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Role of e-learning in Clinical Skill Among Clinical Year Medical Students of Melaka-Manipal Medical College (MMMC) - A Cross Sectional Study

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Abstract

E-learning platform has become one of the popular teaching methods and it is being utilized as an important component in medical schools. This study was conducted to evaluate if there is a role of E-learning in clinical skills among the undergraduate clinical year medical students in Melaka Manipal Medical College (MMMC). We wanted to know what is the factor affecting the learning outcome of the students through E-learning and the way to improve E-learning on learning clinical skills especially during this COVID-19 pandemic. A cross-sectional study was conducted for this study. 200 undergraduate clinical year medical students ranging from Year 4 to Year 5 from MMMC voluntarily participated our study. They participated in the online survey. Each participant received a short answer structured questionnaire to assess their sociodemographic details, IT ability, availability, accessibility and connectivity as well as experiences and attitudes towards the use of E-learning and their learning of clinical skills. Statistical tests like unpaired t-test and ANOVA were done using Epi info version 7.2. Majority of the students (93.6%) had access to computer in living accommodation 54.7% of the participants reported that they had not taken any E-learning course previously. Then, 83.3% of the participants did not prefer E-learning over conventional teaching methods. It is found that there is association between having access to computer in living accommodation and student's perceived IT ability whereas there is association between whether the students had taken E-learning courses previously, their preference of E-learning over conventional teaching methods and their attitudes towards E-learning. Although students had good perceived IT ability, but majority of them still did not prefer E-learning over the traditional teaching methods. Thus, E-learning may not be the preferable choice to replace clinical skills among clinical year students in MMMC.

Keywords

Medical Students, Clinical Skills, E-learning, Clinical Year, COVID-19

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1. Introduction

E-learning is also called Web-based learning, online learning, computer-assisted instruction, or Internet-based learning. It is sub-categorized into two modes: distance learning and computer-assisted instruction. Former ones utilizes information technologies to deliver instruction to learners who are at remote locations from a central site. Latter one uses computers to aid in the delivery of stand-alone multimedia packages for learning and teaching. [1] In this era of globalization, the environment in which medical students learn today is vastly different compared to 20 years ago since technology has been a massive contribution in advancement of humanity; including medical education. [2] Universities have placed considerable investment in the development of E-learning for undergraduate's curricula as it has the potential

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of providing an efficient and economical learning environment. E-learning has now been established in many medical schools and it has been widely used in undergraduate education. Despite the contribution by such learning technologies, its effectiveness has been a question, whether it actually assists the undergraduates to acquire clinical skills or the traditional teaching method is much more preferred. [3]

Recently, there is increased demands on academic faculty as there is changes in health care delivery and advances in medicine resulting in less time for teaching. [4] Many advantages have been noted in the literature, including its flexibility and the capacity for learning to be self-paced and traceable, catering to different learning styles and enabling the learner to review as they need to. [5] Some of the main advantages include the economical factor, student have 24-hour access to needed information and learning materials independently of a place or time. They will also be able to contact the professors anytime whenever they face a challenge on studies as E-learning bridge the gap of physical presence. [6] One of the formats available for E-learning in clinical education is offering online videos on clinical skills like OSCE videos. This helps to foster interactions between teachers and students, and it is an effective way to convey the class uniformly. [7] E-learning enables learners to participate in their own education actively and learner is motivated to become more engaged. [8]

E-learning could be useful in building up knowledge like basic sciences, from the available sources. However, its is limited in teaching medical students and qualified doctors' clinical skills like physical examinations which require direct observation and practice. As communication skills are best learned by interaction with patients and colleagues in clinical practice, E-learning also plays a limited role. [9] Some factors create barriers for online learning. For example: administrative issues, social interaction, academic skills, technical skills, learner motivation, time and support for studies. [10]

However, the coronavirus disease 2019 (COVID-19) has rapidly transitioned into a worldwide pandemic. The epidemics of COVID-19 first identified by the Chinese Centre for Disease Control and Prevention from a throat swab of a patient in Wuhan, Hubei province of China last December and have become a major challenging public health problem for not only China but also countries around the world. [11] On January 8, 2020, a novel coronavirus was officially announced as the causative pathogen of COVID-19 by the Chinese Center for Disease Control and Prevention. On January 30, 2020, the World Health Organization (WHO) announced that this outbreak had constituted a public health emergency of international concern. [12] The International Committee on Taxonomy of Viruses (ICTV) named the virus as SARS-CoV-2 and the disease as COVID-19. [13-15] As of now; which is 18 May 2020, there is total of 4,618,821 cases including 93,324 new cases and 311,847 deaths including 4,452 new death globally. While in Malaysia, there is 6,894 total cases including 22 new confirmed cases and a total of 113 deaths with no new death case reported. [16]

In the wake of novel coronavirus (COVID-19) pandemic, not only MMMC, Malaysia but all medical education faculty in all over the world have quickly transitioned the entire pre-clerkship curriculum to online formats including E-learning. Examinations have also transitioned to online settings. A transformative change in the current approach to medical education across the world is inevitable and although the full extent is unknown at the current time it is essential to consider potential future scenarios to begin the process of preparing for the future. [17] The profound effects of COVID-19 may forever change how future physicians are educated. [18]

Therefore, a question has arisen, especially among medical students: is there really a place for E-learning in the clinical skill? The replacement of in-person classes with online equivalents is an obvious necessity at this time but creates a loss of collaborative experiences that has the potential to be a significant detriment to education. However, the cancellation of clerkships, which are necessary for both skill acquisition as well as for relationship building, is a serious issue which students and medical schools must now resolve. Medical students not only will losing the opportunity of collaborative experiences, experiences from clerkships but also lost the opportunity for personal development through conference presentations that plays a big role during the residency application process which have the potential to be a serious detriment to medical students' career trajectory. On a national level there is an apparent lack of a cohesive approach to E-learning in health care education. [19] Concerns have also been highlighted that such educational activities may be driven more by novelty, than pedagogical evidence. [20, 21]

