

The Impact of Online Learning In The Internal Medicine Rotation Among Medical Clerks During The Covid 19 Pandemic and Lockdown



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ABSTRACT

Background: The impact of online learning during internal medicine rotation among graduating medical students was evaluated during COVID 19 pandemic.

Objectives: The study aimed to gauge acceptability of a self-directed learning, recognize frustrations, identify coping mechanisms, assess rate of learning, evaluate study habits and appraise level of readiness in handling actual patients later in practice among graduating medical clerks.

Methodology: An ambispective cohort design study involving both retrospective and prospective follow-up of respondents belonging to the medical clerkship program of the University of Santo Tomas, Faculty of Medicine and Surgery (UST-FMS). The retrospective component involved blended learners with clinical experience (Group 1). The prospective component included online learner with clinical experience (Group 2) and online learner without clinical experience.

Results: Group 1 showed that they favor pure traditional learning over pure online learning in contrast to the other 2 groups which rated acceptability of online learning high. All groups had high levels of frustration with their inability to

experience actual patient exposure, had moderate to high level of coping mechanisms, and rated high the traditional learning and blended learning methodologies. In contrary, all groups rated low to moderate contributions of online learning to their learning. Group 3 had a significantly higher mean overall readiness score compared to the two other groups.

Conclusion: The study showed the different levels of impact of on line learning to the different population of medical clerks in terms of its acceptability as an alternative way of learning. Actual patient exposure is of main concern while different coping mechanisms maximize knowledge acquisition.

Key words: On line learning, self directed, COVID 19 pandemic, Medical clerks

INTRODUCTION

The rotation in Internal Medicine for graduating medical clerks is the most anticipated part of their learning journey prior to their graduation. This rite of passage draws ambivalent feelings as they foresee the hardship yet rewarding clinical experience. Learning and teaching activities consist of actual patient exposure in the ambulatory care services, various specialty wards, in intensive care and emergency units of the University of Santo Tomas Hospital (USTH). They have the mandatory 24 hour duty every 3 days as they rotate to the

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different subspecialties for at least a week. They are under the direct supervision of the Consultants of the Department of Medicine both from UST-FMS and UST Hospital assisted by the Medical Residents and Fellow-in-Training of different subspecialties. For more face to face patient encounters, the medical clerks are likewise deployed to two government hospitals, namely San Lazaro Hospital and Jose Reyes Memorial Hospital. In between their numerous ward works and patient care, they are required to have case presentations of actual patients seen and attend conferences in between schedules with consultants as moderator/facilitators.

Unfortunately, the coronavirus disease (COVID-19) pandemic unfolded that generated havoc worldwide leading to the closure of schools and universities.[1-3] The Philippines, not being spared by this tragedy, an enhanced community quarantine (ECQ) or lockdown was enforced by the government closing all the schools and universities as well. Thus, the medical clerks were not allowed to report to the hospital for their ward duties and activities for safety reasons. Instead, the traditional learning methods of actual patient encounters in the hospital and face to face learning/teaching activities were put into a halt. This situation led to a 360 degree turn in the manner by which teaching and learning activities were delivered to the medical clerks, from face to face instruction to online learning. Under time constraint, realignment of the course plan, rethinking teaching and learning activities, and review of assessment methods were done immediately and realigned to suit online learning. The UST-FMS is blessed with the infrastructure (the e learning platform Blackboard) that was secured by the University of Santo Tomas years prior to the COVID pandemic though the UST Educational Technology Center (UST EdTech) that tirelessly provides technical support whenever needed, to which the entire faculty and students are grateful of. The maximal use of the said virtual platform was encouraged and prioritized by the UST-FMS's Dean, Assistant Dean and Clinical Program Head.

However, the anxiety of both the medical clerks and the consultants were evident from the very start with different possible sources. Internet connectivity created major problems in the actualization of online learning during the lockdown. For the facilitators, it is more of digital literacy and the familiarity with the features of the virtual platform that worried them.

For the medical clerks, their frustration of not having actual patient encounters prevailed as well as the manner by which their final oral examination exercise (oral revalida) will be carried out, that is, via online. The impact of this online learning to these graduating medical clerks would be difficult to determine unless a formal investigation is carried out.

REVIEW OF LITERATURE

“Electronic (e) or online learning can be defined as the use of electronic technology and media to deliver, support and enhance both learning and teaching and involves communication between learners and teachers utilizing online content”. [4]

There has never been a greater opportune time to reinforce and realize the important position of online learning in medical education in this trying times. Learning delivery through greater accessibility during the lockdown was seen by all sectors as a palpable advantage of online learning over traditional methods. Accessibility refers to the user's ability to find what is needed, when it is needed. [5] The availability of digital learning objects at all times is crucial to one's learning. Digital learning objects pertains to any learning materials compiled together in a meaningful way geared towards a specific learning outcome.[6,7] Case-based learning, simulations, modules, or complete courses are examples of these digital learning objects that are organized to meet the requisites of a specified curriculum. The manner in which the educational content is delivered can either be synchronous or asynchronous. Synchronous delivery is real-time and facilitator-led wherein all students collaborate at the same time in a virtual platform. These includes webinars, internet chat forums, and instant messaging. Asynchronous delivery is not in real time wherein the instructor and students communicate thru emails, blogs and discussion boards. Thus, in this case, the content, sequence and pacing of one's learning are all self-directed.[5]

In online learning, unlike a plenary lecture given to different classes, has an advantage of standardization of content. Since on line learning is student-centered, it is flexible and addresses the different learning style idiosyncrasies of every students, thus it is personalized. This is in contrast to a traditional style of learning where all students, regardless of their different learning capacity and

learning style, is subjected to a one size fit all system of teaching. Medical students engaged in online learning have been assessed to have better retention rates and content utilization resulting to better knowledge, skills, and attitudes as an outcome.[8]

However, the success of online learning in creating an impact to the medical students will be realized only upon properly addressing the key barriers to its implementation. These includes time constraints, poor digital literacy, inadequate infrastructure, weak institutional strategies and support and negative attitudes of all stakeholders.[9]

Digital literacy has been defined as the ability to use digital technology, communication tools or networks to locate, evaluate, use and create information.[10] The digital literacy of all the stakeholders must be taken into account since this key factor determines the success in the deployment of online learning materials, learning and teaching activities, assessment, and updating.

