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Medical students`readiness towards E-Learning: Transition from emergency remote teaching during COVID era to high quality online education

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Abstract

Purpose: To assess the readiness of medical students towards e-learning before initiating online education.

Material and Methods: The study was conducted to first year medical students, whom will be taught a theoretical part of medicine. A 26-item questionnaire was administered to first year MBBS medical students of Karachi Medical and Dental College (KMDC), Karachi Pakistan before starting online medical education in order to assess their readiness towards e-learning. Different domains of e-learning were assessed. The questionnaire assessed technical abilities, study habits, communication skills, and learning styles of students required for e-learning. Response to each question was obtained over a 5-point Likert scale.

Results: 181-completed eligible responses were analysed out of which 9.94% (n=18) were male and 90.05% (n=163) female. Students were found highly competent in their technical expertise in computer and internet with score of 11.41. They possess good study habits conducive to e-learning reflected by score of 11.55. Their communication skills were found suited with score of 7.54 but required to improve them. With a score of 6.61, their learning styles were found adequately aligned to online learning. Readiness score of our students, of all domains was 37.11.

Conclusion: Required technical skills for readiness of our students for online education were found adequate. Further research is required to identify factors with negative effect and to modify them in order to move forward from emergency remote teaching to high quality online education.

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Introduction:

COVID-19 has opened new venues of education. Distance learning was used very infrequently in pre-COVID era. But due to the emergence of COVID, institutions were forced to close down. Alternative methods were therefore advised in order to continue the student education.

In this emergent situation, educational institutions were compelled to shift to online learning using available resources with all challenges of this transformation. Teaching online has several advantage.

Teaching online is based on adult learning principles being self-directed and independent with advantage of learning outside the classroom.[1]

Actual learning is also found to be limited due to predetermined class room time.[2] This problem is effectively countered in virtual, online class rooms where the students can conveniently access the educational content that enhances the instructional efficacy. Medical and dental students prefer web-based tutorials compared to traditional class room as stated in the review of Potomkova et al.[3] There is consensus of educationists that recent advances in medical educa-

tion have significantly increased the study contents and the educational and traditional model of classroom is insufficient for this purpose.[4] Linjawi AL et al., has proposed that scope of health sciences virtual education may be tremendously enhanced by incorporating educational videos, access to educational resources such as text books, photo-gallery, abstract and articles, discussions of clinical cases.[5] In recent past, asynchronous and synchronous methods were employed using eLearning approach.[6] Asynchronus learning allows learning from anywhere and anytime whereas synchronous e-Learning involves both students and teacher at the same time from different locations.

Choice of teaching method between synchronous and asynchronous depends on the course objectives. However teachers usually prefer synchronous mode while students prefer asynchronous as per study results of Wahab N et al.[7] Improvement in technology has now developed more synchronous methods applicable in eLearning. A survey comprising of 4,789 undergraduate students of 95 countries, reflected that 84% of the students preferred synchronous over asynchronous e-Learning.[8] After COVID outbreak eLearning has now become a vital educational strategy. Higher Education Commission (HEC) Pakistan issued instruction during the COVID period, to continue student teaching and learning through online education.[9] The success of eLearning depends on students` attitude towards online learning and use of tools and therefore their readiness is found a crucial factor for success of online learningas reported by Yu T., and Richardson J.C.[10] Considering all above, there is a need to find the readiness of students towards this unique opportunity of e-learning. Our study examined undergraduate students of first year MBBS for online learning readiness using an instrument that comprised of constructs for different domains of online learning readiness.

Material and Methods:

A cross sectional survey was conducted during the month of January 2020. First year medical students of MBBS class of Karachi Medical and Dental College Karachi, Pakistan (n=230) were included in the study with non-probability convenience sampling technique.

The study was conducted with the approval of principal of the college. The study conformed to the principles of Helsinki Declaration of 1975 as revised in 2000. A 26-statement structured questionnaire was prepared. Other surveys used for students` readiness for e-learning were reviewed.[5,11-16] Items were refined to provide simplicity and to remove ambiguities.

