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Perceptions and Satisfaction with Online Learning during the COVID-19 Pandemic Among Nursing Students at Rusangu University, Kitwe, Lusaka and Monze Districts of Zambia

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ABSTRACT

During the COVID-19 pandemic, online learning became a substitute for conventional learning methods, leading to new challenges for both students and faculty.The study aimed at assessing the Perception and Satisfaction of nursing students with online learning at Rusangu University and factors associated with students' perception and satisfaction with online learning.

Methods: The research design adopted for this study was a quantitative analytical cross-sectional study design. The sample was 292 Bachelor of Science in Nursing students comprising pre-service and in-service students who participated in online learning during the Covid-19 pandemic. The students were selected using a stratified proportional simple random sampling technique, encompassing full-time and Block Release Learning nursing students who participated in both online and face-to-face learning at Rusangu University's campuses in Kitwe, Lusaka, and Monze Districts of Zambia. Data was collected through a self-administered questionnaire with validated subscales. Data was entered in SPSS to analyze the data, descriptive statistics were presented using pie charts, bar charts, frequency tables, Chi square and Fishers exact tests were used to test association between variables and a multivariate logistic regression model (95% confidence interval) were employed for data analysis.

Results: Out of the 292 respondents, 61% had a positive perception, while 39% had a negative perception towards online learning. Regarding satisfaction, 49% expressed satisfaction, and 51% were dissatisfied with online learning during the pandemic. Multivariate logistic regression analysis revealed that poor computer efficacy p-value 0.0001, instructor's knowledge p-value 0.001, course management p-value -0.0001, and technological characteristics p- value 0.001 were associated with reduced odds of positive satisfaction with online learning. Students in block release learning had higher odds of good perception, while poor computer efficacy, instructor's knowledge, course management, and technological characteristics were associated with lower odds of good perception towards online learning.

Conclusion and recommendations: Overall, these findings highlight the importance of addressing various factors to enhance students' satisfaction and perception of online learning during the pandemic. To improve the online learning program, the university should redesign course structures, provide orientation on online platforms, invest in technology and internet access, and enhance students' computer self-efficacy. Offering blended learning courses can ease the transition to online learning**.**

Keywords: E-Learning, Perception, Satisfaction, Self-efficacy, course coordination, technological characteristics.

Background

One of the modern developments in nursing education is the use of technology to create a platform for learners and educators to deliver teaching without regard to classroom space, teacher or student presence, or even the time when the lecture is to be delivered [19]. Most educational institutions throughout the world were closed since March 2020 to July 2021 in order to slow the spread of the COVID-19 epidemic. Over 90% of the world's student population has been affected by this (UNESCO, 2020).

Despite the fact that online learning is the only option during the COVID-19 epidemic, student's satisfaction is critical for a healthy and effective learning experience. Communication, student participation in online conversations, flexibility, workload, technology assistance, instructor pedagogical skills, and feedback are all aspects that go into determining student happiness in online learning [22,33] and Wei and Chou, (2020). Three learning theories underpin satisfaction with online learning: social cognition theory, interaction equivalency theorem, and social integration theory [22]. However, it has been difficult to assess the success of e-learning, and there have been concerns in United Arab Emirate that such educational activities may be motivated more by novelty than pedagogical evidence. Whereas some areas lend themselves well to e-learning, clinical skills have been seen as a difficult subject to teach online [28]. Ibrahim and AL-Khafaf [10] found that E-learning is not only one effective way to meet the needs of different learners, but it also incorporates a new style of education through technology for the next generation of learners. E-learning, which is a form of active learning, lays the onus on the students. E-learning is a method of using technology to reach out to a wider range of people. It was also discovered that traditional face-to-face learning advocates will resist, and reject e-learning among colleges. Africa is known for being a gloomy continent, but it has not been left out of this new nursing education trend [33]. A study conducted by Akimanimpaye and Fakude [9], at the University of Western Cape in South Africa found that the emergence of the Internet has created an opportunity for offering e-learning as a new service that has greatly improved learning at institutions of higher learning bringing learning to be more achievable without restriction of a class room as it is flexible.