Understanding the elemental attributes of the current generation of medical trainees as well as that of the generations involved in its planning, implementation, and assessment is of utmost importance. Medical students with different learning styles will only be benefited by learning and teaching methods when it conforms to their own study habits, ideas, and preferences. [11,12]

The present generation of medical students belongs to Generation Y/Millennial or "Civic" generation (age 20s; born 1982–2002). Their parents usually are hovering, protective and fostering. This generation has a variety of learning styles: such as visual, auditory, and kinesthetic. Adapted to learn in small groups in contrast to studying alone nor belong to large groups to study such as in lecture halls.[13] They are usually optimistic, aggressive, quick learners as a result of mistakes from playing video games (video game effect), attentive if the format is on their own terms, and comfortable with multitasking.[14–16] This Generation Y is surrounded by technology and their digital literacy is superior. Online textbooks and journals are virtually omnipresent for this generation. They use chatting and blogging as well as other forms of self-directed, self-paced, online learning due to its convenience and efficiency.[17–19]

Silent or "adaptive/veteran" generation (age 70–80s; born 1922–42) are the Deans, Chairmen, Presidents, senior professors. They prefer to learn

using textbooks and printed materials. They adapt a formal teaching style with authority emphasized and formal attire expected. They use lectures, handouts, written tests. They have strong emphasis on physical exam and face-to-face interactions.[13] Their digital literacy is often times limited to the most basic and usually requires shadowing from Generation X to survive.

Baby Boomers or "Idealist" generation (age 50–60s; born 1943–60) are the present Professors, Associate professors, Curriculum committee heads, Chairs and Supervisors of medical schools. Their learning styles are very much different from the Generation Y medical students of today. They do more self-study, use reference books and prefer face-to-face interactions with medical students by having bedside teachings and interactive lectures. [13] Their digital literacy is somewhat borderline but usually are required to undergo formal training or workshops to keep abreast with the medical students and colleagues.

Generation X or "Reactive" generation (age 30–40s; born 1961–81) comprises the post graduate trainees such as fellows and residents or early mid-career faculty. They participate in study groups and review courses; and make use of interactive didactic strategies and web-based resources for independent learning.[13] Their digital literacy is proficient and willing to explore possibilities by having updated gadgets and applications.

Thus, aiming on Generation Y is important because the future depends on providing them the right education. Although intra- and intergenerational teaching occurs in both directions in medical education, the majority of intergenerational teaching comes from the more senior generations, Silent Generation (Veterans), Baby Boomers (Idealist), and Generation X (Realist) teaching Generation Y.[13]

Likewise, inadequate infrastructure, weak institutional strategies and support were seen to be the major problems that affected the adaptation of online learning in majority of medical schools. Obvious reason is lack of budget allocated for establishing an effective and efficient virtual platform. This problem must be given an utmost priority by the institution. Another aspect is addressing internet connectivity problems. This can be lessened by utilizing low bandwidth-requiring activities such as asynchronous activities like email exchanges, discussion boards and blogs. High bandwidth-

requiring activities should be reserved for prioritized learning and teaching activities which requires real-time interactions between the facilitator and the students at the same time (synchronous). Examples of which are teleconferences, webinars, case-based discussions or facilitation of evaluation exercises.

Thus, the impact of online learning in this generation of medical students with regards to their readiness to be a physician in the future depends on many factors mentioned above considering also the effect of the worldwide CORONA virus pandemic in its success. Whether the pandemic has pushed the adaption of online learning to the forefront of medical education as the only choice and be able concretize the claims of the effectiveness of online learning in terms of achieving all the expected outcomes for a future physician remains to be seen.

Intensive search for some studies in the local setting was done but there was none. Likewise, recent international publications reviewed did not address the objectives that this study wants to know among the graduating medical students such as acceptability of a self-directed learning to them and the frustrations as they use it, the coping mechanisms they adapted during the pandemic time, their rate of learning retention and utilization as well as their quality of study time/study habits and most importantly their level of readiness in handling actual patients later in practice. [1–3]. Thus, this study would aim to address and document the impact of the COVID 19 pandemic and lockdown on their learning experience and the future it holds on them.

RESEARCH QUESTION

This study is interested to know the impact of online learning as an alternative method of learning from the point of view of the end user, the 4th year medical clerks during COVID 19 pandemic and lockdown.

Having experienced online learning instead of the traditional face to face learning, an assessment of the following outcomes would show the impact of this virtual learning method to these graduating medical student with regards to their better assessment of oneself in terms of knowledge, skills and attitude as a future physician, their capacity to utilize self-directed learning to their own advantage, demonstration of the maturity level amidst the current situation, seeing oneself not only as a user but an advocate, and their ability to adapt to present situation as well as

generate ideas creating solutions to the barriers of learning.

RESEARCH OBJECTIVES

GENERAL OBJECTIVE:

1. Understand the impact of online learning as an alternative method of learning from the point of view of the end user, the 4th year medical clerks

SPECIFIC OBJECTIVES:

Using the online learning

Gauge acceptability of a self-directed learning

2. Recognize frustrations on its use
3. Identify coping mechanisms employed
4. Assess the rate of learning retention and utilization
5. Evaluate the quality of study time/study habits
6. Appraise oneself in terms of level of readiness in handling actual patients later in practice

THEORETICAL FRAMEWORK

There are many adult learning theories that can be used as a foundation for this research study. One of this is self-directed learning (SDL) that is rooted in Malcolm Knowles' theory of adult learning. In 1997, D.R. Garrison added elements of self-management to the model. SDL is a process where students take the initiative to determine their own learning needs, formulate learning outcomes, ascertain resources, pace content, volume, implementation of learning, and have self-assessments in which online learning or electronic learning belongs. SDL would still need the help of mentors, viable infrastructure, and peers to be effective. It requires the learner select learnings seems appropriate for them and thus exercises control over all learning decisions.[20]

Wedemeyer's Theory of Independent Study is another theory applicable in online learning. Charles Wedemeyer in 1981 rooted his theory in the ideal of learner autonomy. It is characterized by the capacity of the student to have independent study wherein the teacher is not present on his side, the student is situated conveniently in his own place, the teaching and learning processes are done asynchronously

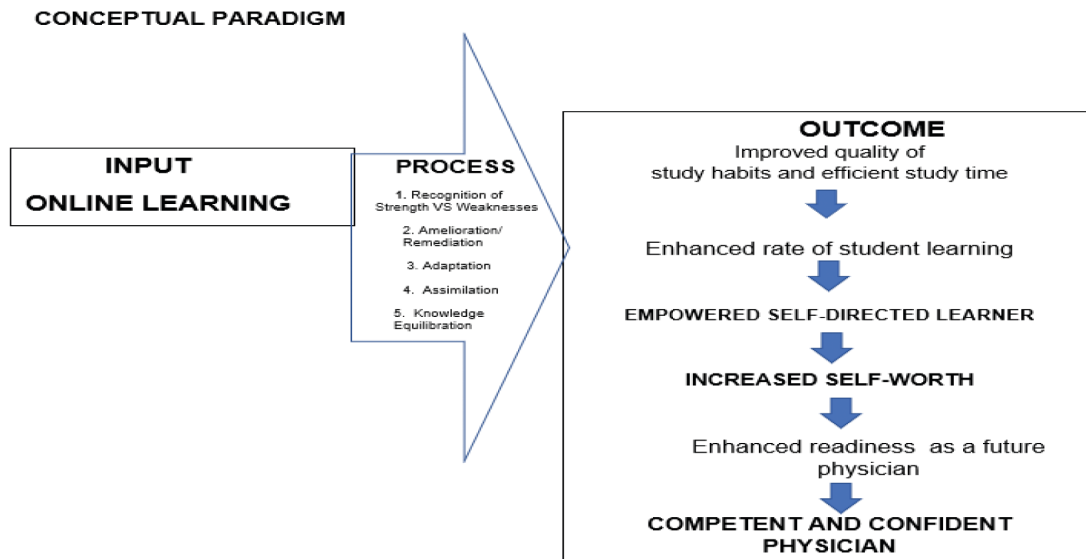


FIGURE 1: Conceptual Paradigm in using online learning.

