▪ *Basic Research*

Nursing Students' Satisfaction with E-Learning Concerning Students' Learning Style Preference during COVID-19 Pandemic

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Abstract

Introduction: The coronavirus pandemic has impacted human life and medical education. With the spread of COVID-19 worldwide, many countries declared e-learning education as an alternative method to ensure students continue learning. Being aware of students learning styles can help them find the appropriate ways to learn and benefit from these styles in their future professional journeys. **Objective:** The study aimed to assess nursing students' satisfaction with e-learning concerning their learning style during the COVID-19 Pandemic. **Method:** A cross-sectional descriptive design was adopted. The study was conducted at Modern University for Technology and Information, Faculty of Nursing, Egypt. The sample size was 279 students. A self-administered questionnaire was used, including; demographic data, E-learning student satisfaction, and VARK Standard Learning Style Questionnaire version 8.01. **Results:** It revealed that 64.2% of them were male, 66.3% of their age group was 22≤ 27 years old, and 85.7% used smartphones as preferred devices for e-learning. There was a significant association between students' learning styles and their level of satisfaction at $p < 0.05$. There was a highly statistically significant association between the studied students' age and learning styles, where $\chi^2 = 453.9$ at $p < 0.001$. Also, there was a statistically significant association between students' registered level and preferred learning styles, where $\chi^2 = 85.3$ at $p < 0.05$. **Conclusion:** most of the participated students were satisfied with e-learning classes and had a unimodal learning style preference, followed by those who had multimodal learning styles. In addition, more than one-third of them prefer the unimodal and multimodal style in the responses to the VARK learning inventory, including Aural, read/write, and kinesthetic. **Recommendations:** the research finding helps nursing educators utilize the appropriate teaching methods and strategies to enhance students' learning efficiency, satisfaction, and achievement according to their learning style. Considering students' learning styles during the e-learning classes, including watching videos, will enhance the students' learning achievements. Teaching materials applied during e-learning should include activities that promote students' motivation, perception, satisfaction, and accomplishments.

Keywords: Students, satisfaction, E-learning, Preference, COVID-19.

Introduction/ Background

The coronavirus pandemic has impacted human life and medical education (Agarwal & Kaushik, 2020). With the spread of COVID-19 across the world, many countries in Africa, Asia, Europe, the Middle East, North America, and South America have announced and implemented school and university closures. In this situation, adopting new teaching methods and learning to various degrees is essential (Nasiri, Gharekhani, & Ghasempour, 2016). Since the early spring of 2020, most universities have been experiencing a massive transfer from traditional face-to-face class education to online education (UNESCO, 2020; Bao, 2020). COVID-19 forced a different lifestyle, and students faced new changes such as dormitory and border closure, travel restrictions, and quarantine; moreover, such a unique experience affected the students' mental health as well as their motivation to attend online classes (Zhu and Liu 2020; Bedewy, 2021).

UNESCO 2020 has declared that the nationwide affected over 91% of the world's student population. The Egyptian ministry of higher education (MOHE) 2020 announced the closure of all educational institutions on March 14, 2020, as a preventive measure and decided to implement distance learning and use diverse modes of assessment as e-Learning was implemented as the alternative method of education and learning. Both Ministries of Education and Higher Education suggested "suspending classes without suspending learning," and 27 million students were switched to different methods and modes of learning, including distant learning, using the schools and universities' portals for online classes (Bedewy, 2021).

Moving from conventional education to e-learning was rapid and forced various challenges. The closure of public and private universities affected the lives and attendance of approximately 2 million active students at these universities in Egypt. It includes limited technical resources, the availability of e-learning materials, internet speed, students' financial status, mental health during the Pandemic, and students' readiness for such a change (Toquero, 2020).

The phenomenon of e-learning as a learning environment supported by Web technologies has become increasingly present in education and training scenarios (Punie and Cabrera, 2005). Zhu, McKnight, and Edwards (2007) described online learning as any formal educational process where the instruction occurs when the learner and the instructor are not in the same place. In addition, internet technology provides a communication link between the teachers and students. The successful learning process depends mainly on the learner, and learning styles have been widely believed to benefit both teachers and students. Being aware of students' styles can help them find appropriate ways to learn and affect their future professional journeys. In addition, the teacher can realize the abilities, existing knowledge, readiness, interests, and diligence of each learner (Hallin et al., 2015; Khongpit, Sintanakul, and Nomphonkarng, 2018). According to 'Sarun,' the learning style is defined as "the

method in which learners perceive, process, interpret, organize and think about information" (Khanal, Shah, & Koirala, 2014).

The learning style can be divided into two categories: unimodal and multimodal. Unimodal learners have only one dominant learning preference and can be classified into four styles, Visual (V), Aural (A), Reader/Writer (R/W), and Kinaesthetic (K). Visual learners prefer to observe the practice of others and use visual resources like pictures, videos & flow charts to perceive information. Learners enjoy attending tutorials and sessions, listening to tape recorders, talking about problems, and exchanging ideas with classmates to acquire knowledge. R/W learners like to acquire and integrate information by reading textbooks and writing down the essential details. Finally, K learners prefer to learn information through practice and self-experience. The "multimodal learners" have a balanced set of learning preferences, including the bi-modal, tri-modal, and quadri-modal (Allen, Swidler & Keiser, 2013).

The educational background is one of the most critical factors that influencs the learning style preference of nursing students. Zhu et al. (2018) conducted a cross-sectional survey to assess the differences in learning style preferences among bachelor's degree and associate degree nursing students in China. They found both differences and similarities between the learning style preferences of bachelor's degree and associate degree nursing students. Ghaderizefreh & Hoover (2018) conducted a cross-sectional study to assess student satisfaction with e-learning in a blended course. This study indicated that students had a high level of understandability and illustration in the class, which related to greater enjoyment and lower levels of anger, anxiety, and boredom. In addition, it led to increase student satisfaction and enjoyment of the e-learning experience (Ghaderizefreh & Hoover, 2018).

Significance of the study

The learning process is an interactive activity between students and teachers within a learning environment. These challenges require shifting from the traditional teacher-centered approach to the newer learner-centered approach (Ahmad, Shaharim, and Abdullah, 2017; McLean, and Gibbs, 2009). Therefore, a study needs to be conducted to assess and explore the nursing students' satisfaction with e-learning concerning their learning style during the COVID-19 Pandemic.

Objective

This study aimed to assess nursing students' satisfaction with E-learning concerning student learning style during the COVID-19 Pandemic.

Methods

Research design

A cross-sectional descriptive design was adopted

Research Questions

1. What is the preferred learning style among nursing students?
2. What is the satisfaction level of nursing students with E-learning during the COVID-19 Pandemic?
3. Is there a relationship between the student's learning style and their level of satisfaction with E-learning?
4. Is there any association between selected demographic data and students' satisfaction level with E-learning?

Setting

the study was conducted at Modern University for Technology and Information (MTI) Faculty of Nursing, Egypt.

Sample

Students of the Nursing College, BSN program (1015 students) fall semester (the academic year 2020-21) were recruited.

