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Research Article

Preference of Use of E-Learning in Medical Education among Undergraduates of King Edward Medical University, Lahore, Pakistan

Shafique Maham*, Farooq Ghumza, Khan Shaheryar, Ahmad Qistas Malik, Arshad Kanza, Nawaz Huda, Jabbar Khushbakht, Noor Bushra, Ahmad Burhan, Adil Muhammad, Khan Umair Muhammad, and Afzal Saira

Department of Community Medicine, King Edward Medical University, Pakistan

***Corresponding author**

Shafique Maham, Department of Community Medicine, King Edward Medical University, Pakistan, Tel: 923-226-650-642; Email: maham_shafiq95@yahoo.com

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Keywords

- E-Learning
- Medical education
- Undergraduates
- Multimedia
- Internet
- Respondents

Abstract

E-learning means web based learning or online-learning involving techniques like internet and multimedia. This article covers how frequently medical undergraduates preferred e-learning for study purposes.

Objective: To assess the preference of use of e-learning in medical education, among undergraduates of King Edward Medical University, Lahore, Pakistan.

Study design: Cross-sectional study design.

Study setting: King Edward Medical University, Lahore.

Study duration: 6 months.

Subjects and methods: This study was conducted for a duration of six months, from January 2017 to June 2017, among 1st, 2nd, 3rd, 4th and 5th year students enrolled in "Bachelor of Medicine, Bachelor of Surgery" program. Informed consent was obtained. A total of 95 students, 19 each from 1st to final year were taken. 48 students were female and 47 were male. Simple random sampling was employed. Data entry and analysis was done using SPSS version 20. Frequency and percentage of effectiveness ease of access, and time spent on e-learning by respondents was calculated.

Results: Majority of the undergraduates (60%) rated e-learning effective, 33% very effective while 7% rated it less effective in medical education. About 75% of the respondents spent 1/4th of their study time on e-learning. However only 2.1% didn't use it for study purposes. 56.8% of the students often found study related material available on the web helpful. 76% students found it easy to access the required study material while searching online, whereas 15% found it difficult. 30.5% of the respondents said that they would always prefer interactive lectures with the use of multimedia over old school methods, while 15.8% of the respondents were of the opposite view.

ABBREVIATIONS

E-Learning: Electronic Learning; E-Books: Electronic Books; MBBS: Bachelor of Medicine-Bachelor of Surgery; SPSS: Statistical Package for the Social Sciences; SD: Standard Deviation

INTRODUCTION

E-learning refers to the content that is delivered through networked technology (such as Internet) although the same terms have also been used to refer to programs delivered through non networked technologies (for example CD or DVD). Thus the umbrella term "e-learning" is used to include all forms of electronically supported instruction [1]. E-learning is the process to learn anytime and anywhere by using a computer. It is a general term for education, training and information delivered by computers. It puts the emphasis on the gathering of skills and knowledge [2].

Various researches have been conducted in the past to assess the importance and efficiency of e-learning with the growing development of technology and its increasing use in medical education. A study by Tyagi SK et al., revealed that medical schools need to bring fundamental change to integrate information and computer technology in medical education and structure computer training for faculty [3]. A review published in the Journal of Management about importance of e-learning in different organizations showed their benefits depend on how e-learning is designed, delivered and evaluated [4]. A paper published in the International Journal of Management, IT and Engineering showed that the integration of e-learning promotes

a shift toward adult learning in medical education wherein educators serve not only as distributors of content but also as facilitators of learning and assessors of competency [5]. A review by Jawaid M concluded that different modes of course delivery suit different learners in different contexts and special attention must be given to make a match between technical attributes of learning and learner's priorities [6].

An article published in The British Medical Journal concluded that e-learning had a positive impact on medical education and a systematic approach is required for the successful planning and implementation of e-learning method in medical education [7]. A research conducted in Dow University of Health Sciences, Karachi, Pakistan showed that out of 700 students, 73%, agreed that e-learning plays an important role in learning, while 59% agreed that web-based training should supplement face to face teaching [8]. A comparative analysis revealed that the participating students, both male and female in the urban and regional areas in Libya were positively disposed towards e-learning and believed in its benefits [9]. Another research identified the barriers in the journey of the Higher Education Institution of Pakistan towards adopting e-learning as an effective style of learning and revealed that effective application and promotion of e-learning can be achieved only after resolving these barriers [10].