Methods; The study utilised a quantitative cross sectional analytical research method. This design was chosen because data was collected at the same time. Probability sampling was used to select study participants. First stratification sampling was used to determine the proportion of participants to be drown from each campus. There after simple random sampling with replacement was used to select participants according to their proportion in each campus to meet the required number.

The identification numbers of students were placed in a fish bowl, then the bowl was shaken and computer numbers were drawn randomly so that each had an equal opportunity to be selected then the drawn identification number were retained in the bowl so that the number of elements remained the same. If the identification number picked at first was selected the second time, then that identification number is removed from the fish bowl and the next draw was conducted to determine the next participant. All the participants selected using the above described method qualified to be included in the study. The sample size comprised of 292 nursing students both pre-service and in-service nursing students at Rusangu University full time and Block Release Learning and those who had successfully completed a minimum of a quarter of both online and face to face learning. A validated adapted

structured questionnaire was used to collect data [33,1,22] used this tool with an Alpha score of 0.8 .All study participants from all three campuses responded to the same questions. This helped to attribute any variations in responses to be due to actual differences among the study participants and not as a result of variations in the study tool. The structured questionnaire consisted of 28 items (5-point Likert scale) covering four major student perception domains (learners' dimensions, technological characteristics, instructors' characteristics, course management and coordination) and satisfaction were distributed to the students physically to all study respondents from all three campuses. Ethical approved was obtained from the University of Zambia Biomedical Research Ethics Committee (UNZABREC REF.NO.3173-2022). Further, clearance to proceed with the study was obtained from the National Health Research Authority (Ref.No.NHRA-R-R-1024/25/08/2022. Additionally, permission from Rusangu University's was approved before conducting the study. Participants were assured that their responses will not affect their academic performance or study at Rusangu University. Participants have a right to withdraw from the study without any reprisal.

Data Analysis; Questionnaires were sorted out according to questions. The responses were verified, coded and entered into SPSS version 25.0. Descriptive statistics were presented (mean values and standard deviations) using frequency tables, pie and bar charts. Analysis of the relationships between variables was done using Fisher's exact test and Chi-square test. A multivariate and Univariate logistic regression model was constructed to identify the predictors of overall satisfaction & perception towards online classes.

Fisher's exact test and Chi-square tests were used to determine the association between independent and dependent variables (perception and satisfaction towards online learning)

Results; **BASELINE CHARACTERISTICS**

Table 2: Baseline characteristics of respondents (n=292)

Variable	Category	Frequency (n)	Percent (%)
Age in years	Under 20 years	18	6.2
	20 – 29 years	191	65.4
	30 – 39 years	57	19.5
	40 – 49 years	26	8.9
Year of study	First	13	4.5
	Second	20	6.8
	Third	39	13.4
	Fourth	220	75.3
Mode of study	Full – time	191	65.4
	Block release	101	34.6
Level of training	Pre-service	189	64.7
	In-service	103	35.3
Internet connectivity	WIFI	59	20.2
	Data package	232	79.5
	Earth net	1	0.3
Online learning platform	Zoom	214	73.3
	Edu roam	41	14.0

	Webcast videos	1	0.3
	Google meet	36	12.3
Campus	Monze	164	56.2
	Lusaka	45	15.4
	Kitwe	83	28.4

Table 2 shows that about two-thirds, (65.4%) of respondents were aged between 20 and 29 years and over three quarters, (75.5%) were in their fourth year of study. Most respondents were on full-time mode of study (65.4%) and were pre-service students (64.7%). Majority of respondents, (79.5%) used data packages for internet connectivity and Zoom was the most common used online learning platform (73.3%). Over half, (56.2%) of the respondents were from Monze campus, over a quarter (28.4%) Kitwe campus and (15.4%) were from Lusaka campus.