Inclusion Criteria

Agree to participate in the study and sign the consent form.
Student Joined in 100% of online education courses during the COVID-19 Pandemic.

Sample size

The researchers took a representative cross-sectional stratified sample from BSN nursing programs using the Raosoft sample size calculation software to calculate the proportional sample size (Sample Size Calculator by Roasoft, Inc,2014). The accepted margin of error was 5%, the response distribution was 50%, the confidence level was 95%, and the population size was 1015 students in the fall semester of 2020-2021. The sample size was calculated using the following equation: "n= [DEFF*Np(1-p)]/[(d2/Z21-a/*(-1) +P*(1-p)]". The sample size was 279 students.

Sampling method

A non-probability stratified sampling (voluntary response) technique was applied (Murairwa 2015).

Tools

It was a self-administered questionnaire consisting of three parts. **Part I:** Demographic data of the nursing students as study year, sex, age, and estimated number of hours using the internet for education were developed by the researchers and included in the questionnaire. **Part II:** E-learning student satisfaction; this tool's items were adapted and modified from Distance Education Learning Environments Survey (DELES) and The Online Learning Environment Survey (OLLES) by (Walker and Fraser, 2005; Clayton, 2007), respectively, to measure students satisfaction level of their online education during COVID-19 Pandemic. The modified scale comprises five subscales instead of 6 in the original surveys. The questions in the subscales were modified as follows: instructor support (5 items), order and organization (4 items), material environment (6 items), reflective thinking (8 items), and

student autonomy   (4 items). Students were requested to rate the items using a five-point Likert scale ranging from 5 = always, 4 = often, 3 = sometimes, 2 = seldom, and 1 = never (Walker and Fraser, 2005). The total score was categorized as unsatisfied (27-62.9), to some extend (63 -98.9), and satisfied (99-135)—the total score value ranged between 27 to 135.

Part III: the Visual, Aural, Read-write, and Kinesthetic (VARK) standard learning Style Questionnaire version 8.01 was used. It is an adopted tool developed by Fleming & Christchurch (1992) (Fleming, 2001). The permission for using the validated tool was received from the author via e-mail. It assesses the learning style preference and consists of 16 multiple choice questions with four options. All the options correspond to the four sensory modalities measured Visual, Aural/ auditory, Read/Write, and Kinesthetic (VARK). The researcher instructed the student to select one or more options. Interpretation of VARK learning style preferences is single modal: having one of the V, A, R, or K preferences; Multimodal: having more than one preference, Bimodal: having two preferences; tri-modal: having three preferences and Quad-modal: having all the four preferences.

Validity of part II:

A preliminary phase was conducted to assess the content validity of part II before its use. Initially, five experts (Ph.D. Faculty) in nursing education were asked to determine which items in the questionnaires were relevant and could be correctly measured. An appraisal sheet was provided to each expert to rate each item in the questionnaire for relevance, clarity, and essentiality. The procedure was carried out using a Likert scale with 4-point to investigate relevancy and 3-point to test clarity and essentiality. Additional comments and recommendations by the experts were written on the hard copy of the attached questionnaire.

The content validity index was calculated using the Item–Content Validity Index (I-CVI) and Scale-level CVI (S-CVI). The Item-Content Validity Index (I-CVI) values ranged from 0.8 to 1.00, which means all items were relevant. S-CVI / Ave and S-CVI / UA calculated the Score-Content Validity Index (S-CVI). S-CVI/ Ave was calculated, and the value was 0.93, which means excellent content validity. And S-CVI/ UA was calculated, and it was 0.7. Kappa was measured to determine the degree of agreement beyond chance as is calculated using the following formula: K= (I-CVI –Pc) / (1-Pc) Where Pc = [N! /A!(N-A)!]* 0.5N (Pc: probability of chance). In this formula, Pc= the probability of chance agreement; N = the number of experts; and A = number of experts that agree the item is relevant. It was 0.762 for nine items and 1 for eighteen items. The clarity was calculated, and the average scores for individual items 2.8 to 3 were considered very clear. The overall clarity score of the 27 questions was 2.5. Content validity ratio (CVR), which measures the essentiality of an item, was calculated, and it varies between 1 and -1, and a higher score indicated greater agreement among the experts. Fifteen items had a CVR of 1.00, and twelve items had a score of 0.6. All recommended modifications were done according to the

experts' feedback.

Pilot study & reliability

Pretesting of the questionnaire on 10 participants was carried out to test the feasibility and applicability of part II and the internal consistency using Cronbach's alpha. The reliability was excellent reliability which was 0.98, and the Cronbach's alpha on the VARK questionnaire was (0.86).

Ethical considerations

The approval for using the VARK questionnaire got from the author. The approval was obtained from the faculty Research Ethical Committee (REC) of the University with the following approval numbers11 to conduct the study. In addition, an e-mail was sent to each prospective respondent with the details of the study provided. Each student was required to read and sign an online consent before starting the formal survey. The consent form also explained their voluntary participation, declaration of confidentiality, and anonymity.

Data collection procedure

After the ethical approval for the study was secured, the questionnaire, including parts I and II, was sent via Google forms to the students through their university e-mail. Those who accepted to participate signed a consent form (A click on the 'acceptance' button) before gaining link access to the questionnaire. An online survey via a google form link was used for the part I and part II data collection. Regarding part III (VARK), the researchers contacted the students and asked them to fill the questionnaire with paper copies (hard copy). The students could complete the questionnaire in approximately 20-30 minutes within two weeks. Only students who provided online consent took part in the study. Data collection started when the survey was sent to the participants' e-mail on November 17, 2020, until the acceptance of responses was closed on January 31, 2021.

Data analysis

Statistical package for social science (SPSS) version 25 was used for data entry and analysis. Data was presented in frequency, percentages, mean and standard deviation. The total score of the e-learning students' satisfaction instrument and each of the five subscales were calculated for learning style. Based on the normality test of the collected data, the appropriate probability chi-square (χ^2) test was used for the association.

The VARK (Part III) analysis included the Visual, Aural, Read-write, and Kinesthetic scores. These total scores were sent to the author to find out the VARK preference of each participant.

Results:

Table (1) reveals the distribution of the studied students according to their demographic characteristics. According to their gender, 64.2% were male, 66.3% were 22≤ 27 years old, and their mean age was 22.16±2.2. In addition, 28.3 % of studied students were registered in BSN year 4, and 26.2 % were registered in BSN year 1.

Table 1: Distribution of the studied students according to their demographic characteristics (n=279).