A research was done in Cornell University which determined that academics and institutions should collaborate to ensure online availability of post secondary study material and devise effective e-learning programs [11]. Iqbal MJ et al., highlighted that students are better motivated and engaged successfully to achieve-learning objectives in an e-learning environment [12]. Another study by Park SY et al. showed that usefulness of e-learning environments is based on teachers' attitudes [13]. A case study revealed the improvement of quality of education through e-learning [14].

Previous studies divulged the outcomes after integration and implementation of e-learning in traditional learning methodologies. These researchers analyzed the evaluation methods of students' performance and challenges offered after collaboration of e-learning with conventional styles of learning.

This study helped us to focus on the personal choice of medical students regarding e-learning. The statistics in our research were entirely collected from medical students. In this way our research will aid the policy makers to bring radical changes such as curriculum modification in order to inculcate e-learning into medical education so that modernized tools of learning can amalgamate into conventional teaching style of King Edward Medical University, Pakistan.

MATERIALS AND METHODS

A cross-sectional study was conducted among first, 2nd, 3rd, 4th and final year undergraduate MBBS students of King Edward Medical University, Lahore. Teaching program being employed in King Edward Medical University consists of various modalities of e-learning in addition to orthodox pedagogical methods. Multimedia lectures consisting of text, images, audio and animations are prepared on Microsoft Office Suite (Word, PowerPoint and Excel) to help in effective acquisition of learning objectives. Video based tutorials consisting of interactive student groups are conducted in an effort to increase student engagement, motivation and attendance. Lectures are uploaded regularly on the official website of the institution to provide flexibility of time and place of learning for students. A student run blog, KemUnited, uploads study related material (consisting of documents, images and videos) online to help students in pacing their studies according to their mood and intellectual capacity. Students often study on internet via information sites (Google, pub med, Wikipedia, YouTube etc) and online libraries (e-books).

Sample size of 95 students is estimated by using 95% confidence level, 9% absolute precision with expected %age e-learning as 73%.

$n = Z^2_{1-\alpha/2} .p.q / d^2$

$Z_{1-\alpha/2}$ = Confidence level 95%

P = Prevalence 73%

q = 1-p

d = Absolute precision 9%

A total of 95 students, 19 each from first to final year were taken. 48 students were female and 47 were male. Simple random sampling was employed. Informed consent was obtained. Students of Allied Health Sciences and Doctor of Physical Therapy (DPT) program were excluded. This was done to ensure that all subjects being enrolled in the same study program are having the same course material, thus, preventing the occurrence of bias. This cross sectional study was carried out in King Edward Medical University, Pakistan for 6 month duration (Jan 2017- June 2017). All 95 students were asked to fill a bio data form and a pretested questionnaire while keeping all social and ethical consideration in mind. Each questionnaire had 30 questions. Data was collected by all batch members for determining the e-learning preference of each student. Preference for e-learning was assessed on the basis of three variables: effectiveness, proportion of study time spent on e-learning, and ease of access.

Effectiveness was evaluated on account of perceived usefulness, better understanding, ease of recall, and satisfaction with the study related material available on the internet. Respondents were asked whether online searching managed to solve their problems and how much web based tutorial videos, images, graphs and animations were helpful. Their preference of interactive lectures with the use of multimedia over face to face teaching was also inquired about.

Second variable of this study was time related, assessed on the basis of duration of use of internet and proportion of study time utilized for e-learning. To evaluate the third variable i.e. ease of access, subjects were asked about internet availability and the ease with which they were able to find helpful study material online. Confounding variables of this study are net availability, socio economic status, awareness about e-learning, and student's aptitude.

Data entry and analysis was done by statistical software SPSS version 20. Frequency and percentage of effectiveness ease of access, and time spent on e-learning by respondents was calculated.

