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ORIGINAL ARTICLE

Awareness and Knowledge of E-learning resources among Undergraduate Medical Students

FARRUKH SARFRAZ[1], HARRISON DAKA[2], KABUNGA NACHIYUNDE[3], FAHAD SARFRAZ[4], SEHRISH LIAQAT[5]
[1]*Associate Professor, Director Department of Medical Education, Sahara Medical College, The Sahara University, Narowal*
[2]*Consultant, Postgraduate Program Coordinator, School of Education, University of Zambia*
[3]*Lectutrer, School of Education, University of Zambia*
[4]*Associate Professor, Medical Education Department, School of Health Professions Education (SHaPE), CMH Lahore Medical College & Institute of Dentistry*
[5]*Medical officer at Nawaz Sharif Social Security Hospital, Lahore*
Correspondence to: Farrukh Sarfraz, Email: drfarrukhsarfraz@gmail.com, Cell: +92 322-9111000

ABSTRACT

Purpose: Teaching and learning have evolved significantly in recent decades, with e-learning emerging as a recent development. Factors driving its growth include student needs, cost reduction, quality improvement, and accessibility. As geographical dispersion increases, e-learning adoption is likely to expand. To assess the level of awareness among medical students about e-learning resources.

Material and Methods: A cross-sectional study was conducted at Azra Naheed Medical College, Superior University Lahore, involving a sample of 262 participants. Following obtaining informed consent, a validated questionnaire was administered to collect data on demographic characteristics, academic level, and utilization patterns of online resources among students. There were 262 participants in the research in which 106(40.5%) were males and 156(59.5%) females

Results: There were 262 participants in the research in which 106(40.5%) were males and 156(59.5%) females. There were three age groups identified. In these first group 18-22 years in which most of the students 153(58.4%) were participated, other age group was 23-26 years in which 72(27.5%) students were participated and last group include 27-30 year of age in which 37(14.1%) students were participated. There were five levels of study from which students participated for e learning activities that include 1st to 5th year MBBS in which 23.3% from Ist year, 15.3% from 2nd year, 21.8% from 3rd year, 22.1% from 4th year and 17.6% medical students from 5th year MBBS. Out of 262 medical students 20.2% novice, 41.2% intermediate and 38.5% experienced when relate to the usage of e-learning as shown in table 1. Frequencies, percentages, mean and SD were calculated. P value 0.00 showed significance of the study.

Conclusion: This research finds that awareness of e-learning rests in development of skills related to independent learning. E-learning resources are essential for medical education. Enhancing awareness and addressing barriers can optimize utilization, ultimately improving learning outcomes.

Keywords: E-learning, medical students, higher education, effective utilization, AI in classroom.

INTRODUCTION

In recent years, e-learning has transformed medical education by offering diverse and flexible learning resources that complement traditional teaching methods. The digital shift in education has accelerated with advancements in technology, providing medical students with access to vast repositories of knowledge, interactive modules, video lectures, online assessments, and virtual simulations. For medical students, especially those in resource-limited environments, e-learning can bridge gaps in access to the latest medical knowledge and evidence-based practices, fostering self-directed and life-long learning skills essential in the medical profession[1-5].

Despite the availability and potential advantages of e-learning resources, awareness and effective utilization among medical students vary significantly. Understanding the level of awareness and the factors influencing the adoption of these resources is crucial for medical colleges, particularly those in the private sector, to develop supportive infrastructure and integrate digital learning tools into the curriculum effectively. Challenges such as limited technical support, inconsistent internet access, and a lack of digital literacy among some students can hinder the full utilization of e-learning resources. Exploring students' awareness, perceptions, and challenges with e-learning can help institutions make informed decisions about resource allocation, faculty training, and curriculum enhancements [6-8].

The adoption of e-learning in medical education aligns with global trends emphasizing technology-driven, student-centered learning. Medical students today have unprecedented access to digital resources that cater to various learning styles and needs, including interactive case studies, clinical videos, virtual dissection labs, online question banks, and research databases. These resources offer advantages such as flexibility in learning pace and timing, access to a wealth of updated medical literature, and the ability to engage with multimedia content that can make complex medical concepts easier to understand[9,10].