Statement	No	%
Gender		
▪ Male	179	64.2
▪ Female	100	35.8
Age	85	30.5
▪ 17≤22	185	66.3
▪ 22≤27	9	3.2
▪ 27-33		
Mean ±SD	22.16±2.2	
Program & level		
▪ BSN -year 1	73	26.2
▪ BSN- year 2	66	23.7
▪ BSN- year 3	61	21.9
▪ BSN-year 4	79	28.3

Table (2) shows the distribution of the studied students according to their usage of e-learning during the COVID-19 Pandemic. Regarding their estimated number of hours spent per week using the internet for education, 56.6% of them used the internet 1≤ 20 hrs., with a mean hour weekly of 22.39±2.6. Regarding their preferred device for e-learning, 85.7% of them responded with "yes" to using smartphones as selected devices. 93.9 % and 94.6 % responded with "no" to using desktops and tablets, respectively. In addition, regarding the online class format and the Nature of the course materials, 91.8% of the studied students responded with "yes" to receiving reading materials, and 65.9% of them received video content. Moreover, 55.5 %, 53.8%, and 53.0% responded with "no" to live online with PowerPoint, video content supplemented with PowerPoint, and recorded class with PowerPoint as course materials, respectively.

Table 2: Distribution of the studied students according to their usage of e-learning during the COVID-19 Pandemic (n=279).

Statement	No	%
Estimated number of hours spent per week using the internet for education.		
▪ 1≤20 hrs.	158	56.6
▪ 20≤40 hrs.	73	26.2
▪ 40-60 hrs.	25	9.0
▪ More than 60	23	8.2
Mean ±SD		**22.39±2.6**
Preferred device for e-learning		
- Desktop		
▪ **Yes**	17	6.1
▪ **No**	262	93.9
- Laptop		
▪ **Yes**	102	36.6
▪ **No**	177	63.4
- Smartphone		
▪ **Yes**	239	85.7
▪ **No**	40	14.3
- Tablet		
▪ **Yes**	15	5.4
▪ **No**	264	94.6
Online class format& Nature of course material		
- Live online with PowerPoint		
▪ **Yes**	124	44.4
▪ **No**	155	55.5
- Recorded class with PowerPoint		
▪ **Yes**	131	47.0
▪ **No**	148	53.0
- Sending reading material		
▪ **Yes**	256	91.8
▪ **No**	23	8.2
- Video content		
▪ **Yes**	184	65.9
▪ **No**	95	34.1
- Video content supplement with PowerPoint		
▪ **Yes**	129	46.2
▪ **No**	150	53.8

Table (3) represents e-learning students' satisfaction mean scores. According to their e-learning level of satisfaction and shows that 92.5% of them were satisfied, and only 4.7% were unsatisfied. As their mean score was 103.9±23.6 for total e-learning students' satisfaction Also, the subscale of e-learning students' satisfaction means was 19.04±4.7,

15.38±3.8, 22.95±54, 30.89±7.4, and 15.64±3.9 for instructor support, order & organization, material environment, reflective thinking, and student autonomy, respectively.

Table 3: Mean scores of E-learning student's satisfaction subscale and level of students' satisfaction (n=279).

Variables	Mean ± SD	
E-learning student's satisfaction questionnaire (minimum-maximum)		
Instructor Support (5 - 25)	19.04±4.7	
Order & organization (4 – 20)	15.38±3.8	
Material environment (6 – 30)	22.95±5.4	
Reflective thinking (8 – 40)	30.89±7.4	
Student autonomy (4 – 20)	15.64±3.9	
Total E-learning student's satisfaction questionnaire (27 -135)	103.9±23.6	
Student's Satisfaction level	**No**	**%**
Unsatisfied	13	4.7
To some extent	8	2.9
Satisfied	258	92.5

Regarding frequency distribution of learning styles among studied students, **Figure (1)** demonstrates that 37.6% preferred unimodal learning style, and 30.5% preferred multimodal learning style.
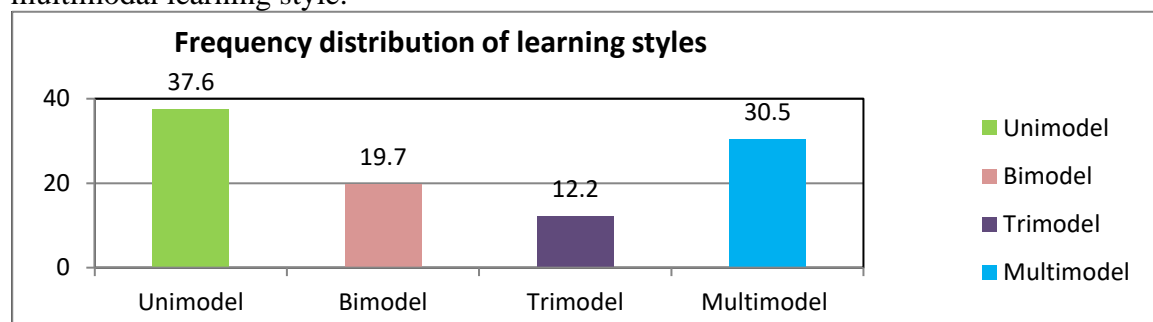

Figure 1: Frequency distribution of learning styles among studied students (n=279).

Among unimodal learning styles, **Figure (2)** indicates that 35.2% preferred the aural learning style, and only 10.5 % preferred the visual learning style.
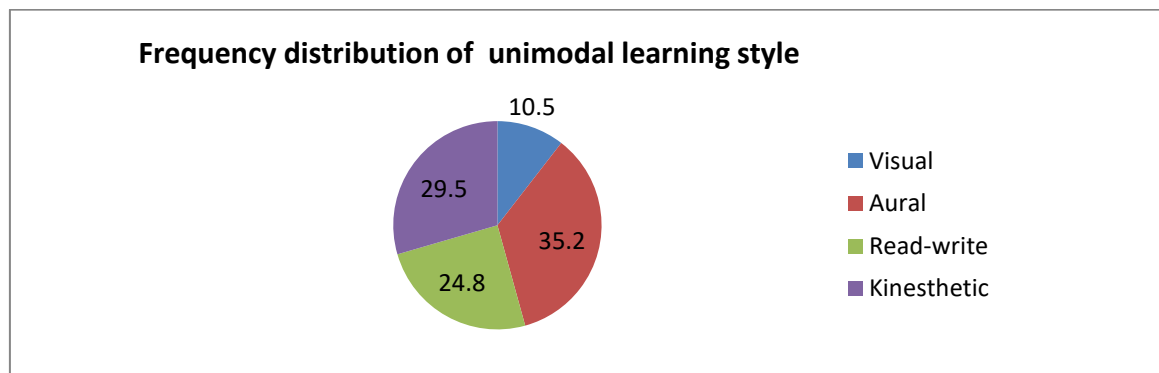
Figure 2: Frequency distribution of unimodal learning style among studied students (n=105).