The questionnaire comprised of 2 sections. Section-1 consisted of demographic data while the section-2 comprised of 26-statement structured questionnaire. A pilot study with 20 students of the same class was carried out. Modifications were made for better understanding. Reliability of questions was performed by Parallel Form Reliability.[17] Two parallel equivalent forms of the questionnaire were developed with different construction of questions. Both forms were interchangeable and provided the same information. Respondents were requested to fill both forms of questionnaires. The correlation of the 2 forms estimates the reliability of the questionnaire. Validity and reliability of questionnaire was checked through Cronbach's alpha test. The Cronbach's alpha value was found to be 0.82 which was acceptable and good. Students who participated in pilot study were not involved in final assessment.

Sample size was drawn from the online software openepi.com by taking 5% error of margin and 95% confidence interval with 50% desired population prevalence and total required sample size was found to be 210. Remaining 230 students of the class were included in the study. The questionnaire was distributed in the class after a lecture. The students were briefed about the purpose of the study and filling of questionnaire. They were encouraged to ask question for any clarification. Confidentiality and anonymity was assured and return of completed questionnaire was considered their consent for participation in the study.

Table 1:Domain score interpretation for e-learning

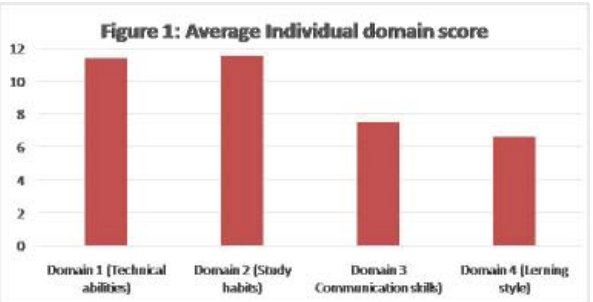
S. No	Domain	Score	Interpretation
1	I: Technical abilities (total score:14)	10-14	Proficient
		7-9	Know quiet a bit but needs to sharpen further
		0-6	Below norms
2	II: Study habits (total score:14)	10-14	Good
		7-9	Basic habits but need to sharpen further
		0-6	Below norms
3	III: Communication skills (total score:12)	10-12	Adequate
		6-9	Needs to sharpen further
		0-5	Below norms
4	IV: Learning style (total score:12)	10-12	Not adequate
		6-9	Adequate
		0-5	Highly conducive

Table 2: Domains score analyzed with gender

Domains	Gender	Mean±S.D	P-value
Technical abilities	Male	13.56±0.9	0.004
	Female	11.17±3.4	
Study habits	Male	12.33±1.0	0.117
	Female	11.47±2.3	
Communication skills	Male	9.83±1.5	0.000
	Female	7.28±2.6	
Learning style	Male	4.89±3.0	0.027
	Female	6.80±3.4	

**Independent sample t-test was applied for significance*

**P-value ≤ 0.05 considered to be statistically significant*



The questionnaire assessed four domains of online readiness; Domain I: students' Technical Abilities regarding computer skills and accessibility to computer and internet (statement 1–7), Domain II: Study habits (statement 8–14), Domain III: Communication skills (statement 15–20), and Domain IV: Learning styles (statement 21–26).

In response to each statement, the following scoring for Likert scale was used: Always (1), Often (2), Sometime (3), Rarely (4), and Not at all (5). Score of 2 was assigned for response of always/often, 1 for sometimes and 0 for Rarely/Not at all for the Domain I, II and III. For Domain IV of Learning Style, the construction of questions were such that for response of Always/Often was 0, 1 for sometimes and 2 for Rarely/Not at all. Interpretation of each domain score is given in Table 1.

