ORIGINAL ARTICLE

Knowledge, Skills, and Attitudes of Faculty Members and Residents-in-Training of the Department of Rehabilitation Medicine of the Philippine General Hospital towards Virtual Learning: A Cross-sectional Study

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ABSTRACT

Background and Objectives. Virtual learning has been utilized in residency programs to continue training amid the COVID-19 pandemic. This study aimed to determine the knowledge, skills, and attitudes of faculty members and residents of the Department of Rehabilitation Medicine of the Philippine General Hospital towards virtual learning.

Method. This is a descriptive cross-sectional study. Respectively, residents and faculty members answered the Online Learning Readiness Scale (OLRS) and Faculty Readiness to Teach Online (FRTO) through Google Forms.

Results. Twenty (20) residents and 19 faculty members participated in the study. The majority of the residents preferred asynchronous learning (50%), while faculty members preferred the hybrid mode (74%). Residents' readiness for online learning was generally high, though problems with easy distractibility (60%) and time management (40%) were revealed. Female residents had higher online communication self-efficacy compared to males (p = 0.0367). Faculty members' perceived attitude was significantly higher than ability in course design (p = 0.00102), time management (p = 0.00159), and technical competence (p < 0.0001). Males had higher perceived ability in course design (p = 0.0320). Older age groups had lower perceived abilities in course design (p = 0.0301) and technical competence (p = 0.0371).

Conclusion. This study revealed the levels of readiness of residents and faculty for virtual learning. Findings indicate the need to address both issues by developing programs to enhance faculty's online teaching abilities and observing best practices to minimize problems such as distractibility. Large-scale studies with longer time frames are also recommended.

Key Words: physical and rehabilitation medicine, internship and residency, Philippines, online learning, distance education, COVID-19

INTRODUCTION

COVID-19 spread like wildfire throughout the globe, claiming many lives. It was declared a pandemic by the WHO Director-General Tedros Adhanom on March 11, 2020, reaching 120,000 cases in more than 100 countries.[1] To curb the rising cases, an Enhanced Community Quarantine was implemented in Luzon, the Philippines, starting March 17, 2020. Stringent limitations were imposed on the movement of people and industries.[2] In hospitals, resident physicians attended the COVID-19 wards and adopted a modified skeletal schedule to lessen their exposure. Outpatient departments were temporarily shut down, and admission of non-emergent cases was deferred.

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Consequently, doctor-patient encounters among residents-in-training, especially those in rehabilitation medicine, were highly decreased. Non-internal medicine residents were required to enter the covid wards to act as the internal medicine resident on duty. In a survey done among residents of Physical Medicine and Rehabilitation, among the six institutions offering training, only those in Philippine General Hospital and Ospital ng Makati play this role aside from going in the Covid wards as a rehabilitation medicine resident. While those at the University of Santo Tomas and St. Luke's Hospital perform the latter function, those at Veterans Memorial Hospital and Philippine Orthopedic Center do not see covid patients but play the role of triage officers. Similarly, activities of residency training like supervised patient rounds, hands-on skills learning, face-to-face lectures, and examinations were suspended. This created the need to utilize alternative methods like virtual learning to ensure continuity of training.

Virtual learning is distance learning conducted in a virtual environment with electronic study content designed for self-paced (asynchronous) or live web-conferencing (synchronous) online teaching and tutoring.[3] Video conferencing applications allow entire residency teams to simultaneously log on to shared video conferences remotely.[4] Asynchronous methods can also be used to accommodate busy resident schedules and duty-hour restrictions.[5] Blended learning combines learning at a distance and traditional on-campus learning (in a classroom).[6] However, virtual learning presents with palpable limitations ranging from access problems to the readiness of both learners and teachers.[7] Several tools have been developed to assess readiness, such as the E-Learning Readiness Survey (ELRS), the Online Learning Readiness Scale (OLRS), and the Faculty Readiness to Teach Online (FRTO).[7-9] Factors affecting virtual learning include self-efficacy in using computer software and the Internet, capacity for self-directed learning, ability to control the learning progress, motivation for learning, and self-efficacy in using online tools to communicate and express oneself.[10] On the other hand, factors affecting virtual teaching include the attitudes and ability of lecturers in course design, communication, technical competencies, and time management.[11] Identifying which factors affect both learners and teachers is vital to developing strategies to address these issues.

This study, therefore, aims to determine the knowledge, skills, and attitudes of residents-in-training and faculty members of the Department of Rehabilitation Medicine (DRM) of the University of the Philippines - Philippine General Hospital (UP-PGH) towards virtual learning and teaching. Specifically, it also aims to identify their virtual education methods and correlate these methods and factors with demographic data. Results of this study can determine strong points and areas for improvement in both the lecturers and learners. Furthermore, this could also be a precedent for a follow-up study aiming to determine if competency requirements of bodies such as the Philippine Board of Rehabilitation Medicine are being met.

MATERIALS AND METHODS

This is a descriptive cross-sectional study conducted from January 14, 2021, to March 21, 2021, to get results early in the academic year and provide suggestions and implement interventions after that. Eligible participants were male or female faculty members and residents-in-training of the UP-PGH DRM. Informed consent was secured before data collection. Prospective participants whose consent was not obtained or those who could not submit the questionnaires were excluded from the study. Any participant who opted to withdraw from the study for any reason was included in the dropped participants.

Among the 22 faculty members and 20 residents of the department, using a 1:6 ratio, assuming that each consultant was giving rounds in each service to six of the 20 residents, it was computed that 28 respondents (i.e., 14 residents and 14 consultants) were needed for this study. This was based on a 0.602 standard deviation of computer/Internet self-efficacy on learner readiness for online learning, 95% level of significance, and 0.3 desired total width of the confidence interval, independent sample t-test, and analysis of variance (ANOVA). Considering the dropout rate of 20%, the total number of target respondents is 34 (i.e., 17 residents and 17 consultants).