Figure (3) illustrates the frequency distribution of studied students who preferred bimodal learning styles. It indicates that 36.4% preferred the aural kinesthetic (AK) learning style, 23.6% preferred the aural read/write (AR) learning style, and only 5.5% of them preferred the visual read/write (VR) learning style.
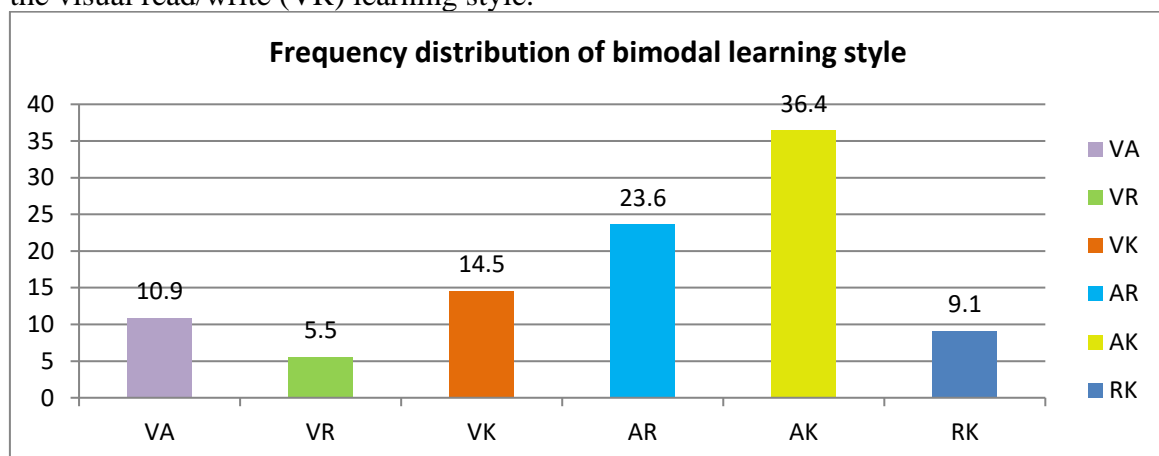

Figure 3: Frequency distribution of bimodal learning style among studied students (n=55)

Figure (4) shows the frequency distribution of studied students who preferred trimodal learning styles and indicates that 47.1% preferred the aural read/write kinesthetic (ARK) learning style. Only 11.8 % preferred the visual read/write kinesthetic (VRK) learning style.
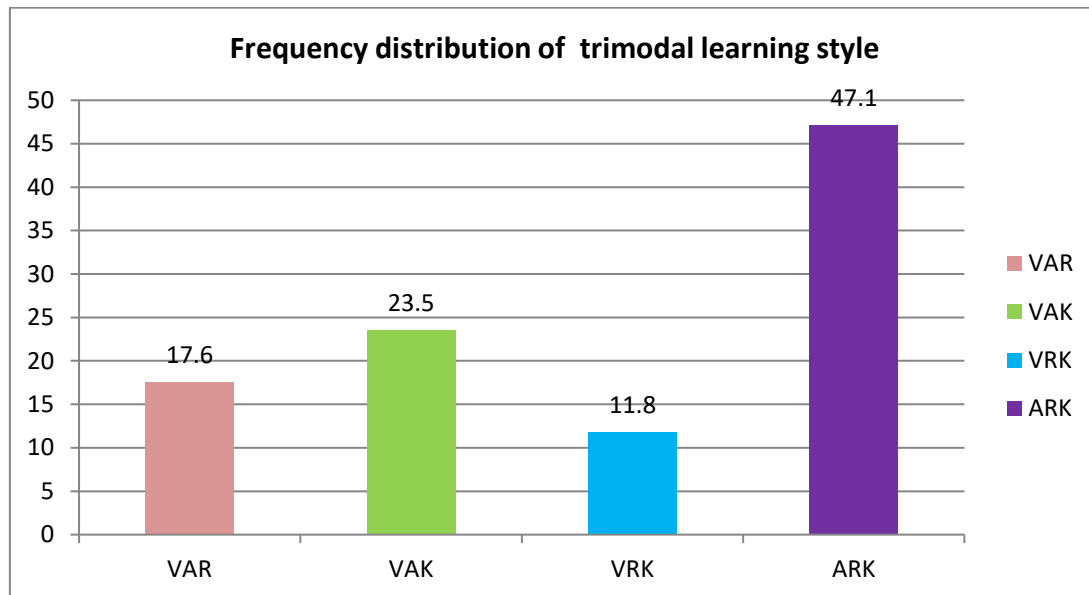
Figure 4: Frequency distribution of trimodal learning style among studied students (n=34)

In addition, **figure (5)** represents the frequency distribution of multimodal learning styles among studied students 64.7 % of them were VARK type two.
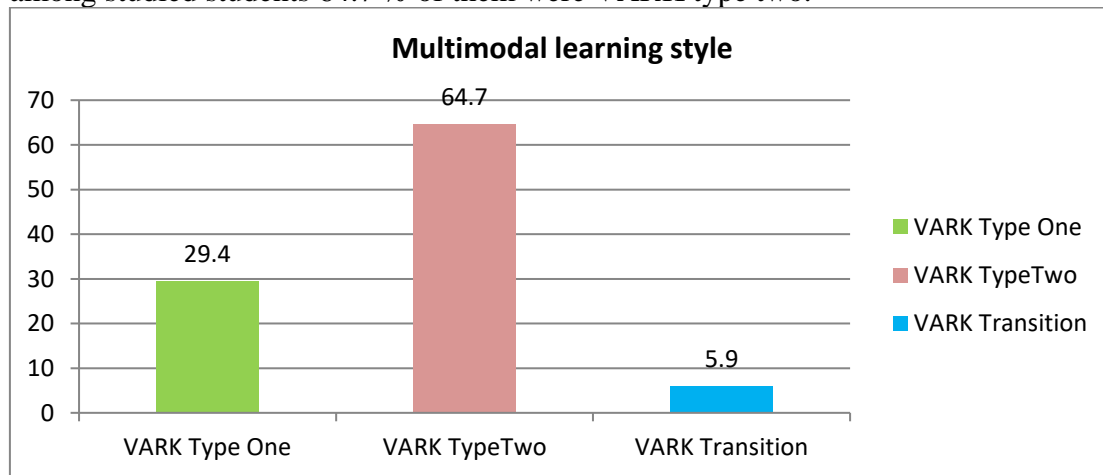

Figure 5: Frequency distribution of multimodality learning style among studied students (n=85)

Table (4) describes the association between the student's learning style and their level of satisfaction with e-learning. It shows a significant association between students' learning styles and their level of satisfaction, which $\chi^2 = 11.34$ at $p < 0.05$. Furthermore, 36.8 % and 31.8% of satisfied students with learning preferred unimodal and multimodal learning, respectively.

Table 4: Association between the student's learning style and their level of satisfaction with E-learning (n=279).

Variables	Learning Style Preferences				χ^2
	Unimodal Learning N (%)	bimodal learning N (%)	Trimodal learning style N (%)	multimodality learning style N (%)	
E-learning student's satisfaction ▪ Unsatisfied ▪ to some extend ▪ satisfied	6 (46.2)	0 (0.0)	4 (30.8)	3(23.0)	11.34*
	4 (50.0)	2(25.0)	2(25.0)	0 (0.0)	
	95 (36.8)	53 (20.6)	28(10.8)	82(31.8)	

(*) statistically significant at p<0.05 (**) highly statistically significant at p<0.001.