Maximum agreed score of technical abilities and study habits was 14 each and 12 for communication skill and 0 for learning style. Therefore maximum agreed readiness score was 40. Overall readiness score of 35-40 was considered very conducive for e-learning. Statistical analysis was done using Statistical Package for social sciences (SPSS) version 21.0. Normality of data was checked by using Kolmogorov Smirnov test.

The data was found to be normally distributed. Continuous variables were reported in means and standard deviation. Categorical variables were presented as frequency and percentage. Significance was checked through independent sample t-test for two groups (gender). Fischer exact test was used to know the significance between gender and learning styles. P-value ≤ 0.05 considered to be statistically significant.

Results:

There were total 230 questionnaires distributed among students. A total of 213 questionnaire were returned with a response rate of 96.8%. After scrutiny, 181-questionnaire were found eligible for analysis because rest of the questionnaires were found as being incomplete, with more than 2-missing responses or duplication of response for a given question. Gender distribution was found to be 9.94% (n=18) male and 90.05% (n=163) female. Readiness score of our students, of all domains was 37.11. Total mean score achieved by respondents in domain of technical abilities, study habits, communication skills and learning style was 11.41, 11.51, 7.54 and 6.61 respectively, presented in Figure 1. Significance of domain score between genders is

Table 3: Interpretation of domain score

Technical Abilities		
Score 10-14 (Proficient)	Score 7-9 (Know quite a bit but needs to sharpen further)	Score 0-6 (Below norms)
138 (76.24%)	15 (8.28%)	28 (15.46%)
Study Habits		
Score 10-14 Good	Score 7-9 Basic habits but need to sharpen further	Score 0-6 Below norms
149 (82.32%)	29 (16.02%)	3 (1.65%)
Communication skills		
Score 10-12 Adequate	Score 6-9 Needs to sharpen further	Score 0-5 Below Norms
43 (23.75%)	105 (58.01%)	33 (18.23%)
Learning Style		
Score 10-12 not adequate	Score 6-9 Adequate	Score 0-5 Highly conducive
55 (30.38%)	61 (33.70%)	65 (35.91%)

presented in table-2.

Technical abilities, communications skills and learning style domain analysis showed a significant P-value of 0.004, 0.000 and of 0.027 respectively. Study habits domain analysis reflected non-significance P-value of 0.117. Domain score Interpretation for eLearning is presented in table 3. In technical abilities domain, 76.24% were competent. Most of our students (82.32%) were found to have good study habits. In the domain of communication skills, 23.75% were having adequate skills while 58.01% students showed acceptable abilities but need to sharpen further. Learning style abilities were found adequate and highly conducive in 69.61% of students.

Discussion:

Online education has now gain increased confidence and undeniable space in student learning process. Studies in this regard have shown promising results. Study conducted by Zogas S et al. concluded that eLearning and class room learning are comparable with equal effectiveness.[18] Some other studies also found equal efficacy of traditional classroom and e-learning in acquiring knowledge.[19-20] Results of a pilot study by Sendra-Portero et al. concluded that virtual education is alternative to traditional education without any negative impact on student's learning.[21] Another study by Chang JY et al., students reported even superior efficacy of eLearning over traditional one.[22] Use of eLearning is also found to produce better performance over traditional method.[23] For the success of online learning, readiness of students is of prime importance. In our study, the readiness of students was found appropriate for online method. In study by Ngampornchai and Adams, students were found slightly positive for e-learning. It was pointed out in the study that although the students were familiar to use of internet and social media but were deficient in knowledge about other learning tools.[24] Study by Ranganathan H et al. on physiotherapy undergraduates-reflected moderate levels of readiness towards online learning.[25] Student satisfaction with e-learning was reported by Alkhowailed MS et al.[26] However another study by Kumari S et al. reported face-to-face learning better over online lectures as perceived by students.[27] A study in Pakistan, revealed that students were motivated but not confident in their decision about online education.[28] Besides readiness there are other factors which influence student online learning including but not limited to age, academic achievement, gender, brain processing, culture and creative thinking.[28-30] Students stress level is also a factor that can affect online learning as described by Jackson J et al.[31] Other influences of eLearning include students' learning style preferences, multimedia design, quality of video and audio, internet speed and access, student engagement, and instructional method.[32] It is important that learning objectives should match with eLearning. For effective online learning, educational content should be of high quality. Educational videos and study guide also prove effective for educational instructions. Tele-guided ultrasound training has been found effective and feasible and is therefore recommended for medical education.[33] All these factors should be considered carefully for effective online education and students' satisfaction. Thaddeus FP concluded that the key influencing factors need to be addressed and understood before evaluate the quality of online education.[29] Besides student`s readiness, motivation and expertise of teaching faculty is also required for a success-