To measure the effectiveness, four questions were selected. We calculated their frequency for 95 students, and then added their frequencies to get a mean of the composite variable (effectiveness) using SPSS version 20. The other two variables were also assessed in the same way.

RESULTS

The data was collected from 95 students, among them 47 of the students were male and 48 were female. The results showed that 98% students had clear idea about e-learning while 2% were not clear. According to the questionnaire data (Figure 1), 50.5% students sometimes read study related material from the internet and others (45.3%) read it often. Most of the respondents i.e. 84.2% (20.0% always, and 64.2% sometimes) were frequently able to solve their problems using internet. More than half of the students i.e. 56.8% often found study related material helpful on the web. 48.4% of the respondents often and 37.9% sometimes watch video lectures for study purposes.

22% of the respondents were always able to gain better understanding of the topic on internet while 53.7% were often, and 23.2% of the respondents were sometimes able to understand a topic better by studying it on internet. As shown in the Figure 2, the study shows that majority of the subjects (41.1% often, 41.1 % sometimes, and 9.4% were always) able to memorize a topic from web however a small proportion of the subjects (8.3%) were never able to memorize the topic. When asked about recalling a topic, 51.6% of the respondents were often and 29.5% were always able to recall a concept through videos watched online. Most of the respondents (52.6% often, 23.2% always and 23.2% sometimes) were able to understand images and graphs when watched online as compared to textbooks. 30.5% of the students said they would always prefer interactive lectures with the use of multimedia over old school methods, 27.4% often while 15.8% would never prefer it. When inquired about tutorial videos being helpful in clinical practice, 38.9% often, 35.8 % sometimes, 18.9 % always and 6.3% of the respondents never found them helpful.

Students were asked about the time spent on internet, about 74% of the students spend < 5 hours (31.6% spend < 2 hours and 42.1% spend between 2-5 hours) on the internet daily and only 10.4% spend > 10 hours on internet daily (Figure 3). 41.7%, 30.2% and 16.7% of the subjects study daily for less than then 3 hours, less than 5 hours and less than 1 hour respectively (Figure 4). As exhibited in Figure 5, 75% of the undergraduates spend 1/4th time of their study on e-learning whereas only a very small proportion i-e 2.1% don't use it for study purposes. As shown in Figure 6, 54% often, 37% always and 9% of the subjects sometimes have internet access with them.

76% students found it easy, however for 15% it was difficult to access the required study material while searching online (displayed in Figure 7). Subjects were also asked about the effect of e-learning on their professional exam results, among them 58.9% of the students agreed that internet based learning had positive effect on their professional exam result, 22.1% were undecided (Figure 8). When asked about which multimedia modalities out of text, videos and images should be used in lectures, 72% of the respondents voted for all of these while 1%, 3% and 24% of the respondents voted for text, images and videos respectively (Figure 9). In the end quite a large proportion of the undergraduates (60%) rated e-learning effective in medical education, 33% rated it as very effective while 7% found it less effective (Figure 10).

DISCUSSION

E-learning has brought radical changes in every sector of education. Many researchers have previously identified different variables regarding the use of e-learning in education. This research assesses the preference of e-learning in medical education by the undergraduates. It divulges perceived effectiveness, ease of access, satisfaction and frequency of use of e-learning by the respondents.

In our study, respondents predominantly rated e-learning as effective. Respondents found e-learning to be effective on the basis of perceived usefulness in problem solving, better understanding, and memorization of concepts. This aligns with the results of many studies conducted previously. In a study conducted by Javaid M. [6], in Dow University Karachi, 73% of the respondents agreed that Web-based learning plays an important role in medical education.

According to our research, 75% of the respondents spent only $1/4^{th}$ part of their daily study time on e-learning. This result when compared with the effectiveness of e-learning (which came out to be more than 90%) shows that even though students spent less time on web based lectures, still they rated it as highly effective.