While some students may actively engage with e-learning platforms such as Moodle

Canvasm, Courser, Google class room, Zoom, others may not fully exploit the available resources due to factors like lack of guidance, technical barriers, or time constraints. For instance, studies have shown that although medical students often recognize the value of digital tools for exam preparation, they may still prefer traditional methods for certain subjects or skills, such as anatomy and clinical skills. Consequently, understanding the specific e-learning tools students are aware of and regularly use can reveal both the strengths and the gaps in the current digital learning landscape[9, 11].

In private-sector medical colleges, where infrastructure and funding might support a broader range of technological resources, it is crucial to examine how these tools are perceived and accessed by students. Awareness campaigns, orientation programs, and ongoing technical support can play an essential role in familiarizing students with the available resources and promoting regular usage. Furthermore, the role of faculty in guiding students toward awareness and effective e-learning practices and incorporating digital resources into their teaching can impact how students approach self-directed learning[12-14]. The author should mention the significance of the study and also mentioned the research gap

MATERIAL AND METHODS

A cross-sectional study was conducted at Azra Naheed Medical College, Superior University Lahore, employing a sample of 262 participants. Informed consent was obtained from all participants prior to data collection. A validated questionnaire was administered to gather data on demographic characteristics, academic level, and online resource utilization patterns among students. Additionally,

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the questionnaire assessed students' perceptions regarding e-learning. Simple random sampling was employed, ensuring equal probability of selection for each participant in the population. Descriptive statistics, including frequencies, percentages, mean, and standard deviation, were calculated. Inferential statistics were used to determine significant differences, with p-values noted. A p-value of ≤ 0.05 was considered statistically significant.

Inclusion criteria MBBS students of the Azra Naheed Medical College Superior University Lahore, Pakistan who are using smart phones, tablets and laptops after obtaining informed consent and availability at the time of filling of questionnaire.

Exclusion criteria Students lacking mobile technology (smart phones, tablets, laptops). Students possessing smart phone, tablets and laptops but are not using it appropriately i.e. they are making or receiving calls but not using internet on their device were not included in the study. The students who have less than twenty years of age was not included in the study.

RESULTS

There were 262 participants in the research in which 106(40.5%) were males and 156(59.5%) females. There were three age groups identified. In this first group 18-22 years in which most of the students 153(58.4%) were participated, other age group was 23-26 years in which 72(27.5%) students were participated and last group include 27-30 year of age in which 37(14.1%) students were participated. There were five levels of study from which students participated for e learning activities that include 1st to 5th year MBBS in which 23.3% from Ist year, 15.3% from 2nd year, 21.8% from 3rd year, 22.1% from 4th year and 17.6% medical students from 5th year MBBS. Out of 262 medical students 20.2% novice, 41.2% intermediate and 38.5% experienced when relate to the usage of e-learning as shown in table 1.

Table 1: Demographic information of selected participants

No.	Parameter		Frequency	Percentage
1	Gender	Male	106	40.5%
		Female	156	59.5%
2	Age Group	18-22 years	153	58.4%
		23-26 years	72	27.5%
		27-30 years	37	14.1%
3	Level of Study	Ist year MBBS	61	23.3%
		2nd year MBBS	40	15.3%
		3rd Year MBBS	57	21.8%
		4th Year MBBS	58	22.1%
		5th Year MBBS	46	17.6%
4	How do you rate your experience with e-learning	Novice	53	20.2%
		Intermediate	108	41.2%
		Experience	101	38.5%

Table 2: Descriptive Analysis of the constructs

Learning Domains	Number (n)	Frequency	Percentage	Mean	SD
Accessibility	262	242	92.5%	4.38	0.15
Learning Utilization	262	210	80.3%	4.12	0.51
Learning Outcome	262	201	76.5%	4.56	0.38
Assessment Feedback	262	247	93.5%	4.42	0.29