Table (5) shows the association between the demographic characteristics of the studied students and their learning styles and points out that there were highly statistically significant associations between the studied students' age and learning styles, where $\chi^2 = 453.9$ at $p < 0.001$. Also, there was a statistically significant association between students' registered level and preferred learning styles, where $\chi^2 = 85.3$ at $p < 0.05$**.**

Table 5: Association between demographic characteristics of the studied students and their learning style (n= 279).

Variables	Unimodal Style (n=105)	bimodal learning style(n=55)	Trimodal learning style (n= 34)	multimodality learning style (n=85)	χ^2
	N (%)	N (%)	N (%)	N (%)	
Gender Male	65 (36.3)	37 (20.7)	20 (11.2)	57 (31.8)	21.5
Female	40 (40.0)	18 (18.0)	14 (14.0)	28 (28.0)	
Age 17≤22	29 (34.1)	18 (21.2)	12 (14.1)	26 (30.5)	
22≤27	74 (40.0)	37 (20.0)	22 (11.9)	52 (28.1)	453.9**
27-33	2 (22.2)	0 (0.0)	0 (0.0)	7 (77.8)	
Study year SN -year 1	23 (31.5)	17 (23.2)	6 (8.2)	27 (37.1)	
BSN- year 2	28 (42.4)	14 (21.2)	6 (9.1)	18 (27.3)	
BSN- year 3	26 (42.6)	8 (13.1)	13 (21.3)	14 (23.0)	85.3*
BSN-year 4	28 (35.4)	16 (20.3)	9 (11.4)	26 (32.9)	

(*) statistically significant at p<0.05 (**) highly statistically significant at p<0.001.
Table (6) represents the association between the demographic characteristics of the studied students and their e-learning satisfaction. It reveals a statistically significant association between students' registered level and their satisfaction with e-learning during the COVID 19 pandemic, where χ^2 = 13.2 at p <0.05.

Table 6: Association between demographic characteristics of the studied students and their e-learning satisfaction (n= 279).

Variables	Unsatisfied (n=13)	To some extend satisfied (n=8)	Satisfied (n=258)	χ^2
	N (%)	N (%)	N (%)	
Gender Male	8 (4.5)	6 (3.3)	165 (92.2)	0.45
Female	5 (5.0)	2 (2.0)	93 (93.0)	
Age 17≤22	7 (8.2)	3 (3.5)	75 (88.3)	21.6
22≤27	6 (3.2)	4 (2.2)	175 (94.6)	
27-33	0 (0.0)	1 (11.1)	8 (88.9)	
Study year BSN -year 1	5 (6.8)	4 (5.5)	64 (87.7)	13.2*
BSN- year 2	2 (3.0)	2 (3.0)	62 (94.0)	
BSN- year 3	6 (9.8)	2 (3.3)	53 (86.9)	
BSN-year 4	0 (0.0)	0 (0.0)	79 (100.0)	

(*) statistically significant at p<0.05 (**) highly statistically significant at p<0.001.

Regarding the association between studied students' e-learning level of satisfaction and their estimated number of hours spent per week using the internet for education, preferred device Online class format, and Nature of the course material. **Table (7)** reveals statistically significant differences between the number of hours spent per week using the internet for education, tablets, and the level of student satisfaction with e-learning, where χ^2 = 125.6 and 8.72, respectively, at p<0.05. In addition, there were highly statistically significant differences between the use of smartphones and student satisfaction with e-learning during the COVID-19 Pandemic, where χ^2 = 18.36 at p<0.001.

Table 7: Association between studied students' e-learning level of satisfaction and their estimated number of hours spent per week using the internet for education, preferred device, Online class format, and Nature of the course material (n= 279).

Variables	Unsatisfied (n=13)	To some extend satisfied (n=8)	Satisfied (n=258)	χ^2
	N (%)	N (%)	N (%)	
Estimated number of hours spent per week using the internet for education.				
1 ≤ 20 hrs.				
20 ≤ 40 hrs.				
40- 60 hrs.	8 (5.1)	5 (3.2)	145 (91.7)	125.6*
> 6o hrs.	2 (2.7)	2 (2.7)	69 (94.5)	
Preferred device for e-Learning	1 (4.0)	1 (4.0)	23 (92.0)	
	2 (8.7)	0 (0.0)	21 (91.3)	
Desktop				
▪ Yes	12 (4.5)	8 (3.1)	242 (92.4)	
▪ No	1 (5.9)	0 (0.0)	16 (94.1)	0.582
Laptop				
▪ Yes	7 (3.9)	6 (3.4)	164 (92.7)	0.979
▪ No	6 (5.9)	2 (2.0)	94 (92.1)	
Smartphone				
▪ Yes	6 (2.6)	8 (3.3)	225 (94.1)	18.36**
▪ No	7 (17.5)	0 (0.0)	33 (82.5)	
Tablet				
▪ Yes	3 (20.0)	0 (0.0)	12 (80)	8.72*
▪ No	10 (3.8)	8 (3.2)	246 (93.2)	
Online class format& Nature of course material				
Live online with PowerPoint				
▪ Yes				
▪ No				
Recorded class with PowerPoint				
▪ Yes	6 (4.8)	3 (2.4)	115 (92.8)	
▪ No	7 (4.5)	5 (3.2)	143 (92.2)	0.17
Sending reading material				
▪ Yes	8 (6.1)	3 (2.3)	120 (91.6)	
▪ No	5 (3.4)	5 (3.4)	138 (93.2)	1.41
Video content				
▪ Yes	12 (4.7)	8 (3.1)	236 (92.2)	
▪ No	1 (4.3)	0 (0.0)	22 (95.7)	0.75
Video content supplement with PowerPoint				
▪ Yes	8 (4.3)	5 (2.7)	171 (93)	
▪ No	5 (5.3)	3 (3.1)	87 (91.6)	0.16
	7 (5.4)	2 (1.6)	120 (93.0)	
	6 (4.0)	6 (4.0)	138 (92.0)	1.76

(*) statistically significant at p<0.05 (**) highly statistically significant at p<0.001.

Table (8) investigates the association between studied students' learning style preferences and their estimated number of hours spent per week using the internet for education, preferred device, online class format, and course material. The table highlighted a statistically significant association between the number of hours spent per week using the internet for education and studied students' learning style preferences, where χ^2 =184.0 at p<0.05. Also, there were statistically significant differences between laptops and tablets as preferred devices for education and students' learning styles, where χ^2 = 17.5 and 10.3 at p <0.05, respectively. Regarding the relation between the Nature of course material and students' learning style, the table clarifies that there was a highly significant association between Sending reading material, video content, video content supplement with PowerPoint, and students' learning preferences, where χ^2 = 19.6, 12.4 and 14.1 at p<0.001. Furthermore, there was a significant association between using live online classes with PowerPoint and learning students' learning style preferences, where χ^2 = 10.3 at p<0.05.

Table 8: Association between studied students' learning style preferences and their estimated number of hours spent per week using the internet for education, preferred device, online class format, and Nature of course material. (n= 279).