ful e-learning experience. Study by Kim KJ et al. indicates a gap in use of resources for online education by faculty.[34] Result of study by Rahim N et al. summarizes pharmacy faculty's perception and experience regarding online teaching, reflected that majority academic staff were in agreement not to replace traditional teaching with online teaching.[35] HEC Pakistan has put on tremendous efforts to develop an effective e-learning atmosphere in higher education institutes of Pakistan to move from basic to effective and exemplary standards. During the COVID era, guidance was provided for development of learning management system by higher education institutes. Further guidance was provided from time to time for institutes, faculty, staff, teaching and online readiness.[36] Many educationists are in agreement for a modified eLearning in the form of blended learning being a combination of face-to-face and eLearning. Blended learning has shown better effect on learning outcomes and improved test scores have been documentedas compared to traditional one in medical education.[37-38] Manjeese C describes a combination of organizational, technological, environmental and behavioral issues as key factors for efficacious online education in higher learning institutions.[39] Distance learning in medical education has been found to be successful in improving continuous medical education and is therefore advocated for adoption.[40]

During COVID 19 era, there was a compulsion to prepare for delivery of emergency remote teaching. However the success and acceptance of online teaching now necessitates for transforming from emergency remote teaching to high quality online education. For the success of e-Learning, a collaborative effort is required from all stake holders. It is the responsibility of organization to provide necessary resources both for students and the instructors. Support should be provided to both teachers and students for improving competencies and adoption of e-learning resources. The teacher should create encouraging environment and to prepare content that is appropriate for online learning. Learners should also motivate themselves to learn and seek help whenever required. The government should help in provision of adequate resources to promote e-learning and make them accessible to all. Online courses are sometime erroneously considered easier and less time taking than regular courses. However they require more reading and writing skills, time management and self-discipline. Until the COVID-19 crisis, online learning comprised a relatively small share of higher education but now it has established place with equal importance as class room instruction. However to predict about students readiness to take online classes remains a most important factor for success. Our study was limited by small number of study participants and subjective measurement through administration of self-assessment tool. More research with large number of participants using objective methods is required to uncover and understand the factors that are critical for successful eLearning.

Conclusion:
Our students were found competent in online learning readiness. High score reflect readiness of students towards e-learning but low score does not reflect unsuitability for e-learning and only indicate that person is not yet prepared for online learning and require support in this regard. College/university authorities must devise strategies for providing support to students for online readiness for effective e-learning. Further research is required for identification of factors that can influence e-learning success.

Recommendations: It is high time to suggest that every medical institution should make a technology readiness assessment of incoming students. If a student is identified to have some disparity, remedial steps should be taken to equipe the students with required skills to better coup in a technology rich environment. Faculty development programs for enhancing faculty expertise should be implemented.

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Role and contribution of authors:

Shama Mashhood, study design, manuscript writing, literature search, data handling. Approval of the final version.

Mashhood uz Zafar Farooq, concept, study design, literature search, statistical analysis, write-up of results and approval of the final version.

Jamil Ahmed Lakhiar, literature search, data analysis, review of manuscript and approval of final version.

Mansoor uz Zafar Dawood, study design, manuscript writing, review of manuscript and approval of the final version.

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