Recruitment of participants was done through invitation via electronic mail. Each participant was assigned a study ID for confidentiality reasons. Data collection for demographic profiling (Appendix A) and readiness questionnaires was done through Google Forms. Demographic data, including age, gender, position/year level in training, years in teaching, prior experience in virtual learning, years of teaching/learning online, and preferred teaching/learning method, were obtained (Appendices B and C).

A descriptive cross-sectional study was appropriate since the objects of interest were qualitative aspects of virtual learning and teachings such as knowledge, beliefs, and attitudes. The faculty members answered the FRTO questionnaire, which assessed their skills (ability) and attitudes on four dimensions: course design, course communication, time management, and technical competence (Appendix D). The residents answered the OLRS questionnaire, which assessed their attitudes toward self-directed learning, motivation for learning, learner control, and their skills in computer/Internet self-efficacy and online communication self-efficacy (Appendix E). Participants were asked to describe themselves using a 5-point Likert-type scale for both questionnaires, with anchors ranging from 1 (strongly disagree) to 5 (strongly agree). The more positive responses (strongly agree and agree) were grouped into the "agree" group, while the more negative responses (disagree and strongly disagree) were grouped into the "disagree" group.

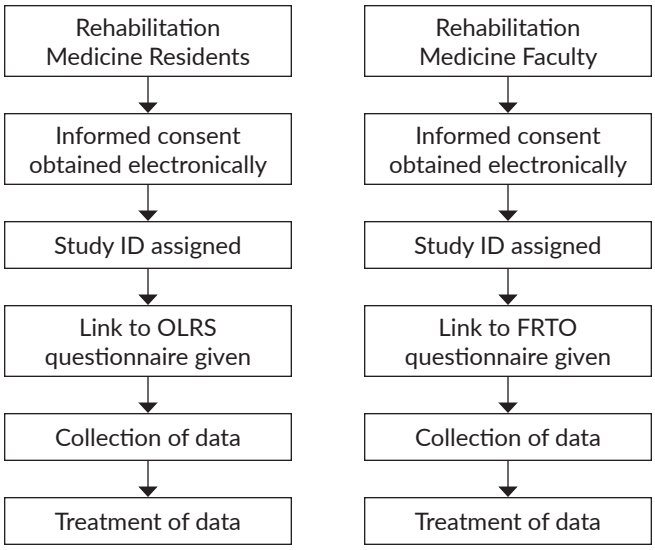

Figure 1. Summary of the Study Procedure.

Data collection was done until all eligible participants had completed the questionnaires and were conducted only once for each participant. Data collection forms were transferred to an encrypted computer accessible only to the principal investigators. All participants were allowed to re-evaluate their decisions regarding participation. Data were then tabulated and summarized in a spreadsheet using Microsoft Excel for Windows 10. All data collected shall be deleted after ten years. There were no foreseeable adverse events during the conduct of the study.

A summary of the study procedure is presented in Figure 1.

Data Analysis

Data were analyzed using STATA v16.1. Results were summarized using descriptive statistics with a 95% level of significance. A cross-sectional study was chosen since descriptive analyses were utilized on all the variables of interest. Categorical variables (self-directed learning, motivation for learning, computer/Internet self-efficacy, learner control, and online communication self-efficacy, attitudes, and ability) where answers could be marked from strongly agree to strongly disagree were expressed as frequencies and percentages. Continuous variables such as a preferred method of learning were expressed as means ± standard deviation. To test for differences among different groups in the OLRS constructs, independent t-test, paired t-test, Kruskal-Wallis test, Mann-Whitney U test, and ANOVA were used.

The learners' scores were compared to each subgroup based on age, gender, years in the training program, prior experience with online learning, and preferred method of learning. Likewise, scores of the lecturers were compared between subgroups based on age, gender, years of teaching, prior experience of virtual teaching, years of virtual teaching, and preferred teaching methods.

Ethical Considerations

This research protocol was submitted to the University of the Philippines Manila Research Ethics Board (UPMREB) and approved before the start of the study. This research was guided by the principles of GCP-ICH and the Declaration of Helsinki and was conducted following Republic Act No. 10173, the Philippines Data Privacy Act of 2012. Informed consent specifying the study's purpose, duration, and the procedure was secured from each participant before data collection. The option to withdraw consent at any time was confirmed electronically by the investigators among eligible participants before data collection.

The authors granted the FRTO and OLRS questionnaires permission and free usage and secured them via email upon communication with the principal investigator to prevent breaching copyright policies.[7,9]

RESULTS

Demographics

Twenty (20) residents-in-training and 19 faculty members completed the online questionnaires. The majority of the resident respondents were female (55%), between 25-29 years of age (80%), in their second year of training (45%), with less than two years of prior experience with using virtual learning (40%), and preferred asynchronous method of learning (50%) (Table 1).

Most of the faculty respondents were female (53%), more than 51 years of age (47%), teaching rehabilitation medicine for more than ten years (53%), and utilizing virtual teaching for less than two years (42%). They preferred the hybrid teaching method (74%) (Table 2).

Residents' Knowledge, Skills, and Attitudes Towards Virtual Learning

Table 1 shows the residents' readiness for online learning using OLRS. For computer/Internet self-efficacy, 95% of the respondents agreed that they are confident in using Microsoft Office programs and the Internet, and 70% agreed that they are confident in their knowledge and skills in managing software for learning.

Residents mostly agreed with self-directed learning parameters, namely seeking assistance (95%), setting up learning goals (85%), carrying out their study plans (80%), and having higher expectations for learning performance (75%). Managing time was singled out, with 40% of respondents neutral, 35% agreed, and 25% disagreed.

The learner control dimension received mixed responses. The majority of the respondents (80%) agreed about being able to direct their learning progress. However, most (60%) disagreed that they are not distracted by other online activities, while only 35% agreed. All respondents agreed to repeat the online materials if needed.

All were open to new ideas for motivation for learning, while 95% were motivated to learn. Eighty percent agreed

that they wanted to improve from mistakes, and 70% wanted to share their ideas with others.

Lastly, 95% of the residents agreed that they are confident using online tools to communicate with others for online communication self-efficacy. Seventy percent are confident in expressing themselves through text, and 50% are confident in posting questions in online discussions.