Out of the total sample size, 44% respondents often found e-learning useful in medical education. In another research by Park S.Y. [13], the α/ρ value of perceived usefulness (determined by learning performance and academic productivity) turned out to be .88/.74 which was consistent with our findings. Similarly another research conducted by Sun P.C [14], found out that technological designs play an important role in students' perceived usefulness (Mean=5.11; SD= 1.09) and exert positive impact on student satisfaction. A study done by Mehra V and Omidian F. [15], found out the perceived usefulness of e-learning to be 0.75 according to "Cronbach's alpha reliability" which was in accordance with our results. According to our study 5.4% respondents said that they never found e-learning useful, the rationale behind this result could be the anxiety and apprehensions which prevail among students about the use of e-learning. Moreover, many students find it difficult to memorize cumbersome knowledge of medical subjects using web based learning. This implies that orthodox methodology still holds significance in the status quo.

In our study, 45% respondents often read study material from internet and 64.2% respondents often managed to solve their problems while using internet. A study by Masrom M. [16], is also in accordance with our results [p value: less than .05]. Another research conducted by Vaghjee H. [17], inferred that 60% students used internet engines to find information regarding academics. More number of respondents agreed with the notion that the internet has brought plethora of knowledge in our access with just one click. Students have less tolerance for dreary routine of face-to-face lectures and prefer active learning over passive learning. McNeill M [18], in his ethnographic study

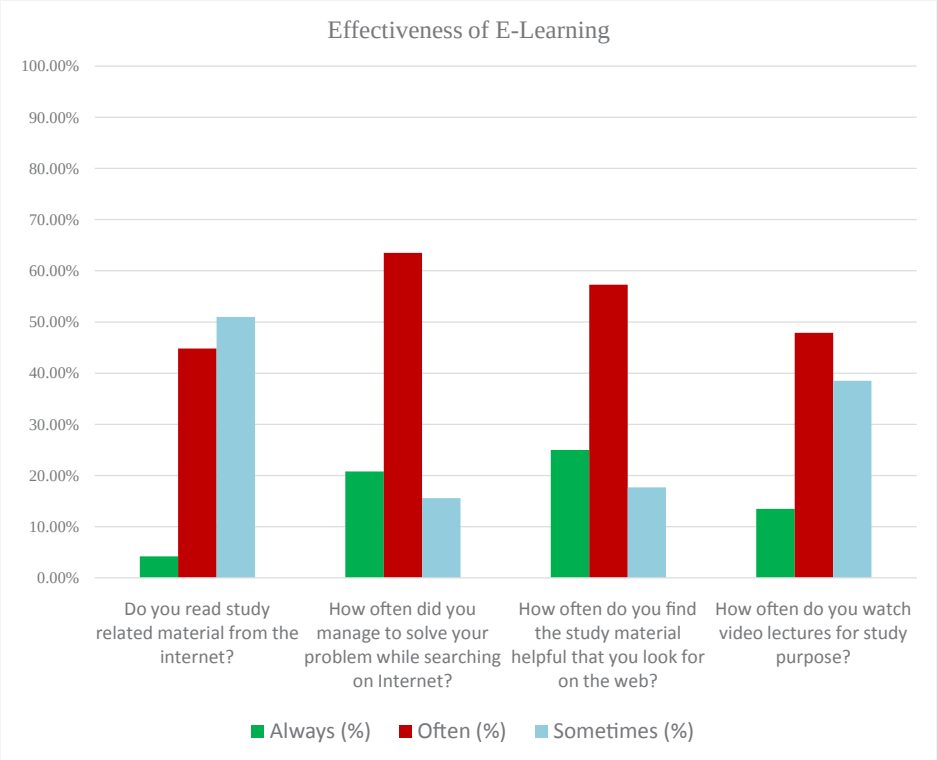

Figure 1 This figure exhibits the percentage% of use of e-learning among undergraduates.