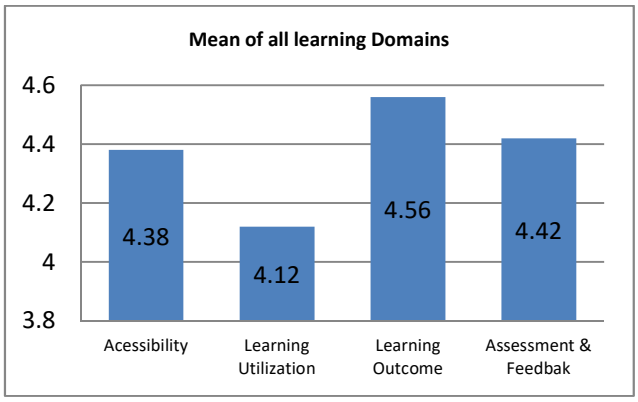

Figure 1: showing mean of all learning domains

The study finds the resources used and impacting their day to day activity by e-learning for medical students. The frequency and percentage regarding accessibility domain include 242(92.5%), learning utilization include 210(80.35%), learning outcome include 201(76.5%) and assessment and feedback include 247(93.5%). The data reveals that the following e-learning domains exhibit high frequencies and percentages, indicating widespread adoption and effectiveness in academic settings. The mean of all domains include Accessibility 4.38±0.58, learning utilization 4.12±0.77, learning outcome 4.56±0.54, and assessment feedback 4.42±0.57 as shown in table 2. Descriptive statistics indicate that the mean for all the variables is over three indicating an overall positive response. Learning Utilization has a slightly lower mean score. Standard deviations are relatively low, indicating consistent responses. A p-value of 0.00 typically indicates that the observed result is extremely statistically significant. The majority of respondents find online resources accessible. Learning outcomes are perceived positively. Assessment feedback is considered effective hence learning utilization could be improved.

DISCUSSION

This research examines various forms of human interaction and provides insights into how people communicate differently. There are number of suggestions on how to make e-learning better and improve its quality overall. This study agrees with previous research that found interaction is important. The important thing for reaching e-learning goals found that the way things are taught can have a big impact on what students learning[15].

This research finds that interactivity is essential for learners to engage with the e-learning system in both personal and technical terms. In other words, interactivity is critical for learners to learn from the teachers and other student and at the same time interactivity is essential for the learners to utilize the content and the system. This research, thus, supports the claim of Lorenzoni, Andrigo Antonio (2019) that interactivity has a significant influence on the overall learning satisfaction of the e-learners This research also supports the claim that interaction allows active engagement of the learner which is essential for not only his knowledge of the subject but also for the development of independent learning skills[16].

Respondents claimed that the primary difference between the traditional classroom model and e-learning is the lack of interactivity. Interestingly respondents also indicated that on the contrary, e-learning has the potential of increasing overall interactivity in the system because of its nature of freedom of learning[17].

Looking at categorization of interactivity in e-learning as passive, limited, complex and real time, this research finds that real time interactivity is the most effective form of interactivity in context of e-learning. Consequently this research supports the argument that interpersonal interaction in e-learning should be two ways and in real time rather than one way communication which is commonly used in e-learning systems. The respondents acknowledged the technical limitations in achieving this but argued that there is a possibility of using some web technology to develop e-learning solutions which will provide better interaction[18].

This research often examines the accessibility of online educational resources and platforms to diverse populations, including individuals with disabilities, those from underprivileged backgrounds, and non-native speakers of the language of instruction. Studies may investigate factors such as the availability of accessible formats (e.g., screen readers, captions), ease of navigation, compatibility with assistive technologies, and adherence to accessibility standards (e.g., Web Content Accessibility Guidelines)[19].

This research explores how learners engage with and utilize e-learning resources, tools, and activities to support their learning goals. This includes measures of user engagement, interaction frequency, time spent on tasks, and usage patterns across different learning modules or topics. Studies may examine factors influencing learning utilization, such as interface design, instructional design features, learner motivation, and technological proficiency. By analyzing quantitative data on learning utilization, researchers can identify effective strategies for enhancing learner engagement, motivation, and self-directed learning in online environments[20].