such as through writings or other medium, learnings are generated directly by the students from their own activities, manner of learning is self-paced and student are directly responsible for their own progress and evaluation [21]

The experiential learning theory by David Kolb in the 1970s rooted from the studies of John Dewey, Kurt Lewin, and Jean Piaget may not directly support online learning in its pure form. Experiential learning needs a hands-on engagement that places the students at the center of the learning experience. Though active participation is important, but learning can only be realized once the student will reflect upon what was actively experienced. In medical education, online learning can address such experiential learnings by simulation activities especially development of skills needed prior to handling actual patients in the future. Simulation activities are the preferred way of teaching critical and sensitive cases that can compromise the patients’ lives if ever done in actual setting. Like what pilots and astronauts do prior to deployment. Through online learning simulation videos or virtual interactive workshop, these activities fulfill the four elements needed for Kolb’s experiential learning theory, that is, concrete experience, reflective observation., abstract conceptualization of the experience, and the use of knowledge gained from experience once actual patient is seen in the future (active experimentation).[22–24]

The medical student who uses this self-directed learning tool will undergo a certain process of identifying its strength and weaknesses compared to

traditional face to face learning method. After which, these factors will be subjected to an amelioration/ remediation process to overcome its weaknesses and maximize its strength resulting to as adaptation. There will be eventual assimilation of such to his own system leading to an empowered self-directed learner who will ultimately become a competent and confident physician in the future.

RESEARCH SETTING

The study is limited to evaluating the impact of online learning as an alternative method of learning from the graduating 4th year medical clerks having their 2 month rotation in the Department of Medicine, UST-FMS specifically during the COVID 19 pandemic and lockdown period.

Even with an already established virtual infrastructure provided by the University, the e learning platform Blackboard, one of the possible impediments in this study is the different level of digital literacy of both the facilitators and the students that will definitely affect the impact of this self-directed learning method. The teaching culture, attitude of both parties and other barriers to its implementation such as internet connectivity and time element will somewhat affect the outcome of this study.

In order to reduce the effect of such factors, shadowing with the facilitators who are not yet well oriented with the Blackboard virtual platform was done by colleagues whose digital literacy is proficient until such a time that the former can access,

create sessions and conduct classes on their own. Commendable efforts of digital-proficient colleagues were exhibited by creating step by step mini-video tutorials on this matter.

Researchers' relationship to the setting

The author of this research is an Associate Professor of the UST-FMS. The author recognizes the anxiety of the graduating medical clerks in terms of not having actual patient exposure since they were not allowed to report to the hospital for safety purposes. Moreover, they have been used to the traditional face to face teaching and learning methods. The exclusive use of on line method of learning during this inevitable global situation has brought apprehension to both the medical clerks and the facilitators themselves.

Collaborative processes and consents

Permission for the study was secured from the Institutional Research Ethics Board, UST-FMS and the students through consent forms.

RESEARCH APPROACH

Study Design

This study employed an observational, ambispective cohort design. According to Rothman, Greenland, & Lash (2008), [25, 26] an ambispective cohort design is a type of analytic, observational study which involves both retrospective and prospective follow-up of respondent, from the point of exposure until the development or change in an outcome or outcomes. The retrospective component of the study will involve the follow-up of fourth year medical clerks who were affected by the community quarantine or lockdown from March 15, 2020 to April 15, 2020, thus had a at least a month exposure to direct patient care during internal medicine rotation (graduating Groups 9 and 10 Batch 2020), until the development of specific learning outcomes. In contrast, the prospective component will entail the observation and follow-up of fourth year medical clerks who will be affected by the quarantine with no exposure to direct patient care during internal medicine rotation (graduating Groups 11 and 12 Batch 2020) and those groups who will just start their Internal Medicine rotation (incoming Groups 1

and 2 Batch 2021) until the assessment of learning outcomes after two months.

Study Population

The study population by convenience sampling involved graduating 4th year medical students (medical clerks) of UST-FMS, graduating Groups 9, 10, 11, and 12 of Batch 2020 and incoming Groups 1 and 2 of Batch 2021 rotating in the Department of Medicine. This population was chosen because these are the rotating groups directly affected by the lockdown due to the COVID 19 pandemic that prevented them to report to the hospital. Of the 2 months required rotation in Internal Medicine, Groups 9 and 10 of Batch 2020 were able to experience patient encounters in their hospital exposures for a month prior to the lockdown and the last month spent on online learning. Graduating Groups 11 and 12 of Batch 2020, and incoming Groups 1 and 2 of Batch 2021 who spent their Internal Medicine rotation on pure online learning. However, the graduating four groups of medical clerks (9,10,11, and 12) were able to have actual patient encounters and hospital exposure prior to the lockdown during their rotation in other specialties. The incoming Groups 1 and 2 of Batch 2020-2021 were included because of the fact that they were most affected by the lockdown. Groups 1 and 2 had last 2 months of their 3rd year academic activities via online learning and promoted to 4th year level thereafter. After which, Group 1 and 2 started their clerkship program in Internal Medicine without any prior significant hospital exposure yet compared to the graduating four groups of medical clerks belong to Batch 2019- 2020.

Each group of clerks is composed of at least 60 students. Thus, a total of 180 respondents were included and grouped into 3 according to the number of months of actual hospital exposure and duration of on line learning exposure during the lockdown. Sample size computation for Analysis of Covariance (ANCOVA) was conducted using GPower version 3.1.9.4. The study of Pei & Wu (2019) was used to estimate a partial η^2 of 0.119 which can be converted as effect size f of 0.368. [27] With a computed partial η^2 of 0.368, a power of at least 80%, a significance level of 5% (two-tailed), a total of three independent groups, and at least 1 covariate, a sample size of 75 respondents is

necessary. This sample size is evenly divided into the number of groups; hence, at least 25 respondents are necessary in each group.