Variables	Learning Style Preferences				χ^2
	Unimodal Style(n=105)	bimodal learning style(n=55)	Trimodal learning style (n= 34)	Multimodality learning style (n=85)	
	N (%)	N (%)	N (%)	N (%)	
Estimated number of hours spent per week using the internet for education. ▪ 1≤20 hrs. ▪ 20≤40 hrs. ▪ 40-60 hrs. ▪ More than 60	68 (43.0) 23 (31.5) 9 (36.0) 5 (21.7)	30 (19.1) 16 (22.0) 5 (20.0) 4 (17.4)	13 (8.2) 10 (13.7) 6 (24.0) 5 (21.7)	47 (29.7) 24 (32.8) 5 (20.0) 9 (39.1)	184.0*
Preferred device for e-learning Desktop ▪ **Yes** ▪ **No**	7 (41.1) 98 (37.4)	2 (11.8) 53 (20.2)	2 (11.8) 32 (12.2)	6 (35.3) 79 (30.2)	0.78
Laptop ▪ **Yes** ▪ **No**	33 (32.3) 72 (40.7)	16 (15.7) 39 (22.0)	7 (6.9) 27 (15.3)	46 (45.1) 39 (22.0)	17.5*

Table 8 Cont'd					
Smartphone					
▪ Yes	86 (36.0)	47 (19.7)	31 (13.0)	75 (31.3)	2.50
▪ No	19 (47.5)	8 (2.0)	3 (7.5)	10 (25.0)	
Tablet					
▪ Yes	3 (20.0)	2 (13.3)	1 (6.7)	9 (60.0)	6.57*
▪ No	102 (38.6)	53 (20.1)	33 (12.5)	76 (28.8)	
Nature, of course, material					
Live online with PowerPoint					
▪ Yes	34 (27.4)	29 (23.4)	19 (15.3)	42 (33.9)	
▪ No	71 (45.8)	26 (16.8)	15 (9.7)	43 (27.7)	10.3*
Recorded class with PowerPoint					
▪ Yes	48 (27.7)	21 (16.0)	14 (10.7)	48 (36.6)	5.31
▪ No	57 (38.5)	34 (23.0)	20 (13.5)	37 (25.0)	
Sending reading material					
▪ Yes	99 (38.7)	55 (21.5)	33 (12.9)	69 (26.9)	19.6**
▪ No	6 (26.1)	0 (0.0)	1 (4.3)	16 (69.6)	
Video content					
▪ Yes	66 (35.9)	29 (15.7)	21 (11.4)	68 (37.0)	12.4**
▪ No	39 (41.0)	26 (27.4)	13 (13.7)	17 (17.9)	
Video content supplement with PowerPoint					
▪ Yes	43 (33.3)	18 (13.9)	15 (11.6)	53 (41.1)	14.1**
▪ No	62(41.3)	37 (24.7)	19 (12.7)	32 (21.3)	

(*) statistically significant at p<0.05 (**) highly statistically significant at p<0.001.

Discussion

The unprecedented emergence of COVID-19 has disrupted nursing education, theoretical classroom instruction, and related learning experiences, affecting how future nurses are trained and educated (Puljak et al., 2020). However, nursing professional development practitioners are encouraged to consider incorporating preferred learning styles into professional development programs. This shift helps learners to identify individual learning style preferences, design educational initiatives to support various styles, and provide learning opportunities to match preferred learning styles (Mangold et al., 2018).

Significant findings related to the usage of studied students' e-learning during the COVID-19 Pandemic; more than half of nursing students used the internet $1 \leq 20$ hrs, with a mean hour weekly of 22.39 ± 2.6. Similar to results from Oducado & Soriano (2021), the results indicated that half of the participants used the internet for about 5 to 8 hours daily. The results suggest that the respondents felt that e-learning can solve many of the educational problems as it helps in saving their time and that e-learning improves their access to other learning material during the COVID-19 Pandemic.

Most of the studied students preferred using smartphones as selected devices in e-learning class; due to their flexibility and portability, they became a more popular e-learning gadget than lab top or personal computer (PC). Also, **Oducado & Soriano** (2021) mentioned that most respondents used mobile phones due to easy access to the internet during the COVID-19 Pandemic. However, in one of the studies conducted by **Shete et al.** (2020) in India, they found that mobile phones and laptops were approximately fifty-fifty.

In addition, the current findings show that most of the nursing students preferred to receive reading materials, and more than half of them received video content. At the same time, they did not choose the live online with PowerPoint, video content supplemented with PowerPoint, and recorded class with PowerPoint as course materials. This finding shows the respondents felt that e-learning does not help achieve better results, increase learner's engagement in learning, improve teacher and student interaction, and enhance understanding of the concepts. The finding is consistent with the findings of many other studies (**Abbasi et al., 2020; Koirala et al., 2020; Bali and Liu, 2018**). Yangoz (2017) conducted a study to assess the use of e-learning programs in nursing education, and he found that students were more satisfied with the lecture method than with e-learning. However, Mamattah (2016) found that students preferred the combination (hybrid) of face-to-face Learning and online Learning. They found that the students are more acquainted with the traditional learning activities, and since nursing involves skill attainment tasks through practical, the objectives are not met through virtual learning.

Significant findings related to e-learning students' satisfaction and learning style preference (VARK) were total e-learning students' satisfaction and 23.7 ± 11.6. Also, the subscale of e-learning students' satisfaction was the material, environment, reflective thinking, and student autonomy; it has been shown that the active learning style in the information. This finding is emphasized by **Bandura's learning theory**, which states that individual self-

efficacy is a crucial factor in any behavior that the individual decides to engage with it. Therefore, it is necessary to establish a relationship between self-efficacy and performance (Bandura, 1986).

In the current study, regarding learning style preference of nursing students, they have a kinesthetic, visual learning style, aural learning style, while 5.69±3.5 and read/write, respectively. These results are owing to nursing students as learners prefer to learn by practicing through hands-on experiences, and they like to be provided with demonstrations and descriptions. According to **Almigbal** (2015) and **Aldosari et al.** (2018), Students have unique learning styles; however, they may differ in different situations. Learners who prefer different learning styles have different motivations for learning and vary in confidence and reading speed. The findings of this study pointed out that studied students were satisfied with their e-learning. In the same line study done by **Hong et al.** (2016); on the other hand, a study done by **Oducado and Soriano (2021)** found that the nursing students generally expressed negative and ambivalent attitudes toward e-learning.

Regarding the preferred learning styles among studied students, there was an equal percentage of preferred learning styles between unimodal and multimodal learning styles. One-third of students selected the aural learning style among unimodal learning styles. However, they preferred the aural kinesthetic (AK) and aural read/write (AR) learning styles among the bimodal learning styles. Moreover, the trimodal learning styles preferred the aural read kinesthetic (ARK) learning style. This results because each learner has distinct and consistent preferred methods of organizing, perceiving, and learning.