Age, years in training, and prior experience in online learning did not significantly affect acceptance of online learning. Females were noted to have higher online communication self-efficacy scores than males (p = 0.0367) (Table 1). Overall, there was a positive response across all domains.

Faculty Members' Knowledge, Skills, and Attitudes Towards Virtual Learning

Faculty respondents' perceived attitudes were significantly higher than perceived ability in three domains: course design (p = 0.00102), time management (p = 0.00159), and technical competence (p < 0.0001). The overall mean shows consistent significant findings between attitudes and ability of faculty members with p < 0.0001 (Table 2).

Considering gender among the faculty members, males had a significantly higher perceived ability to design courses than females (p = 0.0320) (Table 2).

Considering the age of the faculty members, older age groups had significantly lower perceived abilities on course design (p = 0.0301) and technical competence (p = 0.0371).

However, there was no statistically significant difference when considering the years of teaching, past virtual teaching experience, length of virtual teaching, and preferred teaching mode of faculty members across the competencies.

DISCUSSION

This is a descriptive cross-sectional study limited to assessing the readiness for online learning of the UP-PGH DRM faculty and residents during the transition from face-to-face training to virtual learning in the COVID-19 pandemic.

Residents

Readiness for online learning is defined in terms of three aspects: (1) students' preferences for the form of delivery as opposed to face-to-face classroom instruction; (2) student confidence in using electronic communication for learning

Table 1. Level of knowledge, skills, and attitudes towards virtual learning of residents by Gender, PGH, n=20

Online readiness dimensions	Male (n=9)	Female (n=11)	p-values
	Median (IQR)		
Computer/Internet self-efficacy			
Confidence in using Microsoft Office programs	4 (0)	5 (1)	0.3138
Confidence in knowledge and skills on managing software for learning	4 (1)	4 (2)	0.7553
Confidence in using the internet	4 (0)	5 (1)	0.0135
Dimension subtotal (mean SD)	11.88 (±0.56)	13.09 (±0.58)	0.1596[b]
Self-directed learning			
Carrying out own study plan	4 (0)	4 (1)	0.5267
Seeking assistance	4 (0)	4 (1)	0.5449
Managing time	3 (1)	3 (1)	0.1516
Setting up learning goals	4 (0)	4 (0)	1.0000
Having higher expectations for learning performance	4 (1)	4 (0)	0.3738
Dimension subtotal (mean SD)	18.33 (±1.05)	19.91 (±0.74)	0.2262[b]
Learner Control			
Directing own learning progress	4 (0)	4 (0)	0.9604
Not distracted by other online activities	2 (0)	3 (2)	0.1219
Repeated online materials when needed	4 (1)	4 (1)	0.7399
Dimension subtotal (mean SD)	10.44 (±0.67)	11.18 (±0.40)	0.3373[b]
Motivation for learning			
Open to new ideas	4 (1)	4 (1)	0.9300
Motivation to learn	4 (0)	4 (1)	0.8003
Improve from mistakes	4 (0)	4 (1)	0.3716
Share ideas with others	4 (1)	4 (1)	0.1815
Dimension subtotal (mean SD)	15.67 (±0.58)	17.09 (±0.59)	0.1073[b]
Online communication self-efficacy			
Confidence in using online tools to communicate with others	4 (0)	4 (1)	0.8514
Confidence in expressing self through text	3 (2)	4 (1)	0.0317
Confidence in posting questions in online discussions	3 (2)	4 (2)	0.1744
Dimension subtotal (mean SD)	10.22 (±0.48)	12.18 (±0.64)	0.0367[b]

[a] *Mann-Whitney U test*, [b] *t-test*

and computer-mediated communication; and (3) ability to engage in autonomous learning.[10]

This study revealed that residents had mixed preferences for the mode of learning, with half opting for the asynchronous method, a few preferring the hybrid mode and face-to-face setup, and only one favoring synchronous learning. This reflects a previous study that found a mixed preference for synchronous and asynchronous learning for graduate school students. Some students preferred asynchronous study because they were teaching with families of their own and opted to have additional time to reflect and not to "talk so much on the computer."[8] Others preferred

Table 2. Perceived importance and confidence of faculty members on online teaching competencies, PGH, n=19

