had patients present printed web based information on their condition during the office visit. In the same study Sixty two per cent of the survey respondents would permit patients to access their information through a web site, and slightly more than half of the survey respondents favoured second opinions via the web as a valuable resource for patients. Similarly, slightly more than half of the physicians claimed that web information does influence their healthcare decisions [80]. Another study conducted Professional use of the Internet among Saudi Arabian dermatologists by AlGhamdi[81], revealed that 97% of the respondents found the Internet to be a useful tool for medical updating, 96% found the Internet to be a useful tool for obtaining information about medical courses, conferences, and meetings, 51% found the Internet to be a useful tool for obtaining information on career (job) opportunities. In the same study 91% found the Internet to be a useful tool for obtaining information on drugs and medical equipment, 84% reported seeing patients who had presented them with medical information from the Internet (web-informed patients), and 80% of dermatologists expected there to

be a major gain in the overall importance of the]internet for practicing dermatologists. In a study conducted by Rehman and Ramzy[82], when the respondents were asked to indicate their perception about the importance of using the Internet in their work as health care professionals, almost two-thirds of them, 65.4%, perceived the Internet as extremely valuable, and more than one-third of them (29.9%) perceived it to be quite valuable. In the same study, It was found that majority of them learnt how to use the Internet through self-instruction 60.6% reported that they used online help and documentation. Internet usage is widespread among physicians. However, use of online EBM resources such as the Cochrane library, clinical evidence and up-to-date was very minimal [69]. In a study conducted by Trivedi and Joshi [69], it was observed that most of the users in their survey were using PubMed (26.80%) indicating that the services provided by the Internet or useful for their research work, dissertation purpose. However in of the study held in Iran by Asefeh and Asemi (2005) cited in Trivedi and Joshi [69], it was depicted that internet utilization for research work purpose was 28%.

According to Shim [83], the Internet has unquestionably changed the flow of health information. Due to the important role of the Internet as an important source of health information, people can now make themselves well-informed and self-involved in health decision-making, based on simple Web searching [84, 85]. In the past the health care people tried to take help from printed materials such as books, journals, handbooks, monographs held in personal libraries and also from friends [86-88]. However, due to increase in the pace of health care research and the introduction of computers and internet many new electronic information resources and systems are now available. Due to the easy availability of the Internet there is an increased possibility of immediate access to the most recent and reliable results of clinical research in every day medical practice in developing countries as well as developed countries. However, internet is still only available to a minority of health care professionals in developing countries like India and often it is not available when actually needed. There are number of problems regarding its connectivity and speed [69]. The degree of Internet and IT use varies by health care setting: Pharmacies are generally advanced users, while other settings such as physician offices or nursing homes are further behind [74]. The kind of technology used also varies by setting. For example, in home health, the use of technology that allows patients to monitor their own vital signs from their home and communicate results to the agency could increase the ability to address a problem before a patient requires acute care [74]. In both home health and nursing home settings, use of handheld computers to complete documentation and capture patient assessment information can increase efficiency and provide more information to care givers. IT and the Internet have also had a significant impact on consumers. Numerous websites have made health information more available to patients, thereby strengthening their role in care decisions. The Internet also helps consumers choose providers by allowing insurers and others (including Medicare) to post information on providers including, in some instances, comparative quality information [74]. Royal College of Nursing [89], argues that today all nurses recognize the importance of evidence-based practice, where every care decision is informed by accurate and up-to-date knowledge. ICT, and in particular the Internet, gives you the access you need to knowledge and resources including recent research findings, protocols and guidelines. According to Royal College of Nursing[89], it is not only nurses who will benefit from increased access to knowledge, and with Internet, patients can now obtain a great deal of health information. This is already changing the balance of power between the professional and the patient, and while some professionals may view this as a threat, the Royal College of Nursing strongly believes nursing is very much about empowering and enabling people. CT offers nursing a great opportunity to take on the role of 'knowledge broker', actively helping patients to access the information they need, and deciding how to use it. As well as teaching patients about their disease or disability, nurses can help patients to find, and understand, information about specialists, resources, and alternative treatments. At the same time nurses can use information to enable people to keep healthy and well whilst avoiding or minimising stress or risky behaviour [89]. From the literature, one would argue that the Internet is gaining ground as the central source of health-related information [90-94].

VI. Conclusion

The findings from this study revealed that DDLM, it is a good tool to evaluate the success of e-learning in nursing education. The results indicated both positive perception and negative perception, and even those who were neutral, and there was statistically positive relationship between all the six constructs which is a positive indicator of the future for e-learning in Rwanda. However a further investigation should be made to find out the relationships of the constructs of DDLM and other constructs related to e-learning in nursing. The results presented above were part of the preliminary finding of the action research, and more findings will be presented to explore in in depth the utilisation of e-learning platform in the selected nursing campuses in Rwanda. Those results add to the existing body of knowledge of e-learning in nursing education. Cheng [2] argued that with the rapid development of e-learning, most institutions now have a clearer picture of what e-learning is. However, some institution' knowledge of e-learning is still limited to construction of a new learning platform and acquisition or development of e-learning content[2]. Even if they invest a huge amount of funds in building an e-learning environment, they may not obtain immediate results and will only leave the established environment

unused and wasted. Successful introduction of e-learning requires not only construction of software and hardware facilities but also support of multiple measures, including executives' support and commitment, design of proper instructions, introduction of teaching strategies and assessment by external experts [2].DDLM was a good tool to assess the perception on nursing students the utilisation of e-learning in nursing education on the content; delivery; the services, the outcomes, the structure the evaluation done in e-learning platform for the selected campuses, and in the context of Rwanda. Thus an on-going program evaluation and continual adaptation is imperative as recommended by Mac Donald [1].

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