Despite widespread panic and uncertainty, the medical community must ask itself what history has taught us about medical education during pandemics. Students might struggle in adapting to this initiative as they now must lead their own learning process. Even though students were advocates of technology, many of them were unwilling to forgo the face-to-face learning experiences. [22] Furthermore, there is inadequate guidance on how to integrate E-learning into the curriculum despite that information technology resources be integral part to supporting the clinical skills curriculum has been recommended. [23] It is necessary for students to have the opportunity to develop and improve their clinical skills in appropriate teaching environments. [24] It has also been recognized that there has been added pressure on already overworked faculty as the changes and developments in the

medical education. [25]

Another aspect in question is the difference in IT accessibility, ability, including training and usage. It is not surprising that students' knowledge and skills in information and technology has impact on their self-efficacy to maximize the usage of E-learning. According to the study of Compeau, and Higging (1995), it is found that self-efficacy shapes the individuals beliefs and behaviours as well. In addition to this, it can be concluded that the difference in skills of using the technology and its accessibility do have impact on the usage of E-learning. [26] In order for learners to engage with E-learning, they require accessibility of relevant technologies and the appropriate IT skills. However a lack of such skills and inadequate technology provision have been identified as potential barriers to E-learning both for health care professionals and students. [21, 27] Where some domains may lend themselves well to E-learning, clinical skills has been considered a challenging area for online learning. [28]

Thus, we have conducted a research to assess the perception towards E-learning in clinical study among medical students in MMMC Malaysia through an online survey. The objectives of conducting this study is to assess undergraduate medical students' of MMMC of (i) perceived levels of IT ability, accessibility and availability, (ii) experiences and attitudes towards E-learning and their development of clinical skills, (iii) attitudes towards E-learning in clinical skills education compared to other teaching methods.

2. Methodology

2.1. Study Design, Population, Time and Place

A cross-sectional study was conducted among the undergraduate clinical year medical students of a private medical college, Melaka Manipal Medical College (MMMC). This study was carried out from May 2020 until June 2020. Our college has 2 campuses which is located at Muar, Johor and in Malacca. The Muar campus offers Bachelor of Medicine and Surgery (MBBS) Year 4, while the Malacca campus offers (MBBS) Year 5, Bachelor of Dental Surgery (BDS) and Foundation in science (FIS). This study is conducted among Year 4 and Year 5 of MBBS students only.

2.2. Sample Size

The sample size of this study was calculated using a sample size calculator from the application "Epi Info". Based on the application software "Epi Info" version 7.2 with our estimated population size of 600, expected frequency of 50% and acceptable margin of error 6.0%, along with a confidence level of 95%, thus, we conclude that our sample size is 185.

The minimum sample size needed was calculated as shown below:

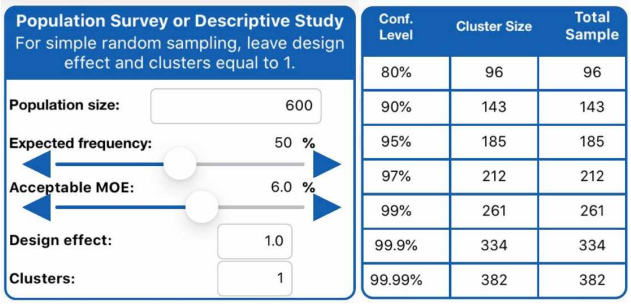

Figure 1. Sample size.

Upon calculating the sample size (n) using formula application software "Epi Info" version 7.2, and taking non-response percentage of 20% into consideration, n_{final} was calculated as follows:

$$n_{final} = n_{calculated} / 1 - (\text{non response } \%)$$

$$= 185 / 1 - 0.2\ (20\%)$$

$$= 231.25$$

The final sample size obtained for this study after rounding off was 231.

2.3. Sampling Method

The sampling method is non-probability sampling method using the purposive sampling. A self-administered questionnaire was distributed to all the students. For the inclusion criteria, we involved 1) clinical year MBBS students from Semester 6 to Semester 10 from MMMC, Malaysia and 2) students who voluntarily took part in our study. The exclusion criteria including 1) students who did not want to involve themselves in the study, or 2) who did not complete the questionnaire or 3) students of FIS and BDS from MMMC, Malaysia.

2.4. Data Collection Method

The data was collected by the distribution of questionnaire through Google form to those students in Year 4 and Year 5, studying in Muar and Malacca campus of MMMC. This questionnaire and the survey items were formulated based on the previously published article. [3]

This study accesses if there is a place of E-learning in clinical skills among the clinical year undergraduate medicals students in MMMC between the independent variables and dependent variables. The questionnaire consisted of 8 parts. Before proceeding with the questionnaire, the informed consent (awareness and knowledge of the participant's right) was compulsory to be filled in. In part 2, participant had to fill in their sociodemographic information.

Open-ended, close-ended and multiple-choice questions were consisted in part 3 and part 4. Part 3 included 10 questions which helped us to identify the students' IT usage, accessibility, availability and connectivity. Next, part 4 contained 8 questions.

Moreover, 5-point linear scale was used from part 5 to part 8 - strongly disagree (1), disagree (2), neutral (3), agree (4), and strongly disagree (5). Then, the participants' responses were rated on a 5-point likert scale ranging from 1= Strongly disagree to 5= Strongly agree.