Faculty readiness competencies	Attitude (importance)	Ability (confidence)	p-value[a]
	Mean ± SD		
Course design			
Create an online course orientation	4.11 (±0.94)	3.84 (±0.90)	
Write measurable learning objectives	4.26 (±0.93)	4.05 (±0.91)	
Design learning activities that provide students with opportunities for interaction	4.11 (±0.81)	3.74 (±0.93)	
Organize instructional materials into modules or units	4.11 (±1.05)	3.84 (±1.01)	
Create instructional videos	3.74 (±1.24)	3.42 (±1.30)	
Use different teaching methods in the online environment	4.32 (±0.67)	3.84 (±0.90)	
Create online quizzes and tests	4.32 (±0.67)	3.95 (±0.85)	
Create online assignments	4.42 (±0.61)	3.89 (±1.05)	
Manage grades online	4.26 (±0.73)	3.89 (±1.05)	
Sub-competency Total	37.63 (±5.59)	34.47 (±7.41)	0.01380
Sub-competency Mean	4.18 (±0.20)	3.83 (±0.18)	0.00102
Course communication			
Send announcement/reminders to course participants	4.37 (±0.68)	4.32 (±0.58)	
Create and moderate discussion forums	4.00 (±1.05)	3.95 (±0.97)	
Use email to communicate with learners	4.63 (±0.50)	4.47 (±0.51)	
Respond to student questions promptly	4.00 (±0.82)	3.84 (±1.01)	
Provide feedback on assignments	3.79 (±0.71)	3.84 (±0.83)	
Use synchronous web-conferencing tools	3.74 (±0.73)	3.47 (±0.96)	
Communicate expectations about student behavior	4.00 (±0.94)	4.11 (±0.88)	
Communicate compliance regarding academic integrity policies	4.05 (±1.03)	4.05 (±0.85)	
Apply copyright law and fair use guidelines when using copyrighted materials	4.26 (±0.65)	4.21 (±0.71)	
Apply accessibility policies to accommodate student needs	4.16 (±0.69)	4.16 (±0.69)	
Sub-competency Total	41.00 (±4.74)	40.42 (±5.54)	0.64330
Sub-competency Mean	4.10 (±0.27)	4.00 (±0.29)	0.66800
Time management			
Schedule time to design the course before delivery	4.32 (±0.75)	3.95 (±0.91)	
Schedule weekly hours to facilitate the online course	4.37 (±0.60)	3.74 (±0.93)	
Use features in learning management system to manage time	4.32 (±0.75)	3.52 (±1.07)	
Use facilitation strategies to manage time spent on course	4.26 (±0.81)	3.58 (±0.96)	
Spend weekly hours to grade assignments	3.89 (±0.88)	3.84 (±0.96)	
Allocate time to learn about new strategies or tools	4.00 (±1.00)	3.80 (±0.92)	
Sub-competency Total	25.16 (±4.00)	22.42 (±4.67)	0.03160
Sub-competency Mean	4.19(±0.20)	3.74 (±0.16)	0.00159
Technical competence			
Complete basic computer operations	4.42 (±0.77)	3.73 (±1.19)	
Navigate within the course in the learning management system	4.05 (±0.85)	3.37 (±1.16)	
Use course roster in the LMS to set up teams/groups	4.16 (±0.69)	3.37 (±1.16)	
Use online collaborative tools	4.21 (±0.71)	3.42 (±1.02)	
Create and edit videos	3.79 (±0.85)	3.16 (±1.17)	
Share and open educational resources	4.21 (±0.63)	3.47 (±0.96)	
Access online help desk/resources for assistance	4.16 (±0.69)	3.63 (±1.01)	
Sub-competency Total	29.00 (±4.14)	24.16 (±7.12)	0.00610
Sub-competency Mean	4.14 (±0.19)	3.45 (±0.19)	<0.00010
Total	132.79 (±13.64)	121.47 (±20.32)	0.01260
Overall Mean	4.15 (±0.21)	3.80 (±0.30)	<0.00010

[a] *paired t-test*

synchronous study because of the immediacy of feedback provided during live classroom sessions as concerns could be readily addressed, and changes could quickly be made to their classrooms as needed.[12]

Residents generally gave positive responses to all domains of the OLRS, with a few exceptions. They are confident in computer/Internet self-efficacy, including using Microsoft Office programs, the Internet, and software for learning. Previous studies have likewise reported the positive response of students to an online learning environment. An investigation revealed that although online learning via Microsoft Teams was new for the students, this environment motivated them to participate, making it easier to comprehend their learning materials.[13] Another study found that students felt that their professors have improved their online teaching skills since the beginning of the pandemic (68.1%), that online education is useful (77.9%), and that they appreciated the software and online study materials used to support online education.[14]

Respondents also had positive responses for self-directed learning, which encompasses seeking assistance, managing time, setting up learning goals, carrying out study plans, and having high expectations for learning performance. Of these, time management had the most mixed responses, with 40% having a neutral response, 35% agreeing, and 25% disagreeing. Residents need to balance their time among a myriad of tasks – hospital work (i.e., patient rounds, charting, reporting of the census), academic requirements (i.e., presentations, reports, demonstrations, reviews for exami-nations and quizzes), administrative tasks (i.e., organizing postgraduate courses), personal care especially for those living apart from their families (i.e., household chores, groceries, errands), and personal relationships. Similarly, a previous study discovered that students employed full-time had lower time management scores due to factors such as job-related stress, non-academic priorities, the potential for over-commitment, and economic issues, all of which must be balanced with coursework.[12]

The learner control domain included questions about the respondent's learning progress, distractions, and repetition of instructional materials based on needs. This study revealed that most of the respondents were easily distracted, which is supported by previous literature. It has been reported that sources of distractions during online learning were at least one of five activities: emailing (64%), surfing the web (65%), using social media (52%), instant messaging (32%), and playing games (30%).[15] Female students engaged with social media significantly more than male students, whereas male students played games significantly more than female students.[13] There is no doubt that students will have to figure out an effective way to prevent themselves from being distracted while learning online.[14]

Residents are also shown to have positive responses in the last two domains. Motivation for learning asked about being motivated to learn, being open to new ideas, sharing ideas, and improving from mistakes. On the other hand, online communication self-efficacy asked about confidence in using online tools to communicate and express themselves through text or other methods such as emails.

This study found that females had higher online communication self-efficacy scores compared to males. Previous literature has been contradictory regarding gender and online readiness to learn. One study found that gender was the only insignificant factor in the five OLRS domains.[10] In contrast, another research states that males had a higher degree of Internet self-efficacy than females. In contrast, females had higher scores in online discussion participation and final exams than males.[4] Furthermore, another study concluded that female students adapted as strategic learners better than males in asynchronous learning situations. The latter was not as active as they were in traditional face-to-face discussions.[16]

Computer-mediated communication is crucial in online learning. This comes in emails, instant messaging, and real-time communication during online lectures by verbally asking or typing questions.[16] A study compared the levels of communication between an online and a face-to-face group. It revealed that participants in the former group reported higher levels of personal self-disclosure and perceived partner self-disclosure. It was found that the anonymity provided in an online environment allowed people to feel safer in self-disclosing.[16] In another article, it was believed that computer-mediated communication reduces gender-influenced inequalities that are often observed in face-to-face communication.[17]

Faculty Members

The majority of the faculty members preferred the hybrid mode of teaching followed closely by asynchronous and synchronous teaching, while face-to-face teaching was the least preferred. Hybrid courses have been shown to meet the needs of most students. They both provide a learning style that requires students to participate in classroom instruction where they can visually and verbally interact with their instructor and peers and offer the convenience of reducing transportation costs. Moreover, hybrid courses also develop students' Internet, technology, and virtual team skills by participating in online discussions, tests, and other virtual learning activities.[18]

Faculty readiness to teach focuses on two aspects of preparedness: (1) attitudes on the importance of online teaching and (2) ability to confidently teach online. Attitude is defined as the viewpoint a person has about something and its relevance to them, while ability is the capacity to perform such skills successfully.[19]

In this study, the perceived attitudes of faculty members are significantly higher than their perceived ability in course design, time management, and technical competence. Overall, there is a significant difference in all disciplines. These results indicate that faculty members have excellent attitudes towards virtual teaching but lower perceived ability. This is

similar to a previous study that revealed higher attitudes than the ability of faculty in course design, course communication, and technical competencies. In contrast, the higher ability was perceived for time management.[10] Results of this study also revealed that males have a higher perceived ability in course design and technical competence. Moreover, those in older age groups have lower scores.