ASSOCIATION BETWEEN VARIABLES

This section presents results from analysis of association between study variables. To establish the associations, the dependent variables (satisfaction and perception) were cross tabulated with respondents' baseline characteristics, instructors' knowledge and characteristics, course management and co-ordination, computer self-efficacy and technological characteristics Results are shown in Table 9.

Table 9: Factors associated with satisfaction and perception of online learning during the COVID-19 pandemic at Rusangu University.

Variable	Satisfaction		Sig.	Perception		Sig.
	Good n (%)	Poor n (%)		Good n (%)	Poor n (%)	
Mode of study						
Full-time	82 (42.9)	109 (57.1)	0.005[C]	100 (52.4)	91 (47.6)	<0.001[C]
Block release	61 (60.4)	40 (39.6)		78 (77.2)	23 (22.8)	
Level of training						
Pre-service	81 (42.9)	108 (57.1)	0.005[C]	100 (52.9)	89 (47.1)	<0.001[C]
In-service	62 (60.2)	41 (39.8)		78 (75.7)	25 (24.3)	
Source of internet connectivity						
WIFI	30 (50.8)	29 (49.2)	0.884[F]	33 (55.9)	26 (44.1)	0.254[F]
Data package	113 (48.7)	119 (51.3)		145 (62.5)	87 (37.5)	
Ethernet	0 (0.0)	1 (100)		0 (0.0)	1 (100)	
Year of study						
First	7 (53.8)	6 (46.2)	0.357[C]	8 (61.5)	5 (38.5)	0.236[C]
Second	11 (55.0)	9 (45.0)		12 (60.0)	8 (40.0)	
Third	14 (35.9)	25 (64.1)		18 (46.2)	21 (53.8)	
Fourth	111 (50.5)	109 (49.5)		140 (63.6)	80 (36.4)	

Campus enrolled						
Monze	75 (45.7)	89 (54.3)	0.455[C]	96 (58.5)	68 (41.5)	0.593[C]
Lusaka	24 (53.3)	21 (46.7)		28 (62.2)	17 (37.8)	
Kitwe	44 (53.0)	39 (47.0)		54 (65.1)	29 (34.9)	
Computer self-efficacy						
Good	123 (59.1)	85 (40.9)	<0.001[C]	150 (72.1)	58 (27.9)	<0.001[C]
Poor	20 (23.8)	64 (76.2)		28 (33.3)	56 (66.7)	
Instructor's knowledge and characteristics						
Good	119 (61.0)	76 (39.0)	<0.001[C]	145 (74.4)	50 (25.6)	<0.001[C]
Poor	24 (24.7)	73 (75.3)		33 (34.0)	64 (66.0)	
Course management and co-ordination						
Good	59 (83.1)	12 (16.9)	<0.001[C]	65 (91.5)	6 (8.5)	<0.001[C]
Poor	84 (38.0)	137 (62.0)		113 (51.1)	108 (48.9)	
Technological characteristics						
Good	103 (73.0)	38 (27.0)	<0.001[C]	119 (84.4)	22 (15.6)	<0.001[C]
Poor	40 (26.5)	111 (73.5)		59 (39.1)	92 (60.9)	

C = Chi-square test, F=Fisher's exact test

Table 9 shows that satisfaction with online learning during COVID-19 was significantly influenced by mode of study (p=0.005), level of training (p=0.005), computer self-efficacy (p<0.001), instructor's knowledge and characteristics (p<0.001), course management and co-ordination (p<0.001) and technological characteristics (p<0.001). On the other hand, the source of internet connectivity (p=0.884), year of study (p=0.357) and campus enrolled at (p=0.455) were not significantly associated with satisfaction with online learning during COVID-19.

Table 9 further shows that mode of study (p<0.001), level of training (p<0.001), computer self-efficacy (p<0.001), instructor's knowledge and characteristics (p<0.001), course management and co-ordination (p<0.001) and technological characteristics (p<0.001) were significantly associated with perception towards online learning during the COVID-19 pandemic. The variables; source of internet connectivity (p=0.254), year of study (p=0.236) and campus enrolled at (p=0.593) were not significantly associated with perception towards online learning during COVID-19.