In part 5, 7 questions were included to access the ability of student to perceive E-learning. While another 7 questions were asked in part 6 about the attitudes towards and experiences of E-learning of clinical skills.

In part 7, different E-learning medias were being chosen by student using 5-point linear scale such as descriptive texts, images, discussion boards, demonstration videos, online assessment, clinical skill check lists and moderated hyperlinks.

Lastly, to perceive the usefulness of different methods of learning clinical skills, 7 methods were included in part 8 such as E-learning, use of simulated patients, hospital attachments, mannequins and simulated models, community attachments, clinical skills laboratory and textbooks.

2.5. Data Processing and Analysis

Data was compiled into Microsoft Excel and eventually statistically analyzed using the software Epi Info version 7.2. In the study, qualitative data frequency and percentage were calculated. Then, quantitative data were analyzed to derive the range, mean along with standard deviation and median. The level of significance is set at 5% which is P=0.05 to find the association between independent and dependent variables. Statistical test that was used for the hypothesis testing was determined based on the independent and dependent variables, tabulated as below.

Table 1. Statistical test used.

Independent variable	Dependent variable	Statistical test
Gender		1. Unpaired t-test
Year	*Experiences and attitudes towards the use of E-learning and their learning of clinical skills.*	2. ANOVA
Funding status	Perceived IT ability	3. Unpaired t-test
Living area	Attitudes towards and experiences of E-learning and learning of clinical skills	4. Unpaired t-test
Access to computer in living accommodation	Perceived usefulness of different E-learning media	5. Unpaired t-test
Whether have taken E-learning course previously	Perceived usefulness of different methods of learning clinical skills	6. Unpaired t-test
E-learning or conventional teaching method		7. Unpaired-test

2.6. Ethical Consideration

An informed consent form with all the important and relevant details of the study was given to the participants. The participants were given the option to participate in this study, and none were forced into participation. The participants' information was kept confidential and used only for the purpose of the particular research. Their anonymity and privacy were well maintained. This research was approved by the Research Ethics Committee, Faculty of Medicine, MMMC.

3. Results

Table 2. Sociodemographic characteristics of undergraduate medical students. (n=203).

Variables	n (%)
Age	
<22	22 (10.8%)
22-25	173 (85.2%)
>25	8 (3.9%)
Mean (SD)	22.7
Minimum - Maximum	20 - 27
Gender	
Male	73 (36.0%)
Female	130 (64.0%)
Ethnicity	
Malay	44 (21.7%)
Chinese	66 (32.5%)
Indian	68 (33.5%)
Others	25 (12.3%)
Nationality	
Malaysian	193 (95.1%)
International student	10 (4.9%)
Year	
4	139 (68.5%)
5	64 (31.5%)
Funding status	
Scholarship	47 (23.2%)
Self-funded	156 (76.9%)
In which area do you live?	
City	155 (76.4%)
Rural area	48 (23.7%)

Table 3. IT usage, accessibility, availability and connectivity among undergraduate medical students.

Variables	Frequency (%)
Do you have the satisfactory access to a computer on campus?	
Strongly agree	34 (16.8%)
Agree	66 (32.5%)
Neutral	64 (31.5%)
Disagree	31 (15.3%)
Strongly disagree	8 (3.9%)
Do you have any access to computer in living accommodation?	
Yes	190 (93.6%)
No	13 (6.4%)
What type of computer do you own?	
Desktop personal computer	6 (3.0%)
Laptop	197 (97.0%)
If you don't own a computer are you considering buying one? (Consideration of buying one)	
Yes	156 (76.9%)
No	47 (23.2%)
If you don't own a computer and are considering buying one – what is your main incentive for doing this? (Main incentive of buying computer)	
Leisure	5 (2.5%)
Studying	26 (12.8%)
Leisure and studying	172 (84.7%)
If you own a computer, what type of internet access do you have in your living accommodation? (Type of internet access in living accommodation if own a computer)	
Dial up	1 (0.5%)
Broadband	4 (2.0%)
Wi-Fi connection	158 (77.8%)
Mobile data (Personal Hotspot)	39 (19.2%)
None	1 (0.5%)
How is your internet connection at home?	
Good connection	142 (70.0%)
Poor connection	61 (30.1%)
If your internet connection is poor, what will you do?	
Go to anywhere nearby to get good internet connection	167 (82.3%)
Will not attend the online class session	36 (17.7%)
What is the average time do you spend online (per week) for studying?	
Less than 3 hours	46 (22.7%)
3-6 hours	70 (34.5%)
6-9 hours	32 (15.8%)
More than 9 hours	55 (27.1%)
What is average time do you spend online (per week) for leisure purpose?	
Less than 3 hours	26 (12.8%)
3-6 hours	48 (23.7%)
6-9 hours	47 (23.2%)
More than 9 hours	82 (40.4%)

Table 4. Perception of E-learning among undergraduate medical students.

Variables	Frequency (%)
Are you aware of E-learning has been growing and has become more popular in recent times?	
Yes	200 (98.5%)
No	3 (1.5%)
Have you taken E-learning courses previously?	
Yes	92 (45.3%)
No	111 (54.7%)
Do you prefer E-learning over conventional teaching methods?	
Yes	34 (16.8%)
No	169 (83.3%)
What types of E-learning methods do you prefer?	
Text-driven	42 (20.7%)
Interactive	95 (46.8%)
Simulation	66 (32.5%)
Do you understand the course that was taught to you through E-learning?	
Yes	131 (64.5%)
No	72 (35.5%)
Do you think your academic performances has improved through E-learning courses?	
Yes	57 (28.1%)

Variables	Frequency (%)
No	146 (71.9%)
Does E-learning prepare you well for competitive exams?	
Yes	28 (13.8%)
No	175 (86.2%)

Table 5. Experiences and attitudes towards the use of E-learning and the learning of clinical skills among undergraduate medical students.