Research Instrument

A structured survey form using a Likert scale was used. This survey form is comprised of 76 items divided into 6 main sections. Each section addresses the specific objectives of the research study. Ten items for section 1, 12 items for section 2, 11 items for section 3, 10 items for section 4, 14 items section 5 and 19 items for section 6. This has to be accomplished by the medical clerks after their 2 months rotation in Internal Medicine. The point system in the Likert scale is assigned as follows: 1.0 point if entirely (not agree/helpful/acceptable); 2 points if somewhat (not agree/helpful/acceptable); 3 points if neutral ; 4 points if somewhat (agree/helpful/acceptable); and 5 points if entirely (agree/helpful/acceptable). This survey has been evaluated and validated by distinguished faculties of the UST-FMS (2) and UST Graduate School (1).

METHODOLOGY

There were 3 groups in the study. Depending on the methods of learning the groups were exposed to during the lockdown while on Internal Medicine rotation. Group 1 included Groups 9 and 10 of Batch 2020 who had one-month traditional learning method and one month on line learning as well as additional clinical exposure of at least 10 months from previous specialty rotations and will be labeled blended learning with clinical experience. Group 2 included Groups 11 and 12 of Batch 2020 with 2 months of online learning method as well as additional clinical exposure of at least 10 months from previous specialty rotations and will be labeled online learning with clinical experience. Group 3 included Groups 1 and 2 of Batch 2021 with pure online learning method but no significant hospital exposure before and will be labeled online learning without clinical experience. All the groups, upon completion of their Internal Medicine rotation, were asked to accomplish an exit survey form assessing the impact of online learning on them with regards to the different objectives of this research paper during the lockdown while on Internal medicine rotation. See Figure 2.

STATISTICAL ANALYSIS

Statistical analyses used STATA Statistical Software, Version 13, College Station, TX: StataCorp LP. A *p*-value of 0.05 was considered statistically significant. Descriptive statistics included mean and standard deviation for continuous variables; median and interquartile range for ordinal data; and, frequency and percentage for nominal variables. Inferential statistics will focus Multivariate Analysis of Covariance (MANCOVA). MANCOVA is a multivariate analytic technique which compares multiple, continuous-level dependent variables between 2 or more groups while controlling for a quantitative confounder or covariate.[28] Cognizant that the study involved six (6) learning outcomes and compare three (3) independent groups, MANCOVA is the best statistical approach to avoid inflating Type I error (false positive results) while controlling for statistically significant confounders such as age and gender. [28]

RESULTS

Table 1 illustrates the demographic profile and the internet stability of the respondents according to the type of learning modality. Results showed that in all group, more than half of the respondents were between 20 – 25 years old and were female. For their internet stability, majority of the blended learning with clinical experience group (53.33%) and online learning with clinical experience group (44.78%) reported very good internet connection, while 52.56% of the online learning without clinical experience group had good internet connection.

The descriptive statistics for the comfort in using computer-based technology activities among the respondents according to the type of learning modality is illustrated in Table 2. Descriptively, all groups rated their comfort in computer-based technology activities as moderate to very high. Comparative analysis also indicated that the online learning without clinical experience had a statistically higher mean comfort scores in using email, keyboarding, accessing the web, electronically sending and receiving documents, downloading, uploading, listening to audio, and viewing videos compared to the two other groups ($p < 0.001$).

The descriptive statistics for the acceptability of online learning among the respondents according to

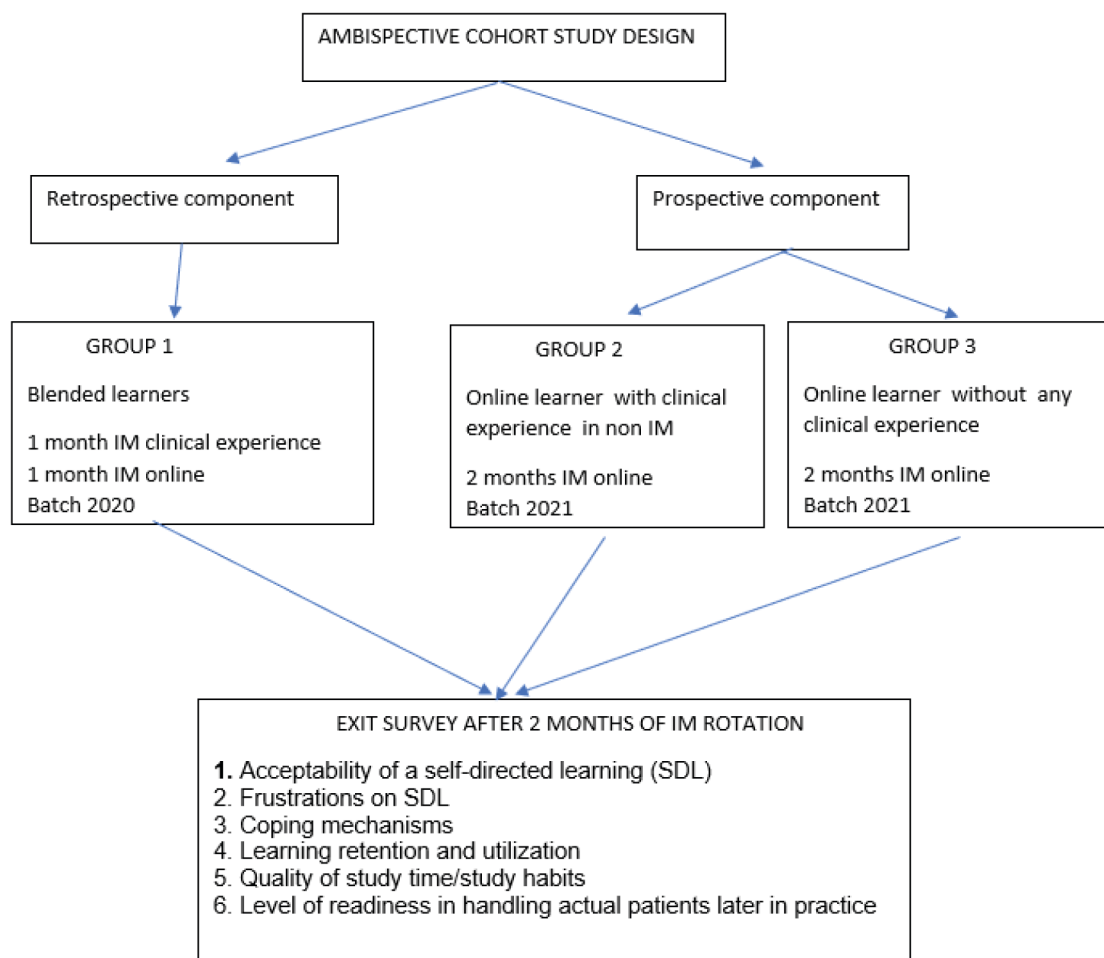


FIGURE 2: Survey methodology regarding the impact of online learning among medical clerks of UST-FMS.