4.2.9. UNIVARIABLE AND MULTIVARIABLE LOGISTIC REGRESSION ANALYSIS

Data in this section presents results from univariable and multivariable logistic regression analysis models. In adopting variables for the multivariable analysis, an investigator guided backward stepwise approach was adopted. Results are shown in tables 10 and 11.

Table 10: Univariable and multivariable logistic regression analysis results on satisfaction with online learning during the COVID-19 Pandemic at Rusangu University

Variables	Univariable analysis			Multivariable analysis		
	cOR	CI (95%)	p-value	aOR	CI (95%)	p-value
Year of study						
First year	Ref			Ref		

Second year	1.05	0.26, 4.26	0.948	0.25	0.04, 1.45	0.123
Third year	0.48	0.13, 1.71	0.258	0.21	0.04, 0.99	**0.049**
Fourth year	0.87	0.28, 2.68	0.812	0.25	0.06, 1.05	**0.058**
Computer self-efficacy						
Good	Ref			Ref		
Poor	0.22	0.12, 0.38	< **0.001**	0.39	0.19, 0.77	**0.007**
Instructor's knowledge and characteristics						
Good	Ref			Ref		
Poor	0.21	0.12, 0.36	< **0.001**	0.34	0.17, 0.66	**0.001**
Course management and co-ordination						
Good	Ref			Ref		
Poor	0.12	0.06, 0.25	< **0.001**	0.23	0.11, 0.49	< **0.001**
Technological characteristics						
Good	Ref			Ref		
Poor	0.13	0.08, 0.22	< **0.001**	0.19	0.10, 0.33	< **0.001**

cOR= Crude Odds Ratio, aOR= adjusted Odds Ratio, CI= Confidence Interval

Multivariable analysis results in table 10 show that being in third versus first year (aOR = 0.21, 95% CI = 0.04, 0.99, p=0.049), poor computer efficacy versus good (aOR = 0.39, 95% CI = 0.19, 0.77, p=0.007), poor instructor's knowledge and characteristics versus good (aOR = 0.34, 95% CI = 0.17, 0.66, p=0.001), poor course management and coordination versus good (aOR = 0.23, 95% CI = 0.11, 0.49, p<0.001) and poor technological characteristics versus good (aOR = 0.19, 95% CI = 0.10, 0.33, <0.001) were significantly associated with reduced odds of good satisfaction with online learning during COVID-19.

Table 11: Univariable and multivariable logistic regression analysis results on perception towards online learning during the COVID-19 pandemic at Rusangu University

Variables	Univariable analysis			Multivariable analysis		
	cOR	CI (95%)	p-value	aOR	CI (95%)	p-value
Mode of study						
Full-time	Ref			Ref		
Block release	3.09	1.79, 5.32	< **0.001**	3.81	1.64, 8.84	**0.002**
Campus enrolled						
Monze	Ref			Ref		
Lusaka	1.17	0.59, 2.30	0.656	0.30	0.10, 0.91	**0.033**
Kitwe	1.32	0.76, 2.28	0.322	0.76	0.34, 1.67	0.490
Computer self-efficacy						
Good	Ref			Ref		
Poor	0.19	0.11, 0.33	< **0.001**	0.37	0.19, 0.74	**0.005**
Instructor's knowledge and characteristics						
Good	Ref			Ref		
Poor	0.18	0.10, 0.30	< **0.001**	0.28	0.14, 0.54	< **0.001**