No	Item	Strongly Disagree n (%)	Disagree n (%)	Neutral n (%)	Agree n (%)	Strongly Agree n (%)
Perceived IT ability						
1	Overall I am confident using a computer	2 (1.0%)	10 (4.9%)	34 (16.8%)	72 (35.5%)	85 (41.9%)
2	I have good keyboard skills	1 (0.5%)	12 (5.9%)	48 (23.7%)	66 (32.5%)	76 (37.4%)
3	I am confident word processing	1 (0.5%)	10 (4.9%)	53 (26.1%)	69 (34.0%)	70 (34.5%)
4	I am confident using Power Point.	2 (1.0%)	10 (4.9%)	45 (22.2%)	79 (38.3%)	67 (33.0%)
5	I am confident using e-mail.	0	5 (2.5%)	21 (10.3%)	76 (37.4%)	101 (49.8%)
6	I am confident browsing the internet	0	4 (2.0%)	16 (7.9%)	63 (31.0%)	120 (59.1%)
7	I am confident using media software	4 (2.0%)	11 (5.4%)	51 (25.1%)	66 (32.5%)	71 (35.0%)
Attitudes towards and experiences of E-learning and learning of clinical skills						
1	Overall E-learning is useful in my learning of clinical skills	51 (25.1%)	50 (24.6%)	57 (28.1%)	28 (13.8%)	17 (8.4%)
2	I feel that E-learning encourages me to examine real patients	74 (36.5%)	47 (23.2%)	47 (23.2%)	19 (9.4%)	16 (7.9%)
3	I review E-learning material prior to my teaching sessions.	28 (13.8%)	37 (18.2%)	60 (29.6%)	58 (28.6%)	20 (9.9%)
4	E-learning encourages me to attend clinical attachments	41 (20.2%)	45 (22.2%)	67 (33.0%)	29 (14.3%)	21 (10.3%)
5	I find E-learning useful for my assessment preparation in clinical skills	61 (30.1%)	49 (24.1%)	56 (27.6%)	29 (14.3%)	8 (3.9%)
6	E-learning improves standardization of teaching	52 (25.6%)	39 (19.2%)	66 (32.5%)	39 (19.2%)	7 (3.5%)
7	E-learning encourages me to purchase textbooks	48 (23.7%)	44 (21.7%)	45 (22.2%)	39 (19.2%)	27 (13.3%)
Perceived usefulness of different E-learning media I find the following media useful in my learning of clinical skills:						
1	Descriptive Texts	6 (3.0%)	14 (6.9%)	64 (31.5%)	88 (43.4%)	31 (15.3%)
2	Images	5 (2.5%)	4 (2.0%)	25 (12.3%)	89 (43.8%)	80 (39.4%)
3	Discussion boards	4 (2.0%)	9 (4.4%)	55 (27.1%)	81 (39.9%)	54 (26.6%)
4	Demonstration Videos	2 (1.0%)	6 (3.0%)	23 (11.3%)	80 (39.4%)	92 (45.3%)
5	Online assessment	26 (12.8%)	29 (14.3%)	59 (29.1%)	56 (27.6%)	33 (16.3%)
6	Clinical skill check lists	13 (6.4%)	26 (12.8%)	52 (25.6%)	73 (36.0%)	39 (19.2%)
7	Moderated hyperlinks	13 (6.4%)	23 (11.3%)	78 (38.4%)	66 (32.5%)	23 (11.3%)
Perceived usefulness of different methods of learning clinical skills I find the following useful in my learning of clinical skills:						
1	E-learning	37 (1.8%)	54 (26.6%)	72 (35.5%)	30 (14.8%)	10 (4.9%)
2	Use of simulated patients	10 (4.9%)	15 (7.4%)	59 (29.1%)	63 (31.0%)	56 (27.6%)
3	Hospital Attachments	7 (3.5%)	6 (3.0%)	31 (15.3%)	58 (28.6%)	101 (49.8%)
4	Mannequins and simulated models	7 (3.5%)	8 (3.9%)	34 (16.8%)	94 (46.3%)	60 (29.6%)
5	Community attachments	5 (2.5%)	12 (5.9%)	52 (25.6%)	75 (37.0%)	59 (29.1%)
6	Clinical skills laboratory	7 (3.5%)	7 (3.5%)	35 (17.2%)	83 (40.9%)	71 (35.0%)
7	Text books	6 (3.0%)	15 (7.4%)	67 (33.0%)	59 (29.1%)	56 (27.6%)

Table 6. Descriptive statistics of experiences and attitudes towards the use of E-learning and the learning of clinical skills among undergraduate medical students.

Variables	Mean SD	Median	Minimum - Maximum
Perceived IT ability	4.1 (0.7)	4.1	2.1 - 5.0
Attitudes towards and experiences of E-learning and learning of clinical skills	2.6 (0.9)	2.7	1.0 - 5.0
Perceived usefulness of different E-learning media	3.7 (0.7)	3.7	1.0 - 5.0
Perceived usefulness of different methods of learning clinical skills	3.7 (0.7)	3.7	1.0 - 5.0

Table 7. Association between demographic variables and perceived IT ability among undergraduate medical students.