On the other hand, the multimodality learning style among studied students was VARK type two. They spend longer collecting data from each modality, and, as a result, they often have a more comprehensive understanding. **Mangold et al. (2018)** studied the learning style preferences of practicing nurses; had Important findings related to the visual-verbal scales; most satisfied respondents had a more potent visual learning choice than neutral respondents. **Alqurashi (2016)** showed that most dental students preferred sensing learning more than visual learning. Most students were well balanced between active-reflective and global sequential learning dimensions. **Idrizi et al. (2018)** stated that learning styles in education should be considered in teaching delivery preferences and examining the ability to explain learning outcomes in online environments. In general, there is a relation between students' satisfaction and learning style with e-Learning.

Strengths and Limitations

The current study is considered the first to assess nursing students' satisfaction with e-learning mode concerning the student learning style preferences during the COVID-19 Pandemic. However, there is a limitation that the study's design was a cross-sectional study during the pandemic period, which means we could not generalize the findings and develop inferences.

Implication for Practice

The evidence from the results of this study has recommended appropriate teaching methods to enhance students' learning efficiency, satisfaction, and achievement according to their learning style. In relation to further research, there is a need to assess the relationship between e-learning classes and academic performance. Considering students' learning styles during the e-learning classes, including watching videos, will enhance the students' learning achievements. Teaching materials applied during e-learning should include activities to promote students' motivation, perception, satisfaction, and accomplishments.

Conclusion

From the present study's findings, it can be concluded that most of the participated students were satisfied with e-learning classes and had a unimodal learning style preference, followed by those who had multimodal learning styles. In addition, more than one-third of them prefer the unimodal and multimodal style in the responses to the VARK learning inventory, including Aural, read/write, and kinesthetic. Thus, the research finding helps the nursing educators to utilize the appropriate teaching methods and strategies to meet the nursing students' needs from different educational backgrounds.

References

Abbasi, S., Ayoob, T., Malik, A., & Memon, S. I. (2020). Perceptions of students regarding E-learning during Covid-19 at a private medical college. *Pakistan Journal of Medical Sciences*, *36*(COVID19-S4), S57.

Ahmad CN, Shaharim SA, Abdullah MF. (2017).Teacher-student interactions, learning commitment, learning environment, and their relationship with student learning comfort. *J Turkish Sci Educ.*; 14(1):5772.

Aldosari, M. A., Aljabaa, A. H., Al-Sehaibany, F. S., & Albarakati, S. F. (2018). Learning style preferences of dental students at a single institution in Riyadh, Saudi Arabia, evaluated using the VARK questionnaire. *Advances in medical education and practice*, *9*, 179.

Allen S., Swidler M., Keiser J. (2013) Aligning pedagogy of american business language with marketing students' preferred learning styles. *Procedia Soc Behav Sci.* ; 70 (25):1254 -64.

Almigbal, T. H. (2015). Relationship between the learning style preferences of medical students and academic achievement. *Saudi medical journal*, *36*(3), 349.

Alqurashi, E. (2016). Self-efficacy in online learning environments: A literature review. *Contemporary Issues in Education Research (CIER)*, *9*(1), 45-52.

Agarwal, S., & Kaushik, J. S. (2020). Student's perception of online Learning during COVID pandemic. Indian Journal of Pediatrics, 1. https://doi.org/10.1007/s12098-020-03327-7.

Bali, S., & Liu, M. C. (2018, November). Students' perceptions toward online learning and face-to-face

learning courses. In *Journal of Physics: Conference Series* (Vol. 1108, No. 1, p. 012094). IOP Publishing.

Bandura, A. (1986). Social foundations of thought and action: A SOCIAL COGNITIVE THEORY. Englewood Cliffs, NJ7 Prentice-Hall.

Bao, W. (2020). COVID-19 and online teaching in higher education: A case study of Peking University. Human Behavior and Emerging Technologies, 2 (2), 113–115.

Bedewy, D. (2021). The impact of COVID-19 on higher education in Egypt: A study of students' perspectives of distance learning. *Psychology and Education Journal*, *58*(5), 1430-1438.

Clayton J. F., (2007). Development and validation of an instrument for assessing online learning environments in tertiary education: the online learning environment survey (OLLES). Published Doctor of Science Education of Curtin University of Technology.

EPM. Egyptian statistics on COVID-19. https://www.care.gov.eg/EgyptCare/Index.aspx. [Cited 2020 May 3, 2020].

Fleming, N. D., & Mills, C. (1992). Not another inventory, rather a catalyst for reflection. *To improve the academy*, *11*(1), 137-155. Fleming, N. (2001). How do I learn best?: A students guide to improved Learning: VARK-visual, aural, read/write, kinaesthetic. Supplementary web site.

Ghaderizefreh, S., & Hoover, M. L. (2018). Student Satisfaction with Online Learning in a Blended Course. International Journal of Digital Society (IJDS), Volume 9, Issue 3.

Hallin K, Haggstrom M, Backstrom B, Kristiansen LP. (2015) Correlations Between Clinical Judgement and Learning Style Preferences of Nursing Students in the Simulation Room. *Glob J Health Sci.*; 8 (6):1–13.

Hong, J. C., Hwang, M. Y., Szeto, E., Tsai, C. R., Kuo, Y. C., & Hsu, W. Y. (2016). Internet cognitive failure relevant to self-efficacy, learning interest, and satisfaction with social media learning. *Computers in Human Behavior*, *55*, 214-222.

Idrizi, E., & Filiposka, S. (2018). VARK learning styles and online education: Case Study. *learning*, 5-6. https://www.researchgate.net/publication/327869001

Khanal L., Shah S., Koirala S., (2014), Exploration of preferred learning styles in medical education using VARK modal. *Russian Open Medical Journal*, *3*(3), 305.

Laxman, K., Sandip, S., & Sarun, K. (2014). Exploration of preferred learning styles in medical education using VARK modal. *Russian Open Medical Journal*, *3*(3), 305.

Koirala, D., Silwal, M., Gurung, S., Bhattarai, M., & KC, V. K. (2020). Perception towards online classes during COVID-19 among nursing students of a medical college of Kaski District, Nepal. *Journal of Biomedical Research & Environmental Sciences*, *1*(6), 249-55. DOI: 10.37871/jbres1151.

Khongpit, V., Sintanakul, K., & Nomphonkrang, T. (2018). The VARK learning style of the university student in computer course. *International Journal of Learning and Teaching,* 4(2), 102-06. DOI: 10.18178/ijlt.4.2.102-106

Mangold, K. L., Kunze, K. L., Quinonez, M. M., Taylor, L. M., & Tenison, A. J. (2018). Learning style preferences of practicing nurses. *Journal for nurses in professional development*, *34*(4), 212-218. DOI: 10.1097/NND.0000000000000462.

McLean M, Gibbs TJ. (2009). Learner-centered medical education: improved learning or increased stress? *Educ Health.;* 22 (3): 287. Available from: https://www.educationforhealth.net/text.asp?2009/22/3/287/101523

Mamattah RS. (2016). Students' perceptions of e-learning. Independent thesis Advanced level (degree of Master). https://www.diva-portal.org/smash/record.jsf?pid=diva2%3A925978&dswid=-2277 cited on November 27, 21.

