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THE ROLE OF VIRTUAL SIMULATION AND ONLINE LEARNING IN ADVANCING MEDICAL EDUCATION AMONG THE YOUTH POPULATION OF PAKISTAN

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ABSTRACT

Background: The pandemic has brought to light the students' need for online learning and virtual simulations.

Objective: To evaluate the role of Virtual Simulation and Online Learning in Advancing Medical Education in Pakistan

Methods: Almost 90 medical students were enrolled at one of Pakistan's private medical universities. The students were placed in two groups. Group A had only those students who took traditional learning, and Group B had students who took both online education and virtual simulation. The independent-sample t-test was used to compare the outcomes of the two groups.

Results: Out of 90 students, 28 (31%) were male students and 62 (68%) were female students. Almost 31 (34%) students were from pre-clinical years, and 59 (65%) students participated from clinical years. Nearly 12 (13%) of the students had basic knowledge, 16 (17%) had general knowledge, and 62 (68%) had professional knowledge regarding computer skills. Further, the results revealed that there was no significant difference between the two groups (P = 0.721)

Conclusion: The study's results indicate that the integrated learning strategy, which combines virtual simulation and online learning, will help students grasp the theoretical and practical components of advanced medical education.

Keywords: Medical Education, Online Learning, Virtual Simulation, Pakistan

INTRODUCTION

Globally, with the advent of the pandemic, almost all medical schools are preparing the next generation as they have struggled to deliver standard clinical training to their students (1). To satisfy established curricular objectives, these novel educational options required meaningful learning that mimicked clinical learning experiences (2). Interestingly, these fast pivots gave important insights into the effectiveness of synchronous screen-based simulation education with small groups and a simulated patient (3).

Virtual simulation is becoming a popular teaching tool in medical education. The rapid advancement of computer simulation technology has led to an increase in advanced and emerging virtual reality-based educational approaches (4). A novel approach to education called "experimental teaching with medical virtual simulation" builds a highly realistic virtual environment and experimental items using virtual reality, multimedia, databases, network connectivity, and human-computer interaction. A growing number of medical schools are making an effort to improve more conventional teaching methodologies and achieve particular learning objectives by incorporating virtual simulation technology into their curricula (5).

According to studies, simulation-based learning can boost confidence, decrease errors in real-world practice, and increase clinical abilities (6). In Pakistan, where it became crucial to maintain medical education in the face of limitations on in-person instruction, the pandemic further propelled the global trend toward online learning (7). Education may become transformative when teachers and students integrate information from other fields and experiences. Hence, teachers may provide chances for students to enhance their analytical, imaginative, critical synthesis, creative, self-aware, and purposeful learning abilities by establishing critical learning environments (8).

The delivery of education on the Internet is still growing quickly and broadly. All areas of education have shown support for online learning, which has grown rapidly (9). According to current research, the biggest modification to the teaching and learning processes in recent years is distance education (10). Online delivery is becoming the norm in higher education, according to current trends, since enrolments in online courses seem to be surpassing those in traditional modalities (11). Young people make up a sizable section of Pakistan's population, and there is a rising interest in using online and virtual platforms to help them with their educational needs. 64% of the population is under 30, making them ideal candidates for breakthroughs in digital learning, according to the Pakistan Bureau of Statistics (12). Online learning and virtual simulation have enormous potential to improve the nation's medical education system in light of the growing need for high-quality healthcare education and the ability of technology to reach underprivileged communities. During the pandemic, online teaching techniques served as a research foundation for transforming instructional methods (13).

The effective use of online learning platforms and virtual simulation to improve educational results has been one of the most noteworthy developments in recent years. In low- to middle-income nations like Pakistan, where socioeconomic considerations may limit access to traditional educational resources and where there is a growing need to close gaps in healthcare education, these methods are especially relevant (14). This study used a questionnaire to assess the role of virtual simulation and online learning in advancing medical education among the youth population of Pakistan

OBJECTIVE

To evaluate the role of Virtual Simulation and Online Learning in Advancing Medical Education in Pakistan

MATERIAL AND METHODS

The study included almost 90 students from one of the private medical universities of Pakistan. The medical students were placed in groups according to the type of learning they received from their university, such as traditional learning, virtual simulation, and online learning. All those students who were willing to participate involuntarily, those who were free from their exams, were part of the study, and those who were unwilling to participate were excluded from the study. Students were informed

regarding the aim and objective of the study, and further, they were assured that their responses would be kept anonymous and confidential. The ethical approval was obtained from the ethical review committee of the medical university. The questionnaire, which was distributed among the students, consisted of the following details, such as demographics, along with attitudes of teachers and students regarding virtual simulation and online learning in Advancing Medical Education. The questions included five possible answers on a Likert scale, ranging from strongly agree to strongly disagree. All the participants were assured that all responses recorded were kept confidential. For statistical analysis, SPSS version 24.0 was used. The differences in outcomes between the two groups were compared using the independent-sample t-test. A significant difference test was conducted with a level of significance of 0.05, and all the results are presented as means ± standard deviations (means ± SDs).