Variables	Perceived IT ability Mean (SD)	Mean difference (95% CI)	P value
Gender			
Male	4.1 (0.8)	0.07	0.480
Female	4.1 (0.7)	(-0.1, 0.3)	
Year			
4	4.1 (0.7)	-0.1	0.339
5	4.2 (0.7)	(-0.3, 0.1)	
Funding status			
Scholarship	3.9 (0.7)	-0.2	0.060
Self-funded	4.2 (0.7)	(-0.5, 0.01)	
In which area do you live?			
City area	4.1 (0.7)	0.1	0.331
Rural area	4.0 (0.7)	(-0.1, 0.4)	
Do you have any access to computer in living accommodation?			
Yes	4.1 (0.7)	-0.5	0.020
No	3.7 (0.6)	(-0.9, -0.1)	

Variables	Perceived IT ability Mean (SD)	Mean difference (95% CI)	P value
Have you taken E-learning courses previously?			
Yes	4.2 (0.6)	-0.2	0.084
No	4.0 (0.8)	(-0.4, 0.02)	
Do you prefer E-learning over conventional teaching methods?			
Yes	4.2 (0.7)	-0.1	0.300
No	4.1 (0.7)	(-0.4, 0.1)	

In Table 7, it shows the result of association between independent variables and perceived IT ability among students in MMMC using unpaired t-test. For the gender component, male perceived IT ability have a mean score of 4.1 (SD=0.8) which is equal to female. The mean difference is 0.07 with 95% CI range from -0.1 to 0.3 and P-value which is 0.480, showing that there is no association between gender and perceived IT ability of students. Next, students from Year 4 and Year 5 of MBBS were taken into consideration whether does it effects the perceived IT ability of students. Year 5 students has higher mean value of 4.2 (SD=0.7) compared to Year 4 students which is 4.1 (SD=0.7). the mean difference is -0.1 ranging from -0.3 to 0.1. Result of P value is 0.339, showing that there is no association between semester and perceived IT ability. Next, students with scholarships has a mean score of 3.9 (SD=0.7) which is slightly lower than students who are self-funded which has a mean score of 4.2 (SD=0.7). The mean difference is -0.2 with 95% CI range from -0.5 to 0.01 and P-value is 0.060 showing that there is no association between funding status and perceived IT ability.

Not only that, areas that the student live were also tested, where the student that lives in city area has a mean score of 4.1 (SD=0.7) which is slightly higher than rural area that has the mean score of 4.0 (SD=0.7). The mean difference is 0.1 with 95% CI range of -0.1 to 0.4 and P-value is 0.331 showing that there is no association of area that the student lives with perceiving the IT ability. Then, student with computer has a mean score of 4.1 (SD=0.7) which is more than students without a computer that has a mean score of 3.7 (SD=0.6). The mean difference is -0.5 with 95% CI range ranging from -0.9 to -0.1 and P-value which is 0.020 showing that there is no association. Students that taken E-learning courses before has a mean score of 4.2 (SD= 0.6) which is more than student that has not taken any E-learning courses which has a mean score of 4.0 (SD=0.8). The mean difference is -0.2 with 95% CI range ranging from -0.4 to 0.02 and P-value which is 0.084 showing that there is no association. Last but not least, students who prefer E-learning over conventional teaching methods has a mean score of 4.2 (SD=0.7), slightly higher than students who prefer conventional teaching methods which has a mean score of 4.1 (SD=0.7). The mean difference is -0.1 with 95% CI ranging from -0.4 to 0.1. The P-value is 0.300 showing that there is no association.

Table 8. Association between demographic variables and attitude towards and experiences of E-learning; and learning of clinical skills among undergraduate medical students.

Variables	Attitudes towards and experiences of E-learning and learning of clinical skills Mean (SD)	Mean difference (95%)	P value
Gender			
Male	2.6 (1.0)	0.04	0.763
Female	2.6 (0.8)	(-0.2, 0.3)	
Year			
4	2.6 (0.9)	-0.1	0.892
5	2.7 (1.0)	(-0.4, 0.1)	
Funding status			
Scholarship	2.7 (0.8)	0.1	0.368
Self-funded	2.6 (0.9)	(-0.2, 0.4)	
In which area do you live?			
City area	2.6 (0.9)	0.06	0.704
Rural area	2.6 (0.9)	(-0.2, 0.3)	
Do you have any access to computer in living accommodation?			
Yes	2.6 (0.9)	-0.2	0.467
No	2.4 (1.0)	(-0.7, 0.3)	
Have you taken E-learning courses previously?			
Yes	2.9 (0.9)	-0.5	<0.001
No	2.4 (0.8)	(-0.7, -0.3)	
Do you prefer E-learning over conventional teaching methods?			
Yes	3.2 (0.8)	-0.7	<0.001
No	2.5 (0.9)	(-1.0, -0.4)	

Table 8 shows association between independent variables and attitudes towards and experiences of E-learning and learning of clinical skills using unpaired t-test. For gender and attitude towards and experiences of E-learning and learning of clinical skills, male has a mean score of 2.6 (SD=1.0) while female has a mean score of 2.6 (SD=0.8) which is equal. The mean

difference is 0.04 with a CI range of 95% ranging from -0.2 to 0.3. The P-value is 0.763 showing that there is no association between gender and attitude towards and experiences of E-learning and learning of clinical skills. For year wise the mean score for Year 4 is 2.6 (SD=0.9) while Year 5 have the higher mean value of 2.7 (SD=1.0). The mean difference is -0.1 ranging from -0.4 to -0.1 and there is no significant mean difference value taken, the P-value is 0.892 showing that there is no association. Next, funding status who has scholarship has a mean score of 2.7 (SD=0.8) which is higher than self-funded 2.6 (SD=0.9), the mean difference is 0.1 ranging from -0.2 to 0.4, the P-value is 0.3681 which has no association.