Course management and co-ordination						
Good	Ref			Ref		
Poor	0.10	0.04, 0.23	< **0.001**	0.20	0.08, 0.54	**0.002**
Technological characteristics						
Good	Ref			Ref		
Poor	0.12	0.07, 0.21	< **0.001**	0.19	0.10, 0.37	< **0.001**

cOR= Crude Odds Ratio, aOR= adjusted Odds Ratio, CI= Confidence Interval

A multivariable analysis, table 11 shows that students in block release learning compared to those on full-time had 3.81 times higher odds of good perception towards online learning during COVID-19 (aOR = 3.81, 95% CI = 0.04, 0.99, p=0.049). Multivariable analysis further showed that learners at Lusaka versus Monze campus (aOR = 0.30, 95% CI = 0.10, 0.91, p=0.033), poor computer efficacy versus good (aOR = 0.37, 95% CI = 0.19, 0.74, p=0.005), poor instructor's knowledge and characteristics versus good (aOR = 0.28, 95% CI = 0.14, 0.54, p<0.001), poor course management and coordination versus good (aOR = 0.20, 95% CI = 0.08, 0.54, p=0.002) and poor technological characteristics versus good (aOR = 0.19, 95% CI = 0.10, 0.37, p<0.001) were significantly associated with lower odds of good perception towards online learning during COVID-19.

Discussion

Studies have shown that online learning boosts student engagement and satisfaction levels while reducing the number of dropouts from online courses. A balance between online and offline activities can also be achieved, according to some literary suggestions. A few things are crucial for the impact of the online learning environment. More research is needed to gain a clearer understanding of the factors that affect the e-learning experience in a more productive way, especially in light of the COVID19 pandemic. A lot of work has been done to determine the significance of the factors that increase the positive outcomes of online learning, but this work has not yet been concluded.

The discussion of the findings is based on data collected of a sample of two hundred and ninety-two (292) respondents. The respondents were nursing students at Rusangu University. The main objective was to determine the Satisfaction and Perceptions of Nursing students towards online learning at Rusangu University during the COVID 19 pandemic in Zambia at Kitwe, Lusaka and Monze campuses. Data was collected using an adapted self-administered questionnaire.

This chapter is arranged as follows; the demographic factors of the respondents, computer self-efficacy, technological factors, course management, student satisfaction, student perceptions and finally the relationships perceptions and satisfaction of students towards online learning in order to determine to what extent these factors having a bearing on students satisfaction and perceptions with online learning.

Demographic characteristics

Table 2 shows that about two-thirds, (65.4%) of respondents were aged between 20 and 29 years and over three quarters, (75.5%) were in their fourth year of study. Most respondents were on full-time mode of study (65.4%) and were pre-service students (64.7%). Majority of respondents, (79.5%) used data packages for internet connectivity and Zoom was the most common used online learning platform (73.3%). Over half, (56.2%) of the respondents were from Monze campus, over a quarter (28.4%) Kitwe campus and (15.4%) were from Lusaka campus.

This data shows that the sample was diverse and represented the characteristics of the population and hence the findings can be generalised as the true reflection of the student populace with online learning at Rusangu University. The following factors were determinants of satisfaction and perception of online learning among nursing students at Rusangu University weather positively or negatively and are discussed in details below.

Computer Self-efficacy

As shown in figure 5, most respondents, (71.2%) expressed good computer self-efficacy, whereas (28.8%e) expressed a poor computer self-efficacy. Consistent with recent studies (Bin et al., 2020; Chen et al., 2019; Scherer et al.,2019; Thongsri et al., 2019; Yalcın & Kutlu, 2019), the statistical analyses have verified that Rusangu University students' perceived usability and value of online learning platforms are directly influenced by their level of computer self-efficacy. This means that the perceived usability and effectiveness of online learning platforms among university students depend on their perceptions of their own abilities to use them for academic purposes (Jiang et al,2021). The benefits and advantages of online learning platforms are likely to be gradually accepted by university students as their digital self-efficacy improves. They will probably eventually find it simple to use online learning tools. The findings of this study is that computer self-efficacy influenced satisfaction with online learning as shown in table 9 with the P-value of 0.001 this precisely agrees with Jiang et al, 2021 in which it was established that students self -computer efficacy contributed to the technology acceptance model of learning among universities in China, similarly with the findings of Akimanimpaye and Fakude, 2015 whose study established that computer self-efficacy contributed to students attitude towards online learning at the University of Western Cape. Further the study determined that students who has poor computer self- efficacy had 0.12 odds of taking an online course compared to those with good computer self-efficacy had 0.39 odds of taking an online course, this shows that computer self-efficacy is a determinant of satisfaction with online learning at Rusangu University. Table 9 shows that computer self- efficacy contributed to the student's perception of online learning with the p- value of 0.001 this is agreement with Khaffaf 2013, who established that computer self-efficacy influenced that perception of online learning among nursing students at Mosul university. This study agrees with Opeyemi et al, 2019 and established that the those students who had poor computer self-efficacy had 0.19 odds perception of not taking an online course compared to those with good computer. Therefore, computer self-efficacy is a determinant of students perception with online learning.