Table 1. Demographic Profile and Internet Stability according to Type of Learning Modality among the medical clerks of UST-FMS (N = 205)

Characteristics	Frequency (Percentage)			p-value (two-tailed)
	Blended Learning with Clinical Experience (n=60)	Online Learning with Clinical Experience (n=67)	Online Learning without Clinical Experience (n=78)	
Age Group				0.001*
Between 20 – 25 Years Old	47 (78.33%)	40 (59.70%)	70 (89.74%)	
Between 25 – 30 Years Old	13 (21.67%)	27 (40.30%)	8 (10.26%)	
Sex				0.275
Female	34 (56.67%)	38 (56.72%)	53 (67.95%)	
Male	26 (43.33%)	29 (43.28%)	25 (32.05%)	
Internet Stability				0.001*
Excellent	9 (15.00%)	5 (7.46%)	4 (5.13%)	
Very Good	32 (53.33%)	30 (44.78%)	17 (21.79%)	
Good	14 (23.33%)	29 (43.28%)	41 (52.56%)	
Fair	4 (6.67%)	3 (4.48%)	14 (17.95%)	
Poor	1 (1.67%)	0 (0.00%)	2 (2.56%)	

Table 2. Descriptive Statistics on the Comfort with Computer-Based Technology Activities according to Type of Learning Modality among the medical clerks of UST-FMS (N = 205)

Computer-Based Technology Activities	Mean (Standard Deviation)			p-value (two-tailed)
	Blended Learning with Clinical Experience (n=60)	Online Learning with Clinical Experience (n=67)	Online Learning without Clinical Experience (n=78)	
Using email	3.42 (1.12)	3.60 (1.14)	4.06 (1.01)	0.002*
Keyboarding	3.35 (1.02)	3.76 (1.13)	4.22 (1.05)	0.001*
Accessing the Web	3.47 (1.13)	3.73 (1.07)	4.23 (1.07)	0.001*
Electronically sending documents	3.38 (1.04)	3.67 (1.11)	4.23 (0.95)	0.001*
Electronically receiving documents	3.20 (1.02)	3.66 (1.08)	4.17 (0.99)	0.001*
Downloading documents or multimedia materials	3.15 (1.13)	3.60 (1.13)	3.81 (1.13)	0.003*
Uploading documents or multimedia materials	3.08 (1.12)	3.27 (1.15)	3.82 (1.00)	0.001*
Listening to audio on the computer	2.95 (1.23)	3.22 (1.19)	3.82 (1.09)	0.001*
Viewing videos on the computer	2.90 (1.27)	3.24 (1.22)	3.72 (1.10)	0.001*
Overall Comfort	3.21 (0.92)	3.53 (0.93)	4.01 (0.85)	0.001*

Mean Score Categories: Very Low = 1.00 – 1.79 Low = 1.80 – 2.59 Moderate = 2.60 – 3.39 High = 3.40 – 4.19
Very High = 4.20 – 5.00

MANOVA Results: Pillai's Trace=0.24, $F=2.91$, $p=0.0001$

the type of learning modality is illustrated in Table 3. Results showed that the mean acceptability score was lowest in the blended learning with clinical experience group ($\bar{x}=2.02$, $SD=0.98$) and highest in the online learning group without clinical experience ($\bar{x}=2.59$, $SD=1.23$), which was statistically different among the three groups ($p=0.011$). Interestingly, the blended learning with clinical experience group had a higher mean score for pure traditional learning ($\bar{x}=4.07$, $SD=0.95$) while both groups with online learning had higher mean scores in pure online learning for the quality of learning.

It is also interesting to note that in the blended learning with clinical experience group, all reasons for preferring online learning were rated as low; the online learning with clinical experience rated these as moderate; while, the online learning without clinical experience rated these as high. Comparative analyses showed that the online learning without clinical experience group had a significantly higher ($p=0.001$) mean score in all reasons for preferring online learning except for the reason of "less need to go to the campus" ($p=0.241$).

The descriptive statistics for the frustrations with online learning among the respondents according

to the type of learning modality is illustrated in Table 4. Results indicate that all groups had high to very high levels of frustration with the following: inability to have actual patient exposure; inability to go to the hospital; missing 24-hour duty experience; inability to hone skills; missing actual interaction with consultants, residents, and classmates; poor internet connectivity, inability to apply learning physically; and, having too much conference. However, all groups had low levels of frustration with regards to the little number of conferences with online learning. Comparative analyses showed that the online learning without clinical experience group had a significantly higher mean frustration level with missing 24-hour duty experience ($p=0.010$); missing interaction with consultants ($p=0.004$), residents ($p=0.012$), and classmates ($p=0.039$); and, the little number of conferences ($p=0.001$). Results also showed that the online learning without clinical experience group had a significantly ($p=0.003$) lower mean frustration levels ($\bar{x}=3.46$, $SD=1.07$) with regards to the too much number of conferences with online learning.

The descriptive statistics for the different coping mechanisms among the respondents according to

Table 3. Descriptive Statistics on the Acceptability of Online Learning according to Type of Learning Modality among the medical clerks of UST-FMS (N = 205)

Outcomes	Mean (Standard Deviation)			p-value (two-tailed)
	Blended Learning with Clinical Experience (n=60)	Online Learning with Clinical Experience (n=67)	Online Learning without Clinical Experience (n=78)	
Acceptability of Online Learning	2.02 (0.98)	2.42 (1.06)	2.59 (1.23)	0.011
Higher Quality Standard of Learning				
<i>Pure Online Learning</i>	1.43 (0.67)	4.40 (0.92)	4.21 (0.97)	0.001
<i>Hybrid or Blended Learning</i>	3.45 (1.08)	2.39 (1.00)	2.17 (1.09)	0.001
<i>Pure Traditional Learning</i>	4.07 (0.95)	2.31 (1.14)	1.76 (0.82)	0.001
Reasons for the Preference of Online Learning over Traditional Learning				
<i>Self-directed</i>	2.40 (1.25)	2.58 (1.20)	3.42 (1.16)	0.001*
<i>Self-paced</i>	2.75 (1.26)	3.01 (1.37)	3.83 (1.14)	0.001*
<i>Flexible study time</i>	2.98 (1.32)	3.25 (1.32)	3.95 (1.17)	0.001*
<i>Flexible study location</i>	2.72 (1.30)	3.40 (1.37)	3.51 (1.30)	0.001*
<i>Available anytime with Internet</i>	2.13 (1.20)	3.09 (1.41)	3.47 (1.17)	0.001*
<i>Available anywhere with Internet</i>	2.13 (1.24)	2.90 (1.44)	3.47 (1.15)	0.001*
<i>Less need to go to the campus</i>	3.02 (1.31)	3.28 (1.19)	3.38 (1.35)	0.241
<i>Much topic coverage</i>	2.33 (1.23)	2.45 (1.27)	3.10 (1.19)	0.001*

Mean Score Categories: Very Low = 1.00 – 1.79 Low = 1.80 – 2.59 Moderate = 2.60 – 3.39 High = 3.40 – 4.19
 Very High = 4.20 – 5.00

the type of learning modality is illustrated in Table 5. Results indicate that all groups had moderate to high level of coping mechanisms, ranging from 2.68 (SD=1.21) to 4.17 (SD=0.93). Comparative analysis showed that three coping mechanisms were statistically different among the groups, while the remaining seven (7) coping mechanisms were not statistically different. Specifically, the coping mechanisms of “catching up with my readings (medical)” ($\bar{x}=3.65$, $SD=0.89$, $p=0.029$), “joining virtual study groups” ($\bar{x}=3.41$, $SD=1.21$, $p=0.001$), and “listening to music while online” ($\bar{x}=4.01$, $SD=1.00$, $p=0.001$) were significantly higher in the online learning without clinical experience group.