A review published in 2017 discussed concerns of faculty in online teaching, which included issues in content development (i.e., instructional strategies and integration of multimedia), perceived barriers to student success in online classes, uncertainty about their image as online teachers, technical support needs, and the desire for reasonable workload and manageable class enrollments.[20] It was recommended that higher education institutions provide professional development for instructors, training for learners, and technical support for content development.[20,21] Nevertheless, faculty have been shown to adapt to the technological changes of online teaching and were open to learning advanced techniques, proving that they were ready to move to the 21st century online learning process.[22]

CONCLUSION

This study investigated the readiness of residents-in-training and faculty members towards virtual learning. Asynchronous and hybrid modes were preferred by residents and faculty, respectively. Residents generally have positive responses towards virtual learning but have difficulty with time management and distractibility. On the other hand, faculty members' perceived ability was lacking in course design, time management, and technical competence compared to perceived attitudes.

This study highlights the need to revamp training strategies and continually adapt to the needs of both resident learners and faculty members. The UP-PGH DRM has an ongoing program entitled "Strategies To Revitalize and Improve Virtual teaching and learning Experience (STRIVE)." This will provide basic training for the DRM staff on navigating and using online platforms available in the university system to improve and enrich knowledge and skills in virtual teaching and learning. This program will discuss tools in the Google Workspace (i.e., Google Forms, Docs, Sheets, Slides, Drive), Zoom, and Microsoft 365 (i.e., Outlook, SharePoint, Teams, OneNote). It is highly recommended that this program pushes through.

To address easy distractibility while learning online, lecturers are recommended to use distributed learning by breaking down long lectures into several online sessions with short breaks in between and incorporating short quizzes at the end of online learning sessions.[23] It is also recommended that residents employ time management strategies in their daily routines. Due to the limitations of this study, the investigators recommend further research to be done on a larger scale, including other departments, and involving a longer time frame post-COVID-19 pandemic. It is also recommended that a follow-up study be done to determine if specialty training competency requirements of the Philippine Board of Rehabilitation Medicine and other similar bodies are being met in an online learning environment.

Disclaimer

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Statement of Authorship

All authors participated in the data collection and analysis and approved the final version submitted.

Author Disclosure

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APPENDICES

Appendix A. Data Collection Form

Definition of terms

- **E-learning:** Online interaction between a student and the teacher where the training is received through an online medium, even though the teacher may be in the same building as the student.
- **Online learning:** This is a form of distance learning that uses online learning tools that imply lectures and assignments. Tests are all enabled by virtual platforms.
- **Blended or Hybrid learning:** This is a combination of learning at a distance and the traditional on-campus learning (in a classroom), where you will have a more or less fixed schedule where you will have to attend a part of the classes on-site.
- **Virtual learning:** Distance learning conducted in a virtual environment with electronic study content designed for self-paced (asynchronous) or live web-conferencing (synchronous) online teaching and tutoring.
- **Face to face:** This is for the lecturer and student to meet physically upfront.

Code: _____

Participation
☐ Lecturer / Faculty Member ☐ Learner / Resident-in-Training

Year level
☐ 1st year ☐ 2nd year ☐ 3rd year

Gender
☐ Female ☐ Male

Age ____

Have you had a virtual learning experience (either as a lecturer or a learner) before the COVID-19 period?
☐ Yes ☐ No

If yes, how many years have you been utilizing virtual learning?
☐ <2 years ☐ 2-5 years ☐ >5 years

In virtual teaching or learning, what is your preferred mode of learning?
☐ Asynchronous ☐ Synchronous ☐ Hybrid ☐ Face-to-face

Appendix B. Data Gathered from Residents of UP-PGH DRM

Table 3. Level of knowledge, skills, and attitudes per domain of virtual learning of residents, PGH, n=20

Parameter	n, %	Computer / Internet self-efficacy	Self-directed learning	Learner control	Motivation for learning	Online communication self-efficacy
Sex						
Female	11 (55%)	13.09 (±0.58)	19.91 (±0.74)	11.18 (±0.40)	17.09 (±0.59)	12.18 (±0.64)
Male	9 45%)	11.89 (±0.56)	18.33 (±1.05)	10.44 (±0.67)	15.67 (±0.58)	10.22 (±0.55)
p-value[a]		0.1596	0.2262	0.3373	0.1073	0.0367
Age						
<25	1 (5%)	10	19	8	14	12
25-29	16 (80%)	12. 81 (±1.94)	19.38 (±3.07)	11 (±1.67)	16.31 (±1.85)	11 (±2.16)
30-35	2 (10%)	11.5 (±0.71)	18 (±2.83)	11.5 (±0.71)	17 (±1.41)	11.5 (±0.71)
>35	1 (5%)	13	19	10	20	15
p-value[b]		0.3885	0.9723	0.2481	0.2247	0.3719
Year Level						
1st year	7 (35%)	12.57 (±1.90)	19 (±2.58)	10.14 (±0.69)	17.14 (±2.19)	11.71 (±2.36)
2nd year	9 (45%)	13.11 (±1.36)	18.56 (±3.21)	11.11 (±1.76)	16 (±1.94)	10.33 (±1.87)
3rd year	4 (20%)	11.25 (±2.63)	21 (±2.16)	11.5 (±2.52)	16.25 (±1.71)	12.75 (±1.5)
p-value[b]		0.2770	0.2571	0.2885	0.5754	0.1105
Previous Virtual Learning Experience						
No	9 (45%)	12.22 (±2.28)	19.78 (±3.15)	11.67 (±1.94)	16.33 (±1.66)	11.56 (±1.67)
Yes	11 (55%)	12.82 (±1.54)	18.73 (±2.61)	10.18 (±1.08)	16.55 (±2.25)	11.09 (±2.51)
p-value[a]		0.5621	0.5127	0.0718	0.9076	0.5315
Experience in years[c]						
<2 years	8 (61.54%)	12.75 (±1.39)	17.88 (±2.17)	10.63 (±1.06)	16.38 (±1.92)	8 (±10.63)
2-5 years	3 (23.08%)	14 (±1)	21 (±2.65)	10.33 (±0.58)	18..67 (±2.31)	13.67 (±2.31)
>5 years	2 (15.38%)	12 (±2.83)	17.5 (±2.12)	9 (±1.41)	14	10 (±2.83)
p-value[b]		0.3502	0.2147	0.2720	0.0706	0.2526
Preferred mode of learning						
Asynchronous	10 (50%)	12.9 (±2.38)	20.7 (±2.75)	11.3 (±2.16)	16.7 (±1.95)	12 (±1.83)
Synchronous	1 (5%)	11	19	11	17	11
Hybrid	6 (30%)	12.5 (±1.52)	17.17 (±2.32)	10.17 (±0.75)	6 (±16.67)	10 (±2.83)
Face-to-face	3 (15%)	12	18.33 (±2.08)	10.67 (±1.15)	15 (±1)	3 (±11.67)
p-value[b]		0.6831	0.1229	0.6266	0.5290	0.2033