Instructor's Knowledge and Characteristics

The facilitation skills and knowledge of the instructor have an impact on the success and learning outcomes of the students. The instructors who were providing online instruction during the pandemic had an added duty. They had to adapt to a shifting environment, honing their technical abilities in the process and helping students who were unfamiliar with the setting with their technical knowledge.

As can be observed from figure 6, over two-thirds of the respondents, (66.8%) perceived their instructors knowledge and characteristics as good while one-third (33.2%) expressed a poor perception of their instructor's knowledge and characteristics.

The findings demonstrate that, in the face of the epidemic, instructor facilitation and knowledge are significant determinants of students' learning outcomes and happiness with their online learning experiences. These findings are consistent with the finding of Hsu et al. 2019 in their study that found

that the instructor's knowledge is of great importance in the students learning when introducing a mode of learning. Instructor's knowledge of how to engage students with online platforms is of paramount importance to students satisfaction and perception with online learning. Table 9 shows that instructors knowledge to engage students online significantly contributes to students satisfaction and perception with the p- value of 0.001, this shows that there is a strong relationship between instructor's knowledge and student's perception and satisfaction with online learning hence rejecting the null hypothesis. This study also establishes in table 10 and table 11 that instructors who had poor knowledge had 0.21 odds of students not likely to take up their course to compared to those with good knowledge with engaging students with online learning. This is in agreement with willet et al, 2022 who established that students' perceived engagement with faculty and classmates predicted their perceived overall effectiveness of the online course. This aligns with the larger literature on best practices in online learning design. Extensive research prior to the pandemic has confirmed that the effectiveness of online learning is determined by a number of factors beyond the tools used, including students' interactions with the instructor and classmates. Online students may feel isolated due to reduced or lack of interaction , therefore in designing online learning experiences, it is important to remember that learning is a social process . Faculty's role is not only to transmit content but also to promote the different types of interactions that are an integral part of the online learning process (Zheng et al, 2021). The online teaching model in which faculty uploads materials online but teach it in the same way as in the physical classroom, without special effort to engage students, doesn't make the best use of the online format. Putting the "sage on the screen" during a live class meeting on a video conferencing system is not different from "sage on the stage" in the physical classroom both provide limited space for engagement. Such one way monologue devalues the potentials that online learning presents. In light of the critical role that social interaction plays in online learning, faculty are encouraged to use the interactive features of online learning platforms to provide clear channels for student-instructor and student interactions. In the open-ended comments, students highlighted several instructional strategies that they perceived to be helpful for learning. For live online classes, these included conducting breakout room activities, using the chat box to facilitate discussions (Zheng et al,2021).