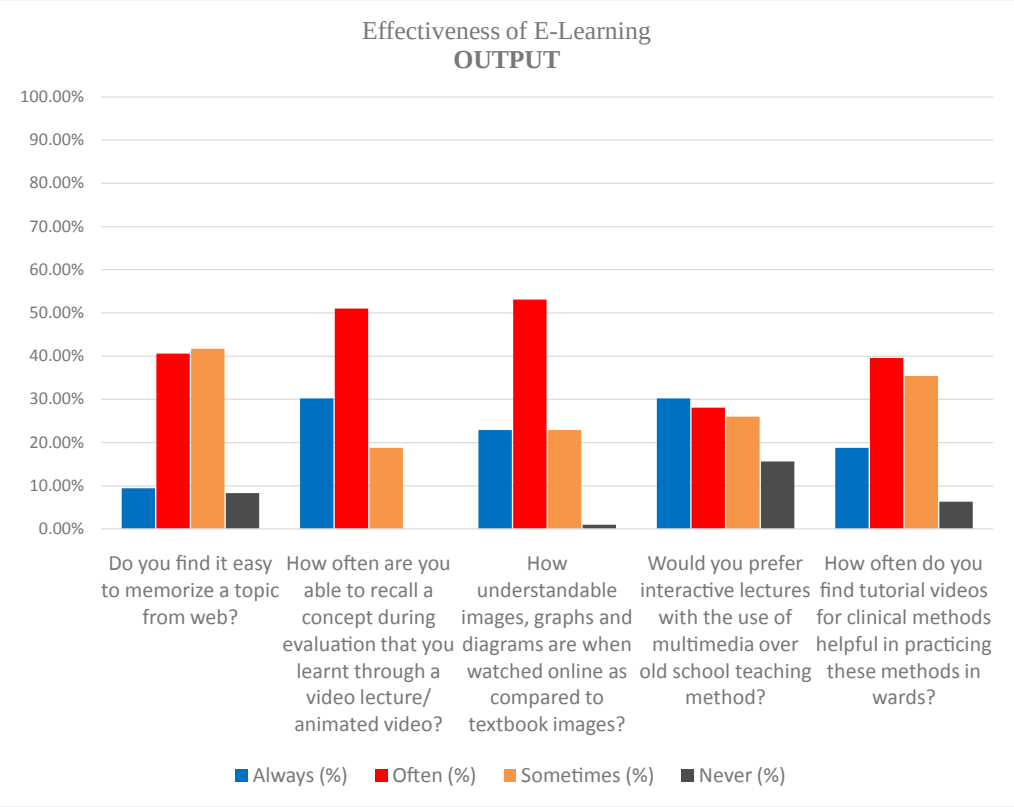

Figure 2 This figure shows the output of the e-learning based on students being able to memorize, recall, understand a topic using e-learning, and usefulness of the videos and interactive lectures.