Table 6 presents the descriptive statistics for the contributions to learning among the respondents according to their type of learning modality. Results showed that all respondents, regardless of learning modality, rated a high to very high contributions to learning when using traditional learning and blended learning methodologies. In contrary, all groups rates low to moderate contributions of online learning to

their learning. Comparative analyses also showed that the online learning without clinical experience had a significantly higher ($p<0.05$) mean scores for all parameters contributing to learning and all factors facilitated by online learning compared to the two other groups.

Table 7 presents the descriptive statistics for the readiness to handle actual patients through online learning among the respondents according to their type of learning modality. Descriptive statistics indicate that the respondents in all groups had varying readiness levels, ranging from moderate to very high depending on the different readiness parameters. Overall, the online learning with clinical experience group had moderate readiness ($\bar{x}=3.39$, $SD=0.70$), while both blended learning with clinical experience ($\bar{x}=3.43$, $SD=0.77$) and online learning without clinical experience ($\bar{x}=3.69$, $SD=0.61$) had high levels of readiness. Comparative analysis showed that the online learning without clinical experience had a significantly higher ($p=0.019$) mean overall readiness score compared to the two other groups.

Table 4. Descriptive Statistics on the Frustrations with E-Learning according to Type of Learning Modality among the medical clerks of UST-FMS (N = 205)

Frustrations	Mean (Standard Deviation)			p-value (two-tailed)
	Blended Learning with Clinical Experience (n=60)	Online Learning with Clinical Experience (n=67)	Online Learning without Clinical Experience (n=78)	
Unable to have actual patient exposure	4.85 (0.44)	4.85 (0.50)	4.82 (0.45)	0.905
Unable to go to the hospital	4.53 (0.70)	4.54 (0.77)	4.72 (0.66)	0.204
Missed 24-hour duty experience	4.05 (1.06)	3.85 (1.16)	4.37 (0.87)	0.010*
No means of honing skills	4.8 (0.48)	4.67 (0.75)	4.72 (0.64)	0.522
Miss actual interaction with consultants	4.52 (0.77)	4.13 (1.06)	4.58 (0.66)	0.004*
Miss actual interaction with residents	4.58 (0.67)	4.24 (1.07)	4.62 (0.63)	0.012*
Miss actual interaction with classmates	4.65 (0.58)	4.45 (0.93)	4.75 (0.55)	0.039*
Poor internet connectivity	4.40 (0.98)	4.49 (0.75)	4.18 (0.95)	0.098
Unable to apply what we have learned physically	4.90 (0.30)	4.73 (0.62)	4.82 (0.45)	0.140
Too much number of conferences	3.97 (1.02)	3.99 (1.02)	3.46 (1.07)	0.003*
Too little number of conferences	2.57 (1.09)	2.18 (1.01)	2.88 (1.03)	0.001*

Mean Score Categories: Very Low = 1.00 – 1.79 Low = 1.80 – 2.59 Moderate = 2.60 – 3.39 High = 3.40 – 4.19

Very High = 4.20 – 5.00

MANOVA Results: Pillai's Trace=0.25, F=2.45, p=0.0001

DISCUSSION

A good internet connection is the key to an effective on line learning. Surprisingly, contrary to expected result, all 3 groups reported a good to very good internet connection. This is despite the fact that during synchronous activities, so many problems are encountered especially during peak hours such as no internet connection at all , recurrent internet connection dropping, slow connections, inability to connect due to high bandwidth requirements of videos or presentations, interferences causing choppy communications, and so many other internet glitches that cause so much frustrations both in the part of the medical clerks and facilitators.

Those who were in far provinces experienced limited access to stable internet connection. This was also reported by Ateneo de Manila University School of Medicine and Public Health in their experience on online learning during the pandemic. [29]

In a study of the internet connections with medical students from Universiti Sains Malaysia (USM) Health Campus in Malaysia during the COVID 19 pandemic

and lockdown, to resolve the internet connectivity needs, participants had to obtain additional Internet subscriptions , some upgraded the current plan to a higher data plan or have changed to a different internet provider. [30] These same strategies were employed by the UST medical students during this time.

With these connectivity problems in mind, it would be prudent to maximize the use activities that would only need low bandwidths such as emails, or using cross-platform voice over IP (VoIP) and instant messaging (IM) software application during peak hours allowing users to post photos, notes, links, blog, and chat. Likewise, synchronous activities must be scheduled not on peak hours if possible. There has been an effort on the part of the UST-FMS to identify medical clerks who have internet connectivity problems and provided them adequate resources to resolve such issues.

Since the present generation of medical students belongs to Generation Y/Millennial or "Civic" generation, all groups rated their comfort in computer-based technology activities as moderate

Table 5. Descriptive Statistics on the Coping Mechanisms employed to Maximize Knowledge Acquisition during the Quarantine according to Type of Learning Modality among the medical clerks of UST-FMS (N = 205)

Coping Mechanisms	Mean (Standard Deviation)			p-value (two-tailed)
	Blended Learning with Clinical Experience (n=60)	Online Learning with Clinical Experience (n=67)	Online Learning without Clinical Experience (n=78)	
Catching up with my readings (medical)	3.18 (1.30)	3.32 (1.02)	3.65 (0.89)	0.029*
Catching up with my readings (non-medical) to relax	3.18 (1.28)	3.03 (1.29)	3.47 (1.27)	0.106
Joined virtual study groups	2.68 (1.21)	2.70 (1.21)	3.41 (1.21)	0.001*
Chat online with friends or relatives	3.73 (1.15)	3.72 (1.08)	3.99 (0.97)	0.230
Bonding with family	3.83 (1.06)	3.79 (1.11)	4.17 (0.93)	0.057
Listened to music while online	3.95 (0.98)	3.49 (1.21)	4.01 (1.00)	0.001*
Rewarded self with watching a movie after	3.82 (1.21)	3.49 (1.28)	3.82 (1.30)	0.228
Binge eating	3.65 (1.27)	3.43 (1.21)	3.85 (1.15)	0.123
Sleeping a lot	3.83 (1.25)	3.73 (1.18)	3.96 (1.16)	0.510
Exercise	3.50 (1.35)	3.33 (1.30)	3.45 (1.35)	0.728