In addition, student that has a computer has a mean score of 2.6 (SD=0.9) which is higher than students that without computer, with mean score of 2.4 (SD=1.0). The mean difference is -0.2 ranging from -0.7 to -0.3, the P-value is 0.467 showing that there is no association. Next, we found out that, students that has taken E-learning courses has a mean score of 2.9 (SD=0.9) is higher than students that has not taken any E-learning courses has a mean score of 2.4 (SD=0.8). The mean difference is -0.5 ranging from -0.7 to -0.3, and P-value is <0.001 showing that there is association between taken E-learning courses previously and the attitude towards and experiences of E-learning and learning of clinical skills. Lastly, for students who prefer E-learning has a mean score of 3.2 (SD=0.8) which is higher than students who prefer conventional teaching methods that is 2.5 (SD=0.9). The mean difference is -0.7 ranging from -1.0 to -0.4, the P-value is <0.001, showing that there is association.

Table 9. Association between demographic variables and perceived usefulness of different E-learning media among undergraduate medical students.

Variables	Perceived usefulness of different E-learning media Mean (SD)	Mean difference (95% CI)	P value
Gender			
Male	3.7 (0.7)	0.0009	0.993
Female	3.7 (0.7)	(-0.2, 0.2)	
Year			
4	3.7 (0.7)	-0.08	0.453
5	3.8 (0.7)	(-0.3, 0.1)	
Funding status			
Scholarship	3.8 (0.6)	0.1	0.227
Self-funded	3.7 (0.8)	(-0.1, 0.4)	
In which area do you live?			
City area	3.7 (0.8)	0.03	0.832
Rural area	3.7 (0.7)	(-0.2, 0.3)	
Do you have any access to computer in living accommodation?			
Yes	3.7 (0.7)	-0.003	0.988
No	3.7 (1.0)	(-0.4, 0.4)	
Have you taken E-learning courses previously?			
Yes	3.8 (0.7)	-0.2	0.043
No	3.6 (0.8)	(-0.4, -0.006)	
Do you prefer E-learning over conventional teaching methods?			
Yes	4.0 (0.6)	-0.4	0.006
No	3.6 (0.7)	(-0.6, -0.1)	

In Table 9, it shows the association between the independent variables and perceived usefulness of different E-learning media using unpaired t-test. For gender association, male has a mean score of 3.7 (SD=0.7) which is equal to female's mean score of 3.7 (SD=0.7). The mean difference is 0.0009 which has a 95% of CI ranging from -0.2 to 0.2, the P-value is 0.993 which shows that it has no association between gender and perceived usefulness of different E-learning media. Next, The mean score for Year 4 is 3.7 (SD=0.7), while Year 5 students has higher mean value of 3.8 (SD=0.7). The mean difference is -0.08 with ranging from -0.3 to 0.1, with P-value of 0.777 shows that it has no association. Funding status of scholarship students has a mean score of 3.8 (SD= 0.6) higher than the mean score of self-funded student which has a mean score of 3.7 (SD=0.7). The mean difference is 0.1 which has a 95% CI ranging from -0.1 to 0.4. The P-value is 0.227 which shows no association. Next, in the city area students recorded a mean score of 3.7 (SD=0.8) while students in rural area has a mean score of 3.7 (SD=0.7). The mean difference is 0.03 which has a 95% CI ranging from -0.2 to 0.3, the P-value is 0.832 which shows that it has no association.

Then, student who has access to computer in living accommodation has a mean score of 3.7 (SD=0.7) equal to student who does not have access to computer which has a mean score of 3.7 (SD=1.0). The mean difference is -0.003 which has a 95% CI ranging from -0.4 to 0.4, the P-value is 0.988 showing that it has no association. Following is the component of whether student has taken E-learning courses previously, students who has taken E-learning courses has a mean score of 3.8 (SD=0.7) higher than students who has not taken any E-learning courses previously which has a mean score of 3.6 (SD=0.8), the mean difference is -0.2 which has a 95% CI ranging from -0.4 to -0.006, the P-value is 0.043

which shows no association. Lastly is whether students prefer E-learning over conventional methods, students who prefer E-learning over conventional method has a mean score of 4.0 (SD=0.6) higher than students who does not prefer which has a mean score of 3.6 (SD=0.7), the mean difference is -0.4 which has a 95% CI ranging from -0.6 to -0.1, the P-value is 0.006, which shows no association.

Table 10. Association between demographic variables and perceived usefulness of different methods of learning clinical skills among undergraduate medical students.

Variables	Perceived usefulness of different methods of learning clinical skills Mean (SD)	Mean difference (95%)	P value
Gender			
Male	3.7 (0.7)	0.07	0.484
Female	3.7 (0.8)	(-0.1, 0.3)	
Year			
4	3.7 (0.8)	-0.1	0.620
5	3.8 (0.6)	(-0.3, 0.2)	
Funding status			
Scholarship	3.8 (0.7)	0.1	0.367
Self-funded	3.7 (0.7)	(-0.1, 0.3)	
In which area do you live?			
City area	3.7 (0.7)	0.1	0.406
Rural area	3.6 (0.8)	(-0.1, 0.3)	
Do you have any access to computer in living accommodation?			
Yes	3.7 (0.7)	0.2	0.333
No	3.9 (0.9)	(-0.2, 0.6)	
Have you taken E-learning courses previously?			
Yes	3.8 (0.6)	-0.2	0.133
No	3.6 (0.8)	(-0.4, 0.05)	
Do you prefer E-learning over conventional teaching methods?			
Yes	3.8 (0.8)	-0.1	0.545
No	3.7 (0.7)	(-0.4, 0.2)	