This research assesses the impact of e-learning on various learning outcomes, including knowledge acquisition, skill development, academic achievement, and attitudes towards learning. Studies use pre- and post-test assessments, standardized tests, quizzes, surveys, and performance metrics to measure learning outcomes and evaluate the awareness of e-learning interventions. Researchers may also conduct comparative studies to assess the relative awareness and effectiveness of e-learning versus traditional face-to-face instruction or blended learning approaches[21].

In this research investigates the role of assessment and feedback mechanisms in promoting learning and improving student performance in e-learning environments. Studies examine the design and implementation of formative and summative assessments, automated feedback systems, peer assessment tools, and adaptive learning algorithms. Researchers may analyze quantitative data on assessment scores, feedback effectiveness, learner engagement with feedback, and the impact of feedback on learning outcomes[22].

This study aimed to assess the awareness and knowledge of e-learning resources among undergraduate medical students, focusing on four key domains: accessibility, learning utilization, learning outcomes, and assessment feedback. With a sample size of 262 participants selected through a simple random sampling method, we were able to gather diverse and representative insights into the experiences of students engaging with e-learning.

As Accessibility emerged as a significant factor affecting students' engagement with e-learning resources. The findings indicated that while many students have access to online learning platforms, issues such as internet connectivity, device availability, and platform familiarity still hindered full utilization. Students with consistent access to stable internet and necessary digital tools reported better engagement, which underscores the need for institutions to ensure reliable access and to consider providing necessary resources to students facing barriers[23] [24].

Learning Utilization measured how effectively students used e-learning tools as part of their medical education. We found that most students were aware of various e-learning resources available to them, but they differed in how frequently they used them. Some students expressed difficulty in navigating complex online platforms or struggled to integrate them into their daily study routines. This suggests that additional support in the form of orientation sessions or workshops on using these resources could improve their utilization[25, 26].

Learning Outcomes analyzed the impact of e-learning on students' academic performance and knowledge retention. The majority of students believed that e-learning contributed positively to their understanding of medical content, especially through multimedia resources and interactive modules that made complex concepts more digestible. However, some students felt that e-learning alone was insufficient and needed to be supplemented with traditional in-person methods. This finding highlights the importance of a blended learning approach that combines online resources with face-to-face interactions to maximize learning effectiveness[27, 28].

Assessment Feedback focused on the role of e-learning platforms in providing timely and constructive feedback on student assessments. Students generally appreciated the quick turnaround time for feedback on online quizzes and assignments, which allowed them to identify areas of improvement in real-time. Nonetheless, some students felt that automated feedback lacked the depth and personalization that in-person feedback offers. This suggests that e-learning platforms could improve by incorporating more detailed and individualized feedback options, perhaps through a hybrid approach where online assessments are paired with periodic in-person discussions[29, 30].

In conclusion, while e-learning resources are accessible and beneficial to most students, there are areas for improvement in terms of accessibility, user training, and feedback. Addressing these areas can further enhance the e-learning experience for medical students, ultimately contributing to better educational outcomes and preparing them more effectively for their future careers.

CONCLUSION

This research aimed at analyzing the impact of interactivity on awareness of e-learning. Understanding the concept of awareness in e-learning is much more than simple evaluation of the grades that the students scored. This research finds that awareness of e-learning rests in development of skills related to independent learning. Past approaches to e-learning have been quite restricted in that they have been focused on and have been evaluated on the basis of the impact on the overall subject outcomes. This, according to the researcher, is a narrow view of the aim of e-learning.

With increased adoption of internet and ubiquity of internet enabled devices most individuals have access to e-learning content online. Amidst such a technologically empowered environment e-learning providers should strive to increase the focus of learning and transform it from formal and institutionalized process to informal, independent and life long process.

Recommendations

1. Improved accessibility: E-learning resources can reach students with disabilities, remote or rural students.
2. Enhanced flexibility: Students can learn at their own pace, anytime, anywhere.
3. Increased engagement: Interactive e-learning resources boost student participation.
4. Better retention: E-learning resources help reinforce learning, improving retention.
5. Cost-effectiveness: Reduced textbook costs, accessible online resources.

6. Personalized learning: E-learning resources cater to individual learning styles.
7. Improved collaboration: Online platforms facilitate group work, discussions.

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