Course management and co-ordination

According to Eom et al. (2017), evidence shows that the course format had an impact on both student satisfaction and learning outcomes. As shown in figure 7, (75.7%) of the respondents indicated that course management and co-ordination was poor, while (24.3%) reported that it was good. The findings indicate that student satisfaction and perceived learning outcomes are directly influenced by the course layout. The findings are in contrast to those of Eom et al. (2017) and support those of Gray and DiLoreto (2020). The online course structure during the COVID19 pandemic was not suited for online learning. The framework of the course was created for conventional, offline learning. To accommodate online learning, the course format had to be changed, which might have improved student learning outcomes. In an online setting, an instructor serves as both a designer and a facilitator (Martin, Wang, and Sadaf, 2018). Table 9 shows that good course management is a strong determinant of online satisfaction and perception with the p-value of 0.001 meaning if the online courses are well managed the likelihood of students enjoying the course is high compared to when the course is not well managed, the study found in table 10 and 11 respectively that poor course management had 0.12 odds of satisfaction and 0.10 of perception compared to those who said they were satisfied and had a positive perception, this aligns with

the findings of Zheng et al 2021, who started that a variety of interaction methods such can have students experience with online worthwhile or more interesting hence there is need combine both synchronous and asynchronous mode. For live online classes, these included conducting breakout room activities,
using the chat box to facilitate discussions, polling, and integrating gameplay with apps such as
Kahoot (a student response tool for all platforms, allows teachers to run game like quizzes and build presentations with embedded quizzes. For self-paced classes, students appreciated that faculty held virtual office hours or subsequent live online discussion sessions to reinforce understanding of the pre-assigned materials (Zheng et al, 2021).

Technological characteristics associated with online learning

A growing variety of technology platforms have become popular in recent years. adopted to aid learning in higher education (Habib et al., 2021, Mpungose, 2020, Su & Chen, 2020, and Yen Yunusa & Umar, 2021; et al., 2018). Learning management systems (LMSs) for example, one of the most significant and necessary. Figure 8 shows that just over half of the respondents, (51.7%) described technological characteristics associated with online learning as poor whereas, about half, (48.3%) described the technological characteristics as good. These findings are consistent with other studies which have observed done by Jiang et al, 2020 among university students in China that found that poor technology have an imparct on students perception and satisfaction of online learning ,conversely if the learning platforms and technology is good the perception and satisfaction of students is enhanced. Further -more the study establishes in table 9 that good technological characteristics such as the students ability to navigate the virtual learning environment has a great significant on the students satisfaction and perception with the p-value of 0.001 this aligns to the finding of Baber, 2020, who stated that there are numerous pros of online learning, especially in modern times, but conversely, there are some concerns that lead to the attrition of online learners and that eventually impede the progress of online courses and the solution can be found by examining students satisfaction and perception of online learning . The study also found in table 10 and 11 that students with poor technology had a 0.13 odds of satisfaction compared to those with good technological characteristics further those with poor technological characteristics had 0.12 odds of perception compared to those with good technological characteristics.

Factors associated with satisfaction and perception of online learning during the COVID-19 pandemic at Rusangu University.

Table 9 shows that satisfaction with online learning during COVID-19 was significantly influenced by mode of study (p=0.005), level of training (p=0.005), computer self-efficacy (p<0.001), instructor's knowledge and characteristics (p<0.001), course management and co-ordination (p<0.001) and technological characteristics (p<0.001).

These findings are consistent with the study done by Elshami et al, 2021 who stated that Student satisfaction has a significant impact on the results of online courses, and it is related to a number of elements, including content, user interface, learning community, and learning performance.

Conversely on the aspect of satisfaction the study found that the students were not satisfied with online learning as shown in figure 10, 51% (n=149) of the respondents were poorly satisfied with online learning during the COVID-19 pandemic while 49% (n=143) expressed satisfaction, these findings are consistent with the findings in study done in United Arab Emirite which stated that Overall satisfaction

correlated with technology satisfaction, and the most common source of dissatisfaction was related to the instructor's accessibility and availability. The sudden shift to online delivery of the curriculum due to COVID-19, in which there was insufficient time for preparation, as well as the stressful working conditions of the pandemic itself, could be blamed for decreased satisfaction (Elshami et al,2021).