Table 4. Characteristics of the Department of Rehabilitation Medicine Consultants, PGH, 2021 (n=19)

Characteristic	n, %
Age in years (mean, SD)	48.26 ± 9.27
Age group	
≤40	5 (26.32%)
41-50	5 (26.32%)
51≤	9 (47.37%)
Gender	
Female	10 (52.63%)
Male	9 (47.37%)
Years teaching rehabilitation medicine	
1-5 years	5 (26.32%)
6-10 years	4 (21.05%)
>10 years	10 (52.63%)

Characteristic	n, %
Years utilizing virtual learning	
<2 years	8 (61.54%)
2-5 years	5 (38.46%)
>5 years	0
Preferred mode of teaching	
Asynchronous	2 (10.53%)
Face-to-face	1 (5.26%)
Hybrid	14 (73.68%)
Synchronous	2 (10.53%)

Table 5. Level of knowledge, skills, and attitudes towards virtual learning of residents, PGH, n=20

Online readiness dimensions	Disagree[a] (n, %)	Neutral (n, %)	Agree[b] (n, %)	Median (IQR)
Computer/Internet self-efficacy				
Confidence in the use of Microsoft Office programs	1 (5%)	0	19 (95%)	4 (1)
Confidence in knowledge and skills on managing software for learning	1 (5%)	5 (25%)	14 (70%)	4 (1.5)
Confidence in the use of the internet	1 (5%)	0	19 (95%)	4 (1)
Self-directed learning				
Carrying out own study plan	1 (5%)	3 (15%)	16 (80%)	4 (1)
Seeking assistance	0	1 (5%)	19 (95%)	4 (1)
Managing time	5 (25%)	8 (40%)	7 (35%)	3 (1.5)
Setting up learning goals	2 (10%)	1 (5%)	17 (85%)	4 (0)
Having higher expectations for learning performance	2 (10%)	3 (15%)	15 (75%)	4 (0.5)
Learner Control				
Directing own learning progress	2 (10%)	2 (10%)	16 (80%)	4 (0)
Not distracted by other online activities	12 (60%)	1 (5%)	7 (35%)	2 (2)
Repeated online materials when needed	0	0	20 (100%)	4 (1)
Motivation for learning				
Open to new ideas	0	0	20 (100%)	4 (1)
Motivation to learn	1 (5%)	0	19 (95%)	4 (0.5)
Improve from mistakes	1 (5%)	3 (15%)	16 (80%)	4 (1)
Share ideas to others	2 (10%)	4 (20%)	14 (70%)	4 (1)
Online communication self-efficacy				
Confidence in using online tools to communicate with others	1 (5%)	0	19 (95%)	4 (1)
Confidence in expressing self through text	3 (15%)	3 (15%)	14 (70%)	4 (1.5)
Confidence in posting questions in online discussions	6 (30%)	4 (20%)	10 (50%)	3.5 (2)

Appendix C. Data Gathered from Faculty Members of UP-PGH DRM

Table 6. Perceived importance and confidence of faculty members on online teaching competencies by Gender, PGH, n=19

Competencies	Female (n=10) Mean (±SD)	Male (n=9) Mean (±SD)	p-value[a]
Attitudes (Importance)			
Course design	35.9 (±5.67)	39.56 (±5.13)	0.1603
Course communication	41.2 (±5.37)	40.78 (±4.24)	0.8526
Time management	25.4 (±4.01)	24.89 (±4.23)	0.7900
Technical competence	29.2 (±4.21)	28.78 (±4.29)	0.8314
Ability (Confidence)			
Course design	31.1 (±7.72)	38.22 (±7.72)	0.0320
Course communication	38.6 (±4.70)	42.44 (±4.96)	0.1348
Time management	20.6 (±3.81)	24.44 (±4.90)	0.0717
Technical competence	21.9 (±7.44)	26.67 (±6.18)	0.1500

[a] *independent t-test*

Table 7. Perceived importance and confidence of faculty members on online teaching competencies by Age Group, PGH, n=19

Competencies	≤40 (n=5) Mean (±SD)	41-50 (n=5) Mean (±SD)	≥51 (n=9) Mean (±SD)	p-value[a]
Attitudes (Importance)				
Course design	38.8 (±5.85)	40.8 (±4.27)	35.22 (±5.52)	0.1505
Course communication	40.2 (±5.26)	41.2 (±2.77)	41.33 (±5.68)	0.7536
Time management	23.6 (±4.04)	26.2 (±3.49)	25.44 (±4.42)	0.4939
Technical competence	29.6 (±3.58)	30.2 (±3.19)	28.00 (±4.97)	0.7231
Ability (Confidence)				
Course design	37.4 (±4.51)	38.0 (±4.18)	30.89 (±3.78)	0.0301
Course communication	39.6 (±7.27)	43.6 (±3.65)	39.11 (±5.23)	0.3258
Time management	23.2 (±5.63)	25.0 (±2.83)	20.56 (±4.56)	0.1038
Technical competence	26.0 (±6.56)	30.0 (±3.08)	19.89 (±6.62)	0.0371