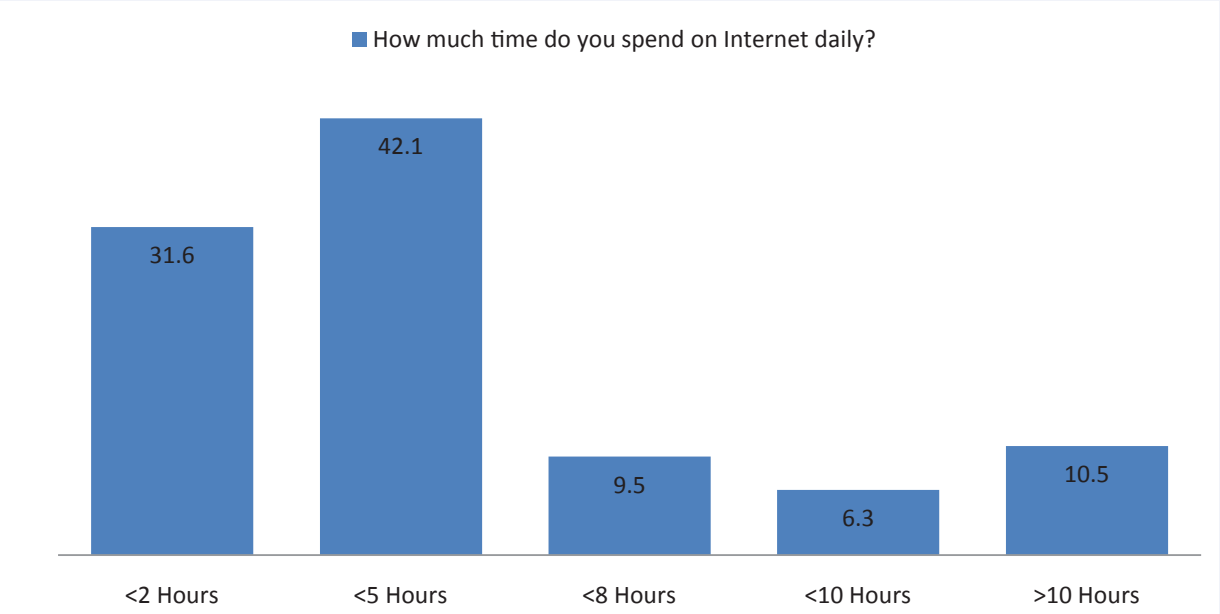

Figure 3 Time spent on internet daily. As shown in the graph, students were asked about the time spent on internet daily, roughly majority of the students (74%) spend <5 hours, and 31.6% spend < 2 hours, 42.1% spend between 2-5 hours on the internet daily, and only 10.4% use internet daily for more than 10 hours.

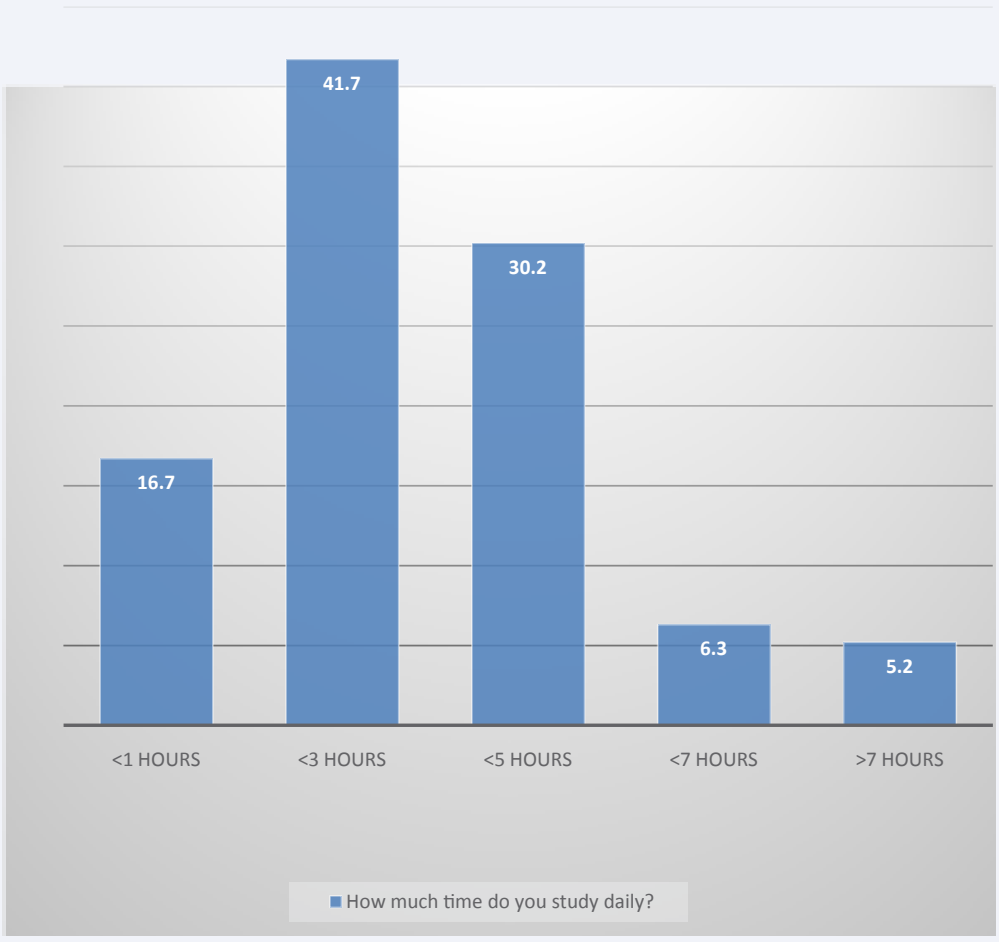

Figure 4 Daily study time; the figure displays how much time students study daily. Most of the students study for less than 3 hours daily.