Mean Score Categories: Very Low = 1.00 – 1.79 Low = 1.80 – 2.59 Moderate = 2.60 – 3.39 High = 3.40 – 4.19
Very High = 4.20 – 5.00

MANOVA Results: Pillai's Trace=0.25, F=2.45, p=0.0001

to very high. The group of online learning without clinical experience had a statistically higher mean comfort scores in using email, keyboarding, accessing the web, electronically sending and receiving documents, downloading, uploading, listening to audio, and viewing videos compared to the two other groups. This could be explained that this group is much younger than the other two groups and has been on online learning mode on the latter part of their 3rd year as medical students, 3 months before their medical clerkship, thus, they are used to already to the use to the virtual learning platform. In this case, it was observed that the facilitators had more difficulty than the medical clerks in using the learning platform, in such a way that the medical clerks somewhat guide the facilitators at times in using the technology. The poor technical skills of the facilitators is one of the major barrier to online learning that has been identified by all the medical schools during the lockdown. [29,31]

The medical clerks belonging to the blended learning with clinical experience group showed that they favor pure traditional learning over pure online learning. This result would be understandable due

to the fact that their mindset was geared towards a traditional learning from the very start of their clerkship but was disrupted by the sudden lockdown due to the COVID 19 pandemic. Their frustrations and anxiety of not having face to face patient encounters are evident in the exit reflections they submitted after the medicine rotation.

In the United States, results from national survey of all medical schools with regards to the internal medicine exposure during Covid 19 pandemic showed that bedside teaching and physical examination activities were "let go" during this period and students were not allowed from direct patient care.[32] This was also adapted by the UST-FMS for the medical clerks in the emergency room settings, ambulatory care, endoscopy, pulmonary and dialysis units/.

The online learning without clinical experience rated almost reasons for preferring online learning high. On line factors such as being self-directed, self-paced, having flexible study time and location, anytime and anywhere availability by just having an internet connection, and can cover much topic scored the highest. The advantages of online learning were

Table 6. Descriptive Statistics on the Contributions to Learning according to Type of Learning Modality among the medical clerks from UST-FMS (N = 205)

Outcomes	Mean (Standard Deviation)			p-value (two-tailed)
	Blended Learning with Clinical Experience (n=60)	Online Learning with Clinical Experience (n=67)	Online Learning without Clinical Experience (n=78)	
Learning Method				
<i>Traditional Learning</i>	4.22 (0.90)	4.07 (0.93)	4.23 (0.77)	0.505
<i>Blended Learning</i>	3.78 (0.99)	4.03 (0.89)	4.33 (0.71)	0.001*
<i>Online Learning</i>	1.75 (0.77)	2.13 (0.83)	2.69 (0.96)	0.001*
Parameters Contributing to Learning				
<i>Blackboard Virtual Platform</i>	2.73 (1.04)	3.40 (0.99)	3.95 (0.84)	0.001*
<i>Digital Literacy</i>	3.38 (1.01)	3.90 (1.03)	4.31 (0.73)	0.001*
<i>Overall Clerkship Program</i>	3.43 (1.00)	3.55 (1.00)	4.01 (0.69)	0.001*
<i>Faculty or Consultant Staff</i>	4.17 (0.76)	4.15 (0.89)	4.64 (0.58)	0.001*
<i>Learning and Teaching Activities</i>	3.45 (1.05)	3.81 (1.02)	4.32 (0.73)	0.001*
<i>Absence of 24-Hour Duty</i>	2.73 (1.23)	3.06 (1.25)	3.36 (1.21)	0.014*
Factors facilitated by Online Learning				
<i>Acquiring your expected learning outcome</i>	2.43 (1.05)	2.93 (1.06)	3.64 (0.84)	0.001*
<i>Improving the quality of your study habits</i>	2.05 (0.85)	2.57 (1.20)	3.37 (1.02)	0.001*
<i>Managing your study time</i>	2.40 (1.04)	2.67 (1.22)	3.40 (1.05)	0.001*
<i>Increasing retention rate</i>	1.93 (0.86)	2.37 (1.11)	2.87 (1.06)	0.001*
<i>Better utilization of content</i>	2.42 (1.08)	3.09 (1.23)	3.49 (1.03)	0.001*

Mean Score Categories: Very Low = 1.00 – 1.79 Low = 1.80 – 2.59 Moderate = 2.60 – 3.39 High = 3.40 – 4.19
Very High = 4.20 – 5.00

avored by the said group maybe because these respondents had not experience yet direct patient care. The high mean scores may have been affected by several factors such as the convenience of online learning. Another would be, their responses may be affected by the word-of-mouth from other students who had Internal Medicine clinical experience prior to the lockdown, which may bring fear among the respondents.

Understandably, the results indicated that all groups had high to very high levels of frustration with their inability to experience what it is like to be a medical clerk rotating in Internal Medicine which is anticipated by everybody to be the acid test of their being a medical student. They never have imagined that this COVID 19 pandemic will shutter their chance to have actual patient exposure, not being able to go to the hospital as front liners, miss what

does it feel to be “from duty” status, their inability to have actual application of skills in patients, and a virtual encounter instead of having a face to face interaction with consultants, residents, and as well as their classmates.

In the same USA national survey, most students agreed that the pandemic had definitely disrupted their internal medicine direct patient exposure, and even stated that they should continued with normal clinical exposures during this pandemic even to accept the risk of infection with COVID-19 if they returned to the clinical setting [32].

On the part of the UST medical clerks, though they accepted the fact that what happened to them was somewhat unavoidable, online learning for them at the very start of the rotation was a disappointment, but was replaced with satisfaction and gratefulness when a retooled curricular program was adapted.

Table 7. Descriptive Statistics on the Enhancement of Readiness to Handle Actual Patients through Online Learning according to Type of Learning Modality among the medical clerks of UST-FMS (N = 205)