Even with the best-designed online course, many authors have claimed that technical issues might make learning ineffective. The same authors also claimed that aspects of technology, such as how much technical help they can count on and how user-friendly their courses' technological infrastructure is, may affect how satisfied students and teachers are with online education (Jiang et al,2020).

Table 9 further shows that mode of study ($p<0.001$), level of training ($p<0.001$), computer self-efficacy ($p<0.001$), instructor's knowledge and characteristics ($p<0.001$), course management and co-ordination ($p<0.001$) and technological characteristics ($p<0.001$) were significantly associated with perception towards online learning during the COVID-19 pandemic..

These findings were consistent with study in South Korea by Hansnan Baber, 2020 that stated "The students perceive interaction, motivation, course content, and the role of instructor to be key determinants of the positive learning outcome. The positive learning outcome also has an impact on student satisfaction, therefore, the higher the perceived learning outcome in online learning, the higher satisfaction of students amid the pandemic".

Study Limitation

There may have been individual differences between students in the online and the face-to face cohorts, such as motivation, learning style, and prior knowledge, that could have impacted the observed outcomes. Additionally, even though course content and assessment methods were largely the same in 2019 and 2020, changes in other aspects of the course could have impacted students' course performance. Some faculty may have been more compassionate with grading (e.g., more flexible with assignment deadlines) in summer quarter 2020 given the hardship students experienced during the pandemic. On the other hand, remote proctoring in summer quarter 2020 may have heightened some students' exam anxiety knowing that they were being monitored through a webcam. The existence and magnitude of effect of these factors needs to be further investigated. This present study only examined the correlation between

students' perception and satisfaction with online learning and their determinants . Other factors that might impact their perception and satisfaction of online format need to be further researched in future studies. Another future direction is to examine how students' perceived online engagement correlates with their actual course performance. This could not be done because the data collected for the present study was anonymous, therefore cannot match students' perceived online engagement data with their course grades to run this additional analysis.

Recommendations

From the findings of the study, if the online learning program is to be improved and meet the students learning needs since online learning is one of the technological advancement in Nursing education and indeed education in general. It is important for the University to consider the following recommendations.

1. The course structure of online courses during the pandemic COVID19 was not designed for online learning. The course structure was design for normal, offline learning. The course structure had to be

modified to fit the needs of online learning, which may have enhanced the student learning outcome. Therefore the University should design course materials that meet the need for online learning as shown in results that course structure was poor

2. The university should offer orientation to both faculty and students on the use of online platforms such as moodle which can be used for both synchronous and asynchronous modes and other platforms which are used for online learning.
3. The quality of online learning is also influenced by the robustness of learning platforms, the university should invest in technology and good internet access as this support online learning for both students and faculty without interruption. Studies done in the developed world have also shown that good learning platforms have been recognized as irreplaceable emergency educational tools in the transition to online learning during the COVID-19 pandemic (Zhu & Peng, 2020).
4. The university to orient faculty on online class handling, preparations of online assessment tools, submission of assignments, marking and grading of assessments and tests.
5. The study has revealed that computer self-efficacy is an influential factor of satisfaction that cannot be ignored. Therefore, University students should gradually strengthen their basic computer competence in different ways so as to enhance their computer self-efficacy. The university should enter into memorandum of understanding with companies that provide computers at affordable prices so that students can acquire these gadgets for their learning.
6. The University to consider offering same courses on blended learning mode so as to sensitize the students to begin adapting to online learning than switching to online learning abruptly.

Conclusion

Based on the results obtained nursing students perception and satisfaction had generally favorable towards online learning during the COVID-19 pandemic and that their perceived engagement with faculty, computer self-efficacy, course coordination and technological characteristics predicted their perception and satisfaction of the online learning. Most notably, this demonstrated that online learning during the pandemic could achieve similar or better learning outcomes than face-to-face learning before the pandemic. Findings of the study could contribute significantly to the literature on online learning during the COVID-19 pandemic in health sciences education. The results could also inform future online learning design as we re-envision the future of online learning.

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