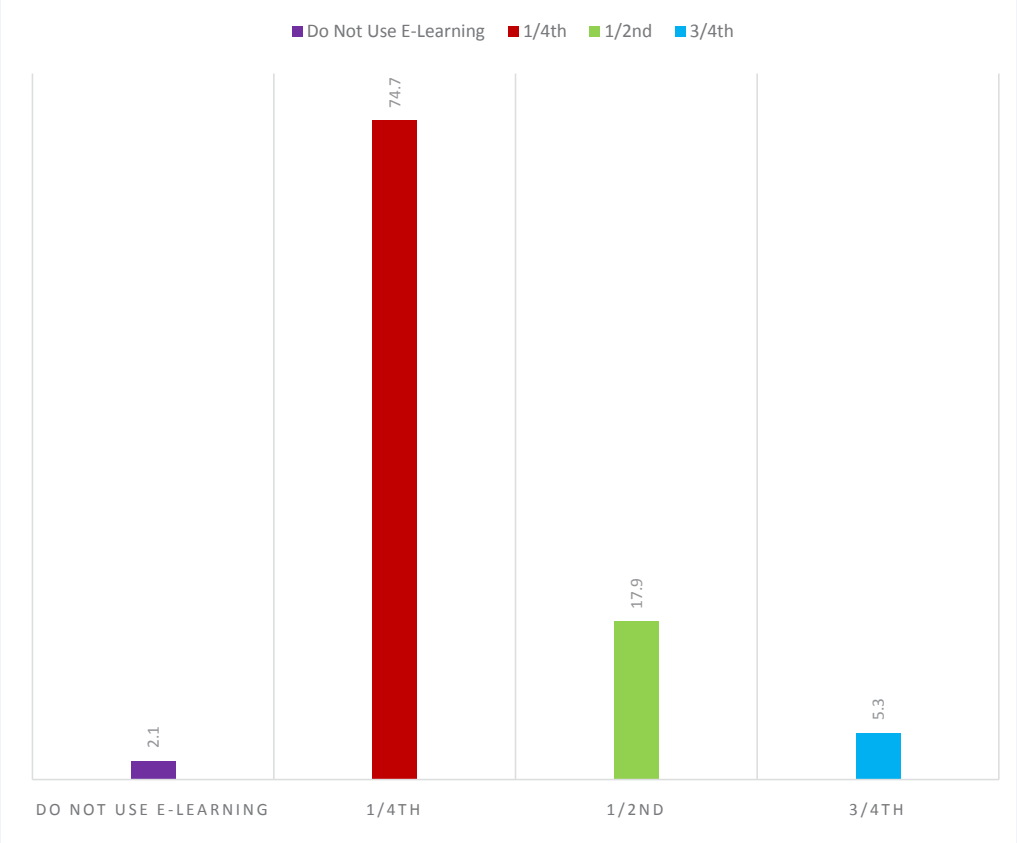

Figure 5 Proportion of time spent on e-learning; about 75% of the undergraduates spend 1/4th of their study time on e learning. Only a very small proportion 2.1% doesn't use e learning for study.