Murairwa, S. (2015). Voluntary sampling design. *International Journal of Advanced Research in Management and Social Sciences*, *4*(2), 185-200.

Nasiri Z, Gharekhani S, Ghasempour M. (2016). Relationship between learning style and academics status of Babel Dental Students. *Electron Physician*. May; 8 (5): 2340–5. DOI: 10.19082/2345

Oducado, R. M. F., & Soriano, G. P. (2021). Shifting the Education Paradigm amid the COVID-19 Pandemic: Nursing Students' Attitude to E-Learning. *Africa Journal of Nursing and Midwifery*, *23*(1),1-14. https://hdl.handle.net/10520/ejc-ajnm_v23_n1_a12

Puljak, L., Čivljak, M., Haramina, A., Mališa, S., Čavić, D., Klinec, D., ... & Ivanišević, K. (2020). Attitudes and concerns of undergraduate university health sciences students in Croatia regarding complete switch to e-learning during COVID-19 Pandemic: a survey. *BMC medical education*, *20*(1), 1-11. https://doi.org/10.1186/s12909-020-02343-7

Punie, Y; Cabrera, M.(2005) The Future of ICT and Learning in the Knowledge Society - Report on a Joint DG JRC-DG EAC Workshop. Institute for Prospective Technological Studies. *European Comission Joint Research Center*. Seville.

Shete, A. N., Garkal, K. D., & Somwanshi, N. (2020) Perceptions of MBBS Students Regarding E-learning during COVID-19 Lockdown. *International Journal of Health Sciences and Research.* 10(9): 319-322.

Toquero, C. M. (2020). Challenges and opportunities for higher education amid the COVID-19 Pandemic: The Philippine context. Pedagogical Research, 5(4), em0063. https://doi.org/10.29333/pr/7947.

UNESCO. (2020, Match 13). COVID-19 educational disruption and response. Retrieved from https://en.unesco.org/themes/education-emergencies/coronavirus-school-closures. Accessed at March; 24, 2020.

UNESCO (2020). COVID-19 Educational Disruption and Response. Retrieved from https://en.unesco.org/covid19/educationresponse. Accessed April 15 2020.

WALKER S. L., & FRASER B. J., (2005). Development and validation of an instrument for assessing distance education learning environments in higher education: the distance education learning environments survey (DELES). Learning Environments Research. 8: 289–308 DOI: https://doi.org/10.1007/s10984-005-1568-3

Yangoz, S. T. (2017). The use of e-learning program in nursing education. *New Trends and Issues Proceedings on Humanities and Social Sciences*, *4*(2), 230-236. https://doi.org/10.18844/prosoc.v4i2.2752

Zhu, E., McKnight, R., & Edwards, N. (2007). Principles of online design. Retrieved January 15, 2007, from Florida Gulf Coast University, Faculty of Development and Support: http://www.fgcu.edu/onlinedesign/

Zhu, H. R., Zeng, H., Zhang, H., Zhang, H. Y., Wan, F. J., Guo, H. H., & Zhang, C. H. (2018). The preferred learning styles utilizing VARK among nursing students with bachelor degrees and associate degrees in China. *Acta Paulista de Enfermagem*, 31(2), 162-169. https://doi.org/10.1590/1982-0194201800024

Zhu, X. & Liu, J. (2020). Education in and After Covid-19: Immediate Responses and Long-Term Visions. Postdigital Science and Education. 2, 695-99. https://doi.org/10.1007/s42438-020-00126-3.

الملخص العربي

لقد اثر انتشار فيرس كوفيد -19 على جميع مناحى الحياة بما فى ذلك تعليم العلوم الطبية على مستوى العالم. مما جعل العديد من البلدان تستخدم التعليم الإلكترونى كوسيلة بديلة مما يسمح للطلاب استمرارية التعلم خاصة التعليم المتعلق بالجانب الصحى ويساعد على إدراك أنماط التعلم لدى الطلاب في إيجاد الطرق المناسبة للتعلم والإستفادة من هذه الأساليب فى المستقبل اذا تم تطبيقها فى تعلمهم خلال رحلاتهم المهنية.

الهدف:. هدفت الدراسة إلى تقييم رضا طلاب التمريض عن التعلم الإلكتروني فيما يتعلق بأسلوب تعلمهم أثناء جائحة كوفيد-19.

طريقة البحث :تم الإعتماد على التصميم الوصفي المقطعي. لجمع البيانات وأجريت الدراسة في كلية التمريض بالجامعة الحديثة للتكنولوجيا والمعلومات (MTI) و كان حجم العينة 279 طالبً وطالبة.

أدوات البحث: استخدم استبيانات يتم ملئها بواسطة الطالب نفسه ويتألف من ثلاثة أجزاء: البيانات الديموغرافية ، ورضا الطلاب عن طريق التعلم الإلكتروني ، واستبيان نمط التعلم القياسي VARK ,الإصدار 8.01 .

النتائج: أظهرت النتائج أن 64.2٪ منهم ذكور ، 66.3٪ منهم كانت أعمارهم بين 22واقل من27 سنة ، 56.6٪ منهم يقضون اقل من20 ساعة أسبوعياً في التعليم بمتوسط ساعة أسبوعيا 22.39 ± 2.6 ، و 85.7٪ منهم يستخدمون الهواتف الذكية كأجهزة مفضلة للتعلم الإلكتروني, كما كان هناك ارتباط كبير بين أنماط التعلم لدى الطلاب ومستوى رضاهم عند p <0.05. كان هناك ارتباط ذو دلالة إحصائية عالية بين عمر الطلاب الدارسين وأنماط التعلم ، حيث 453.9 = χ2 عند P <0.001. كما توجد علاقة ذات دلالة إحصائية بين المستوى المسجل لدى الطلاب وأنماط التعلم المفضلة ، حيث χ2= 85.3.

الخلاصة: طبقا لى نتائج هذه الدراسة اتضح أن غالبية الطلاب المشاركين كانوا راضين عن فصول التعلم الالكترونى وكانت الطريقة المفضلة لأكثر قليلا من ثلث مجموع الطلاب المشاركين فى الدراسة هى الطريقة الأحادية النمط.

التوصيات : توصي الدراسة باستخدام طرق تدريس مناسبة و التى تعزز من كفاءة تعلم الطلاب و تحصيلهم التعليمي. مع مراعاة طريقة التعلم المفضلة لديهم فى فصول التعلم الإلكتروني ، مثل مقاطع الفيديو التعليمية، إلتى تحسن من تحصيل الطلاب. كما يوصى أن تكون المواد التعليمية المطبقة خلال فصول التعلم الإلكتروني ذات نشاط إبداعي وخلاق يحفز إدراكهم و يرفع من رضاهم وتحصيلهم الدراسى .و كما يوصى بعمل بعض الدراسات والتى تقيم العلاقة بين فصول التعلم الإلكتروني والآداء الأكاديمي.