[a] *Kruskal Wallis test*

Table 7. Perceived importance and confidence of faculty members on online teaching competencies by Age Group, PGH, n=19

Competencies	≤40 (n=5) Mean (±SD)	41-50 (n=5) Mean (±SD)	≥51 (n=9) Mean (±SD)	p-value[a]
Attitudes (Importance)				
Course design	38.8 (±5.85)	40.8 (±4.27)	35.22 (±5.52)	0.1505
Course communication	40.2 (±5.26)	41.2 (±2.77)	41.33 (±5.68)	0.7536
Time management	23.6 (±4.04)	26.2 (±3.49)	25.44 (±4.42)	0.4939
Technical competence	29.6 (±3.58)	30.2 (±3.19)	28.00 (±4.97)	0.7231
Ability (Confidence)				
Course design	37.4 (±4.51)	38.0 (±4.18)	30.89 (±3.78)	0.0301
Course communication	39.6 (±7.27)	43.6 (±3.65)	39.11 (±5.23)	0.3258
Time management	23.2 (±5.63)	25.0 (±2.83)	20.56 (±4.56)	0.1038
Technical competence	26.0 (±6.56)	30.0 (±3.08)	19.89 (±6.62)	0.0371

[a] *Kruskal Wallis test*

Table 8. Perceived importance and confidence of faculty members on online teaching competencies by years teaching, PGH, n=19

Competencies	1-5 (n=5) Mean (±SD)	6-10 (n=4) Mean (±SD)	>10 (n=10) Mean (±SD)	p-value[a]
Attitudes (Importance)				
Course design	38.0 (±5)	40.75 (±4.92)	36.2 (±6.05)	0.3286
Course communication	38.2 (±2.95)	42.75 (±3.77)	41.7 (±5.48)	0.1520
Time management	23.6 (±4.04)	25.25 (±3.20)	25.9 (±4.41)	0.5523
Technical competence	30.4 (±4.34)	28.75 (±1.5)	28.4 (±4.86)	0.7554
Ability (Confidence)				
Course design	38.8 (±5.67)	36.50 (±1.91)	31.5 (±8.50)	0.0702
Course communication	40.2 (±7.82)	41.75 (±1.71)	40.0 (±5.68)	0.8080
Time management	23.8 (±6.26)	24.50 (±1.73)	20.9 (±4.43)	0.2096
Technical competence	26.8 (±7.50)	28.75 (±1.5)	21.0 (±7.16)	0.1622

[a] *Kruskal-Wallis test*

Table 9. Perceived importance and confidence of faculty members on online teaching competencies by past virtual teaching experience, PGH, n=19

Competencies	Without experience (n=7) Mean (±SD)	With experience (n=12) Mean (±SD)	p-value[a]
Attitudes (Importance)			
Course design	36.71 (±5.71)	38.17 (±5.70)	0.5993
Course communication	41.14 (±6.28)	40.90 (±3.90)	0.9234
Time management	25.86 (±5.01)	24.75 (±3.47)	0.5758
Technical competence	28.57 (±4.50)	29.25 (±4.09)	0.7407
Ability (Confidence)			
Course design	33.14 (±3.89)	35.25 (±8.94)	0.5650
Course communication	39.00 (±6.35)	41.25 (±5.12)	0.4087
Time management	21.14 (±3.98)	23.17 (±5.04)	0.3773
Technical competence	23.14 (±6.54)	24.75 (±7.65)	0.6484

[a] *independent t-test*

Table 10. Perceived importance and confidence of faculty members on online teaching competencies by number of years of virtual teaching, PGH, n=13

Competencies	<2 years (n=8) Mean (±SD)	2-5 years (n=5) Mean (±SD)	p-value[a]
Attitudes (Importance)			
Course design	36.00 (±5.42)	41.2 (±3.90)	0.0910
Course communication	39.38 (±4.37)	41.8 (±4.27)	0.3475
Time management	24.25 (±3.85)	24.8 (±3.03)	0.7921
Technical competence	30.00 (±4.57)	28.0 (±2.55)	0.3940
Ability (Confidence)			
Course design	32.88 (±9.58)	39.4 (±4.88)	0.1899
Course communication	39.50 (±6.50)	41.8 (±4.49)	0.5049
Time management	22.75 (±5.28)	23.4 (±4.67)	0.8262
Technical competence	24.25 (±8.99)	25.2 (±4.44)	0.8316

[a] *independent t-test*

Table 11. Perceived importance and confidence of faculty members on online teaching competencies by preferred mode of teaching, PGH, n=19

Competencies	Asynchronous (n=2)	Face-to-face (n=1)	Hybrid (n=14)	Synchronous (n=2)	p-value[a]
Attitudes (Importance)					
Course design	36.5 (±0.71)	32	37.43 (±5.96)	43.0 (±2.83)	0.3329
Course communication	41.5 (±2.12)	39	40.20 (±4.90)	47.0 (±1.41)	0.3019
Time management	23.5 (±0.71)	23	25.00 (±4.35)	29.0 (±1.41)	0.4784
Technical competence	28	29	29.43 (±4.70)	27.0 (±2.83)	0.8414
Ability (Confidence)					
Course design	35.0 (±1.4)	31	33.93 (±8.22)	39.5 (±6.36)	0.5327
Course communication	41.5 (±0.71)	44	39.79 (±5.91)	42.0 (±8.49)	0.7773
Time management	23.5 (±0.71)	23	21.79 (±5.00)	25.5 (±6.36)	0.8063
Technical competence	28	23	24.07 (±8.11)	21.5 (±3.53)	0.7620