Table 10 shows the association between independent variables and perceived usefulness of different methods of learning clinical skills using unpaired t-test. For gender association, male has a mean score of 3.7 (SD=0.7) which is equal to female's mean score of 3.7 (SD=0.8). The mean difference is 0.07 which has a 95% of CI ranging from -0.1 to 0.3, the P-value is 0.484 which shows that it has no association between gender and perceived usefulness of different E-learning media. Next, the mean score of Year 5 students is 3.8 (SD=0.6) which is higher than mean value of Year 4 students, 3.7 (SD=0.8). The mean difference is -0.1 with a range from -0.3 to 0.2, with P-value of 0.210 shows that it has no association. Funding status of scholarship students has a mean score of 3.8 (SD=0.7) higher than the mean score of self-funded student with mean score of 3.7 (SD=0.7). The mean difference is 0.1 which has a 95% CI ranging from -0.1 to 0.3. The P-value is 0.367 which shows no association. Next in the city area students recorded a mean score of 3.7 (SD=0.7) while students in rural area has a mean score of 3.6 (SD=0.8). The mean difference is 0.1 which has a 95% CI ranging from -0.1 to 0.3, the P-value is 0.406 which shows that it has no association.

Furthermore, student who has access to computer in living accommodation has a mean score of 3.7 (SD=0.7) higher to student who does not have access to computer which has a mean score of 3.6 (SD=0.8). The mean difference is 0.2 which has a 95% CI ranging from -0.2 to 0.6, and the P-value is 0.333 showing that it has no association. Following is the component of whether student has taken E-learning courses previously, students who has taken E-learning courses has a mean score of 3.8 (SD=0.6) higher than students who has not taken any E-learning courses previously which has a mean score of 3.6 (SD=0.8), the mean difference is -0.2 which has a 95% CI ranging from -0.4 to 0.05, the P-value is 0.133 which shows no association. Lastly, whether students prefer E-learning over conventional methods, students who prefer E-learning over conventional method has a mean score of 3.8 (SD=0.8) higher than students who does not prefer which has a mean score of 3.7 (SD=0.7), the mean difference is -0.1 which has a 95% CI ranging from -0.4 to 0.2, the P-value is 0.545, which shows no association.

4. Discussion

A cross-sectional study was conducted among Year 4 and Year 5 of undergraduate medical students of MMMC, Malaysia. The aim of this cross-sectional study was to assess the clinical years of undergraduate medical students' (i) perceived levels of IT ability, accessibility and availability, (ii) experiences and attitudes towards E-learning and their development of clinical skills, and (iii) attitudes towards E-learning in clinical skills education compared to other teaching methods.

In the current scenario, for training tomorrow's physician where the dynamic changes are evolving in health care

delivery system with new advancements, humongous challenges needs to be shouldered by current academicians with respect to introduce an efficient and appropriate teaching method for clinical year students during this pandemic COVID-19. [29] General practice is a diverse speciality, and an important part of training is wide exposure to the breadth of practice, with development and practise of communication skills. [30]

Our study's results suggest that 98.5% of clinical years undergraduate medical student were aware of E-learning has been growing and has become more popular in recent times. Not only that, only around 45.3% of the students have taken E-learning courses previously before this E-learning teaching method was introduced during this COVID-19 pandemic, while, more than half of the students (54.7%) have never take E-learning courses before. Moreover, only 16.8% of the students agree and prefer E-learning for clinical skills training module compared to conventional teaching methods. Moreover, about 71.9% of the students think that their academic performances have not been improved since the E-learning courses has been conducted and around 83.3% of them strongly agree that E-learning does not help them in preparing well for competitive exams.

The findings in this study does not consistent with the findings of previous studies on perceptions and effectiveness of using E-learning to enhance the acquisition of clinical skills. [31] Furthermore, there is limited evidence available for online learning replacing clinical experience. A cross-sectional study conducted among medical students in a Private Medical College in Chennai showed that implementing e-learning would improve performance in 99% students with 74% male and 53% female indicating better understanding of the course. 38% agree E-learning is disadvantages as they are comfortable with the traditional teaching style. 86% male and 92% female disagree with adapting difficulties on implementing newer e-learning modules and tools while the others agree due lack of training. [29] Another cross-sectional study which conducted among clinical year medical students in University of Tasmania, Australia by Mary Kelly showed that 95% found the E-learning package useful, 75% perceived it to be effective in increasing their performance and 91% believed it increased their knowledge in consulting skills. [31]

A descriptive cross-sectional study among the population of undergraduate students of Eastern Mediterranean University, Faculty of Education, Department of English Language Teaching (ELT) and Turkish Language Teaching (TLT) in fall 2007-2008 at Northern Cyprus, it was found out that their mean score on computer self-efficacy is higher compared to our findings. This might be due to the vast development of their country at much higher pace compared to our country. [26] In our study, we found that 'attitudes towards and experiences of e-learning and learning of clinical skills' suggests the otherwise, as the mean score is 2.6, showing students do not agree that e-learning is useful for their clinical skills. However, according to an analytic cross-sectional study carried out among undergraduate medical students conducted in the School of Medicine and Dentistry, at Queen's University Belfast (QUB) in Sheffield, UK, their mean score for this compartment is much higher. In this study, the mean score of 'perceived usefulness of different e-learning media', is 3.7 indicating that students slightly agree that different e-learning media are somehow useful for clinical skills. It was found in the same study mentioned above, that their mean score in this desire is much higher, showing that they agree with that due to reasons of much more developed technology and various learning media are available for utilization in UK. [3]