RESULTS

A total of 90 students enrolled in private medical universities completed the questionnaire. Out of these students, 28 (31%) were male students and 62 (68%) were female students. Almost 31 (34%) students were from pre-clinical years, and 59 (65%) students participated from clinical years. Nearly 12 (13%) of the students had basic knowledge, 16 (17%) had general knowledge, and 62 (68%) had professional knowledge regarding computer skills, as mentioned in Table 1. Further, the results revealed that there was no significant difference between the two groups (P = 0.721), as shown in Table 4.

Table 1: Demographic characteristics of study participants

Variables	Percentage
Gender	
Male	28 (31%)
Female	62 (68%)
Medical Years	
Pre-Clinical Years	31 (34%)
Clinical Years	59 (65%)
Computer skills	
Basic	12 (13%)
General	16 (17%)
Professional	62 (68%)

Table 2: Assessment of a questionnaire regarding classes taken by medical students online

S.no	Variables	Strongly Agree	Agree	Disagree	Strongly Disagree
1	**Has the way of learning and style been enhanced through online classes?**	40 (36%)	35 (31%)	7 (6%)	3 (3%)
2	**Are there enough resources available for online classes?**	40 (36%)	30 (27%)	10 (9%)	5 (4%)
3	**Can online lectures be recorded and listened to repeatedly by the students?**	55 (49%)	25 (23%)	7 (6%)	3 (3%)
4	**Are online lectures clearer and well-explained?**	50 (45%)	30 (27%)	7 (6%)	3 (3%)
5	**Isn't the network during online classes stable?**	35 (31%)	30 (27%)	10 (9%)	10 (9%)
6	**During online classes, aren't instructors or other students providing on-site supervision?**	45 (41%)	35 (31%)	5 (5%)	5 (4%)

7	**Is there any lack of communication with teachers observed during online classes**	50 (45) %	30 (27%)	5 (5%)	5 (4%)
8	**Do students get tired Due to long hours of online classes?**	45 (41%)	30 (27%)	5 (5%)	5 (4%)

Table 3: Assessment of questionnaire regarding virtual simulation

S.no	Variables	Strongly Agree	Agree	Disagree	Strongly disagree
1	**Is virtual simulation easily accessible and beneficial for all medical students?**	45 (41%)	35 (31%)	5 (5%)	5 (4%)
2	**Is it interesting to learn virtually?**	50 (45%)	30 (27%)	5 (5%)	5 (4%)
3	**Does virtual simulation help in clinical diagnosis and preventive treatment?**	45 (41%)	30 (27%)	5 (5%)	5 (4%)
4	**Does virtual simulation enhance the ability to think clinically?**	40 (36%)	30 (27%)	10 (9%)	5 (4%)
5	**Does virtual simulation help in surgeries?**	45 (41%)	35 (31%)	5 (5%)	5 (4%)

Table 4: Comparison of results between groups A and B

Category	Group-A	Group-B	p-value
Written exam	64.23 ± 9.12	65.91 ± 5.45	0.601
Practical Exam	71.12 ± 4.31	75.61 ± 5.11	0.001*
Total Score	70.10 ± 4.08	69.76 ± 5.28	0.721

***p-value considered significant**

DISCUSSION

Medical institutions throughout the world have called on teachers to modify their pedagogical approaches by offering theoretical courses online, allowing students to learn remotely. Although various universities have developed a hybrid learning strategy that combines virtual simulation (15). In the study, surveys were conducted among medical students regarding online learning and virtual simulation. The results of the study offer insightful analysis and suggestions for upcoming educational improvements.

The results of the study showed that medical students were more receptive to online learning, and students stated that online courses were more effective in enhancing their ability to learn independently by changing their preferred study style and process of learning. However, other students thought that online courses were less successful since there were no in-person professors to supervise them (16). Further, the results of the study revealed that some of the students expressed no view, and others thought that online courses were less successful since there were no in-person

instructors to supervise them. For students who demonstrated high self-discipline, the effect of having a teacher or other students observe the class on learning effectiveness was not statistically significant. Our findings support previous research on the drawbacks of online learning (17, 18). Students find it simple to become distracted by teachers' inability to maintain their interest and their lack of expertise with this type of instruction.

Further, the results of the study revealed that students may view knowledge points once again in asynchronous learning environments, which would allow them to remember the material and provide an enjoyable learning environment utilizing efficient and diverse extended learning methodology. Hence, no noticeable difference was observed in students' performance across the two teaching approaches (19). Hence, the blended learning technique proved effective in improving learning outcomes and was extensively implemented (20). The main limitation of the study was the utilization of educational resources, which were constrained. There are currently no AI teaching techniques that can replicate actual patient diagnostic and treatment procedures; hence, for this purpose, new educational initiatives must be created. More research on teaching methodologies supported and employed in medical schools may be done in light of the benefits of blended learning. The integrated learning approach was popular during the pandemic because it produced higher learning results. More investigation on teaching methodologies sponsored and employed in medical schools may be done in light of the benefits of blended learning.

CONCLUSION

According to the study's findings, the integrated learning approach, which incorporates online learning and virtual simulation, will assist students in mastering both theoretical and practical elements of advancing medical education. In addition to encouraging participation and interaction, this approach offers individualized learning opportunities, closing the theory-practice gap and preparing students for the technological future of medical education.

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