[a] *Kruskal-Wallis test*

Appendix D. The Faculty Readiness to Teach Online (FRTO) instrument

Faculty readiness competencies	Attitudes					Ability				
	SD	D	NAND	A	SA	SD	D	NAND	A	SA
Course Design										
Create an online course orientation (e.g., introduction, getting started)	1	2	3	4	5	1	2	3	4	5
Write measurable learning objectives	1	2	3	4	5	1	2	3	4	5
Design learning activities that provide students opportunities for interaction (e.g., discussion forums, wikis)	1	2	3	4	5	1	2	3	4	5
Organize instructional materials into modules or units	1	2	3	4	5	1	2	3	4	5
Create instructional videos (e.g., lecture video, demonstrations, video tutorials)	1	2	3	4	5	1	2	3	4	5
Use different teaching methods in the online environment (e.g., brainstorming, collaborative activities, discussions, presentations)	1	2	3	4	5	1	2	3	4	5
Create online quizzes and tests	1	2	3	4	5	1	2	3	4	5
Create online assignments	1	2	3	4	5	1	2	3	4	5
Manage grades online	1	2	3	4	5	1	2	3	4	5
Course Communication										
Send announcements/email reminders to course participants	1	2	3	4	5	1	2	3	4	5
Create and moderate discussion forums	1	2	3	4	5	1	2	3	4	5
Use email to communicate with the learners	1	2	3	4	5	1	2	3	4	5
Respond to student questions promptly (e.g., 24 to 48 hours)	1	2	3	4	5	1	2	3	4	5
Provide feedback on assignments (e.g., 7 days from submission)	1	2	3	4	5	1	2	3	4	5
Use synchronous web-conferencing tools (e.g., Adobe Connect, Webex, Blackboard Collaborate, Skype)	1	2	3	4	5	1	2	3	4	5
Communicate expectations about student behavior (e.g., netiquette)	1	2	3	4	5	1	2	3	4	5
Communicate compliance regarding academic integrity policies	1	2	3	4	5	1	2	3	4	5
Apply copyright law and fair use guidelines when using copyrighted materials	1	2	3	4	5	1	2	3	4	5
Apply accessibility policies to accommodate student needs	1	2	3	4	5	1	2	3	4	5

Appendix D. The Faculty Readiness to Teach Online (FRTO) instrument *(continued)*

Faculty readiness competencies	Attitudes					Ability				
	SD	D	NAND	A	SA	SD	D	NAND	A	SA
Time Management										
Schedule time to design the course before delivery (e.g., a semester before delivery)	1	2	3	4	5	1	2	3	4	5
Schedule weekly hours to facilitate the online course	1	2	3	4	5	1	2	3	4	5
Use features in the learning management system to manage time (e.g., online grading, rubrics, SpeedGrader, calendar)	1	2	3	4	5	1	2	3	4	5
Use facilitation strategies to manage time spent on course (e.g., discussion board moderators, collective feedback, grading scales)	1	2	3	4	5	1	2	3	4	5
Spend weekly hours to grade assignments	1	2	3	4	5	1	2	3	4	5
Allocate time to learn about new strategies or tools	1	2	3	4	5	1	2	3	4	5
Technical competence										
Complete basic computer operations (e.g., creating and editing documents, managing files, and folders)	1	2	3	4	5	1	2	3	4	5
Navigate within the course in the learning management system (e.g., Moodle, Canvas, Blackboard, etc.)	1	2	3	4	5	1	2	3	4	5
Use course roster in learning management system to set up teams/groups	1	2	3	4	5	1	2	3	4	5
Use online collaborative tools (e.g., Google Drive, Dropbox)	1	2	3	4	5	1	2	3	4	5
Create and edit videos (e.g., iMovie, Movie Maker, Kaltura)	1	2	3	4	5	1	2	3	4	5
Share open educational resources (e.g., learning websites, Web resources, games, and simulations)	1	2	3	4	5	1	2	3	4	5
Access online help desk/resources for assistance	1	2	3	4	5	1	2	3	4	5

SD – Strongly disagree; D – Disagree; NAND – Neither agree nor disagree; A – Agree; SA – Strongly agree

Appendix E. The Online Readiness Learning Scale (OLRS) Dimensions and items

Item no.	Dimensions / items	SA	D	NAND	A	SA
Computer/Internet self-efficacy						
CIS1	I feel confident in performing the basic functions of Microsoft Office programs (MS Word, MS Excel, and MS PowerPoint).	1	2	3	4	5
CIS2	I feel confident in my knowledge and skills of how to manage software for online learning.	1	2	3	4	5
CIS3	I feel confident in using the Internet (Google, Yahoo) to find or gather information for online learning.	1	2	3	4	5
Self-directed learning						
SDL1	I carry out my study plan.	1	2	3	4	5
SDL2	I seek assistance when facing learning problems.	1	2	3	4	5
SDL3	I manage time well.	1	2	3	4	5
SDL4	I set up my learning goals.	1	2	3	4	5
SDL5	I have higher expectations for my learning performance.	1	2	3	4	5
Learner Control						
LC1	I can direct my learning progress.	1	2	3	4	5
LC2	I m not distracted by other online activities when learning online.	1	2	3	4	5
LC3	I repeated the online instructional materials based on my needs.	1	2	3	4	5
Motivation for Learning						
MFL1	I am open to new ideas.	1	2	3	4	5
MFL2	I have the motivation to learn.	1	2	3	4	5
MFL3	I feel confident in using online tools (email, discussion) to communicate with others effectively.	1	2	3	4	5
MFL4	I feel confident in expressing myself (emotions and humor) through text.	1	2	3	4	5
Online communication self-efficacy						
OCS1	I feel confident in using online tools (email, discussion) to communicate with others effectively.	1	2	3	4	5
OCS2	I feel confident in expressing myself (emotions and humor) through text.	1	2	3	4	5
OCS3	I feel confident in posting questions in online discussions.	1	2	3	4	5

SD – Strongly disagree; D – Disagree; NAND – Neither agree nor disagree; A – Agree; SA – Strongly agree