Parameters	Mean (Standard Deviation)			p-value (two-tailed)
	Blended Learning with Clinical Experience (n=60)	Online Learning with Clinical Experience (n=67)	Online Learning without Clinical Experience (n=78)	
I can recognize life threatening cases when I encounter them.	3.48 (1.03)	3.60 (0.89)	3.97 (0.72)	0.003*
I can make a focus history in the emergency room setting.	3.48 (0.97)	3.55 (0.94)	3.78 (0.85)	0.128
I can perform a focus physical examination in an emergency room setting.	3.50 (0.95)	3.30 (0.97)	3.37 (0.98)	0.499
I can formulate an essential diagnostic plan in an emergency room setting.	3.30 (1.05)	3.22 (1.01)	3.54 (0.75)	0.107
I can create and carry out a crucial therapeutic plan in an emergency room setting.	3.17 (0.99)	2.91 (1.10)	3.41 (0.81)	0.009*
I can write an admitting order.	2.97 (1.04)	2.76 (1.07)	3.45 (0.99)	0.001*
I am capable of doing handoffs and sign outs for patient safety.	3.40 (1.03)	2.74 (1.08)	3.03 (0.99)	0.002*
I know what the parameters are to monitor in patients while admitted in ICU or ward.	3.52 (1.00)	3.16 (1.02)	3.67 (0.96)	0.010*
I can formulate a master problem list of a patient.	3.55 (0.81)	3.42 (0.91)	3.95 (0.75)	0.001*
I can formulate an illness script.	3.12 (0.99)	3.36 (0.95)	3.97 (0.72)	0.001*
I can write a concise medical history.	3.77 (0.98)	3.79 (0.81)	3.82 (0.83)	0.936
I can discuss a case with my colleague.	3.75 (0.97)	3.87 (0.85)	4.22 (0.82)	0.005*
I can discuss a case with my seniors and consultants.	3.43 (0.95)	3.45 (0.88)	3.53 (0.80)	0.792
I can discuss case with my patients.	3.37 (1.10)	3.64 (0.98)	3.74 (0.97)	0.091
I can write a prescription for my patient.	3.58 (1.01)	3.66 (0.93)	3.62 (0.93)	0.910
I can decide what medication to give to my patients based on ESSC knowledge.	3.30 (0.98)	3.31 (1.00)	3.47 (0.89)	0.477
I can follow orders from my seniors after knowing its purpose.	3.60 (1.17)	3.85 (0.87)	3.95 (0.82)	0.098
I can collaborate with my colleague in patient care and management.	3.63 (1.07)	3.72 (0.83)	4.03 (0.81)	0.025*
In OPD setting, I can assess patient, create a diagnostic and therapeutic plan.	3.53 (0.93)	3.36 (1.00)	3.78 (0.82)	0.020*
I can discuss case and give instructions to patients in 30 minutes at most.	3.05 (1.10)	3.15 (1.09)	3.47 (0.96)	0.043*
Overall Readiness	3.43 (0.77)	3.39 (0.70)	3.69 (0.61)	0.019*

Mean Score Categories: Very Low = 1.00 – 1.79 Low = 1.80 – 2.59 Moderate = 2.60 – 3.39 High = 3.40 – 4.19
 Very High = 4.20 – 5.00

MANOVA Results: Pillai's Trace=0.57, F=3.68, p=0.0001

They have realized the greater risk against their health if they insist of being exposed to COVID 19 patients. Interestingly though, both groups with online learning had higher mean scores in pure online learning for the quality of learning.

A multicenter quantitative analysis investigating the psychological effects of the pandemic on US medical students and their reactions to the Association of American Medical Colleges (AAMC) national recommendation to pause all student clinical rotations with in-person patient care showed majority of the medical students to be anxious of what lies ahead of their medical education.[33]. Though obviously experiencing anxiety, all groups had moderate to high level of coping mechanisms to maximize knowledge acquisition during the quarantine. However, the coping mechanisms of "catching up with my readings (medical) , joining virtual study groups and listening to music while online were significantly higher in the online learning without clinical experience group. The results mirrored the characteristic of the present generation of medical students belonging to Generation Y/ Millennial or "Civic" generation. As expected, they are adapted to learn in small groups in contrast to studying alone, and comfortable with multitasking, i.e., listening to music while studying.

It is expected that all respondents, regardless of learning modality, rated a high to very high contributions to learning when using traditional learning and blended learning methodologies. Direct patient exposure is no doubt what all medical clerks are expecting to encounter during this period of their medical training. Since patient is the best teacher in terms of gaining clinical experience, they all yearn for face to face encounters with actual patients. Together with blended learning, actual patient encounters have somewhat been addressed by conducting "Patient as Teachers" (PAT) sessions wherein an actual patient is invited to a virtual conference with the medical clerks. The medical clerks are given opportunities to directly take history from the patient with the guidance of the facilitator. Likewise, modified physical examination feasible by virtual means was maximized. The medical clerks, especially Group 3, were really grateful to the opportunities given to them to have a virtual patient encounter. Interesting to note that all parameters contributing to learning as well as factor facilitated by online learning were all rated high by group 3, respondents from the

online learning without clinical experience. Since this group had not experienced direct patient care, their high mean scores may be affected by several factors. One of which is the convenience of online learning. Second, their responses may be affected by the word-of-mouth from other students who had Internal Medicine clinical experience, which may bring fear among the respondents.

The respondents in all groups had varying readiness levels to handle actual patients through online learning, ranging from moderate to very high depending on the different readiness parameters . Overall, the online learning with clinical experience group had moderate readiness while both blended learning with clinical experience and online learning without clinical experience had high levels of readiness. Comparative analysis showed that the online learning without clinical experience had a significantly higher mean overall readiness score compared to the two other groups. Very ironic that the comparative analysis showed that the online learning without clinical experience had a significantly higher mean overall readiness score compared to the two other groups. This can be explained most likely that this particular group was able to study well for their engagements and asynchronous self-directed learning manifested by excellent presentations as they were able to adjust to the online learning system during the latter part of them being a third year medical students . Likewise, since it has been about 4 months from lockdown after which this group started to have their medical clerkship, the medical clerkship program was well structured compared to the clerkship program of the 2 other groups which started their medical rotation on the start of the lockdown. This particular group had also the benefit of having a well curated repository of resource materials containing must know topics and video procedures from the nine subspecialties of internal medicine. This said repository unfortunately was not yet provided to the other 2 groups due to the sudden shift in the clerkship curriculum brought about by the lockdown . Also, this group might have been psychologically prepared for the online learning since they started their medicine clerkship four months after the lockdown. Actually, many in this group thought of not enrolling for clerkship because they know that their clerkship will be fully online and naturally as expected, should have wanted to have a face to face or traditional medical clerkship.

The perceived readiness of these medical clerks can only be assessed once they will be having their post graduate internship and one they start to have their specialty residency program. As the UST-FMS anticipates, Rose stated in 2020 that providing authentic patient experiences to medical students in this “new normal” environment will remain a big challenge for all medical schools. [34]

CONCLUSION

The study showed the different levels of impact of on line learning to the different population of medical clerks in terms of its acceptability as an alternative way of learning. Online learning as the “new normal” in the pandemic time has proven its worth as the best alternative learning method and has asserted its important role in the present training of the medical clerks. Actual patient exposure is of main concern while different coping mechanisms maximize knowledge acquisition.

SUGGESTION

Being self-directed and self-paced, Online learning is favored by the study participants who have not yet experienced direct patient care in their overall readiness. There is hope, over time, that the medical clerks soon becoming physicians, adapt Online learning as part of blended education even if the pandemic shall have resolved. Thus, it is safe to say that online learning will now be an integral part of medical education.

LIMITATIONS

This paper has the following limitations:

We are cognizant that the Online group without clinical experience did not experience direct patient care, their responses may have been under- or over-estimated and the self-reported responses to the questionnaire may have been under- or over-estimated.

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