Next, there is association between having access to computer in the living accommodation towards the student's perceived IT ability. Students who had access to computer in their living accommodation with the mean score of 4.1, have higher perceived IT ability compared to those who did not have access to computer in their living accommodation with the mean score of 3.7. Other than this independent variable that has shown association towards the perceived IT ability among the students, there's no association between gender, year of the students, funding status, the area where they lived, previously taken an e-learning courses, the preference of e-learning over the conventional method and the perceived IT ability. A study in New Technology in Medical Education (NTIME) committee at Southern Illinois University School of Medicine (SIUSOM) shows that the students did not find social networking tools useful for their learning despite frequent use. However, they reported that some educational technologies were useful for their learning like multimedia tools, collaborative authoring tools and communication tools. [32] From a previous study conducted in James Cook University (JCU), it is found that gender, performance expectation and learning climate were significant to the student's satisfaction with Blended integrated learning (BIL). The participants were satisfied with this blended integrated e-learning method and their results were found to be better after taking BIL compared to those taking traditional teaching method. [33]

Moreover, we found that there is association between whether e-learning courses have been taken previously by the students and the attitudes towards and experiences of e-learning and learning of clinical skills. It shows that there is a mean score of 2.9 for students who had taken e-learning courses previously while there is a mean score of 2.4 for students who had not taken e-learning courses previously. Students who had taken e-learning courses previously have better attitudes and

experiences towards e-learning. The preference of e-learning over conventional teaching methods is also associated with the attitudes towards and experiences of e-learning and learning of clinical skills. From our study, we found that students who preferred e-learning over conventional teaching methods have better attitudes towards e-learning compared to the students who did not prefer e-learning. There is a mean score of 3.2 of the students who preferred e-learning over conventional teaching methods while there is a means score of 2.5 for the students who did not prefer e-learning. Then, there is no association between gender, year of the students, funding status, the area where they live, having access to computer in the living accommodation and the attitudes and experiences towards e-learning. However, a previous study among 36 Korean medical schools demonstrated that e-learning had become a successful model for implementing e-learning in medical education after many efforts being made by their medical educators. The students were motivated to utilize e-learning as they found e-learning useful in learning clinical skills especially video clips. [34]

Furthermore, our study shows that there was no significant association between gender and attitude towards and experiences of e-learning and learning of clinical skills. However, a previous study was done in Manipal College of Medical Sciences, Pokhara and the result showed that female students has a better attitude and experience towards e-learning than males. [35] Meanwhile, in a previous study from Nasser Bin Abdullah Al-Atyyia (NBA) Independent School for boys in Qatar that comprised of 44 students from 10^{th} grade and 39 students from 11th grade and also consist of 21 non-Qatari and 62 Qatari students, from a population 271 students found that there were no significant differences of the attitude towards and experiences. [36]

Last but not least, we found that there were no significant association between gender and perceived usefulness of using E-learning media. It is shown in a previous study some researchers have suggested that women's participation in e-learning and in online discussions is directly related to their comfort level with computers and the software being utilized to host the online course which may also be compounded by generalized learning insecurities (Johnson, 2011; Blum 1999).[37] Since males tend to use computers more frequently and have a more positive attitude towards them, they may have an advantage over females in the online classroom solely based on their comfort level with computers (Ashong & Commander, 2012) [38] Moreover, in our study proven that students living in rural area or city area does not have a significant impact on the association with the perceived usefulness of different e-learning media. However, in a previous study shows that area where the student is living does have an impact on perceived usefulness of e-learning. According to Alyne Rothberg et. al., THE largest discrepancy in the reasons between rural and urban residents not having home internet is lack of access. A strong correlation exists between broadband access and educational attainment, employment opportunities, and individual and community-wide economic viability. [39]

Working from home has also generated some difficulties for both students and academics. Working remotely requires access to digital technology such has a computer, and a stable and reliable internet connection. Many of our students live rurally, and we have had problems with internet connections. There may be competing demands on student and academic time and difficulties in access to computer. Not all students have their own digital technology and may have to share with other household members.

In this time of the year, getting hold onto E-learning is necessary in the pursuit of learning among medical students. After all, E-learning is a platform to modern education as the profession of a medical practitioner requires an individual to keep up to date with most recent and latest diagnostic studies, investigation and treatment modalities. Therefore, both students and faculty should coordinate with each other so that the best way for E-learning to be carried out smoothly. Students should be encouraged to be self-motivated and maintain a well-disciplined. Future research should take into account the potential changes in E-learning with regard to the results of students. Additionally, more senior students should be encouraged to participate in this study in order to have a more even distribution. Other institution of higher learning should also be included to obtain a more comprehensive and representative result as the findings in our study do not necessarily reflect and cannot be generalized to other institutions.

Limitation in our study is that most of the participants in this study are from Year 4 and there is lesser participation from senior students of Year 5 leading to an uneven distribution. As this is a cross-sectional study, we are unable to observe the changes over time as in the students could be much more ready for E-learning in the future. Another limitation in our study is that this study was done only for Melaka Manipal Medical college students only and as such the findings obtained cannot be generalized to other universities as it is only representative to this institution.

5. Conclusion

In conclusion, perceived IT ability among undergraduate medical students is fairly good. However, their attitude and experiences towards E-learning and learning of clinical skills show otherwise. Moreover, we can conclude that the students do not highly considering usefulness of E-learning, be it

different E-learning media or different approach of learning clinical skills as their consideration is optimal, which is between neutral and agree. These come with a question on how to improve E-learning experience among the undergraduate medical students. It is highly recommended for the students to make use of different E-learning media during this COVID-19 pandemic to boost and maximize their knowledge about clinical skills since they are not able to practice on patients in the real clinical setting. E-learning is indeed helpful for practicing them at home.

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