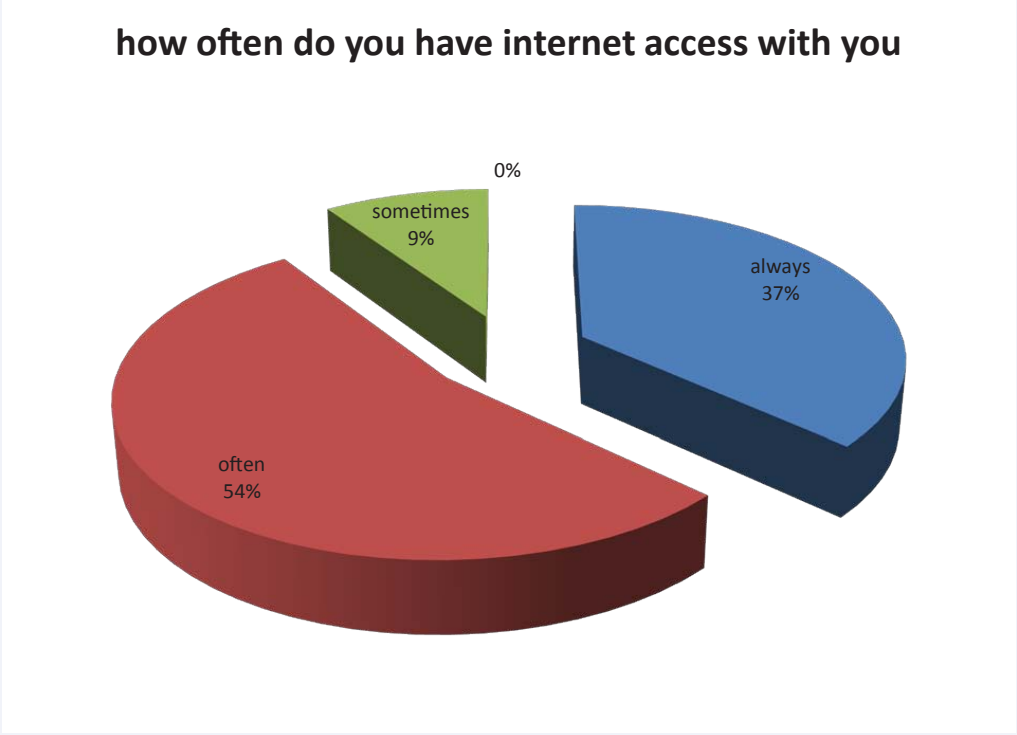

Figure 6 As in data, most of the time students have internet facility with them. 56 % of the students often have internet facility with them.

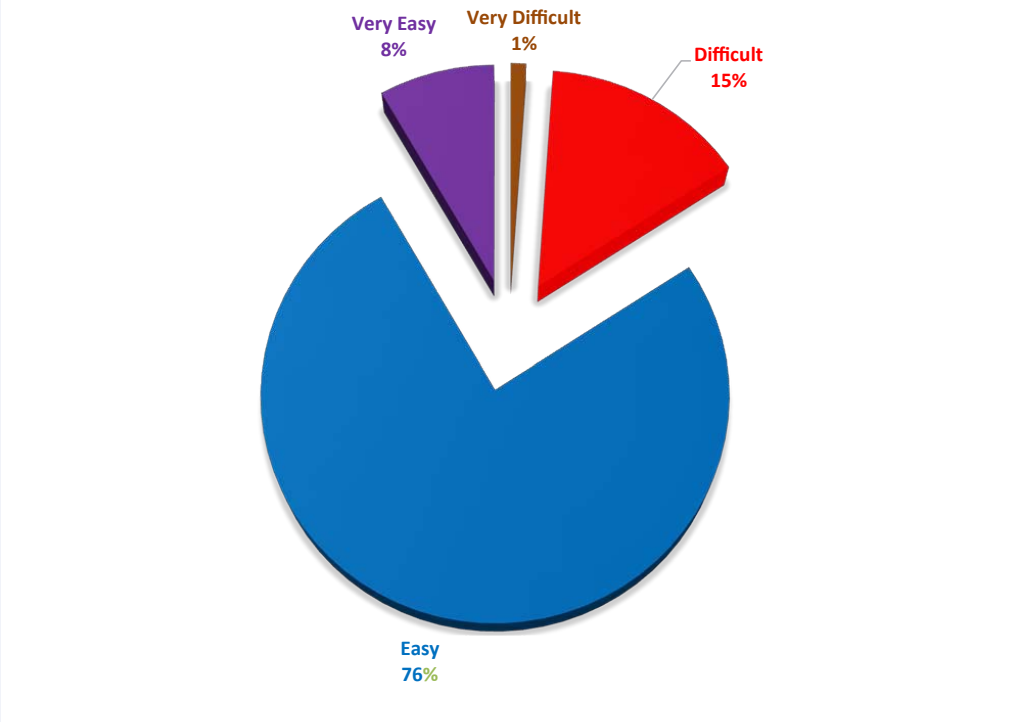

Figure 7 Ease of access of study material on internet 76% of the students found it easy, while only 15% difficult to access the required study material while searching online.

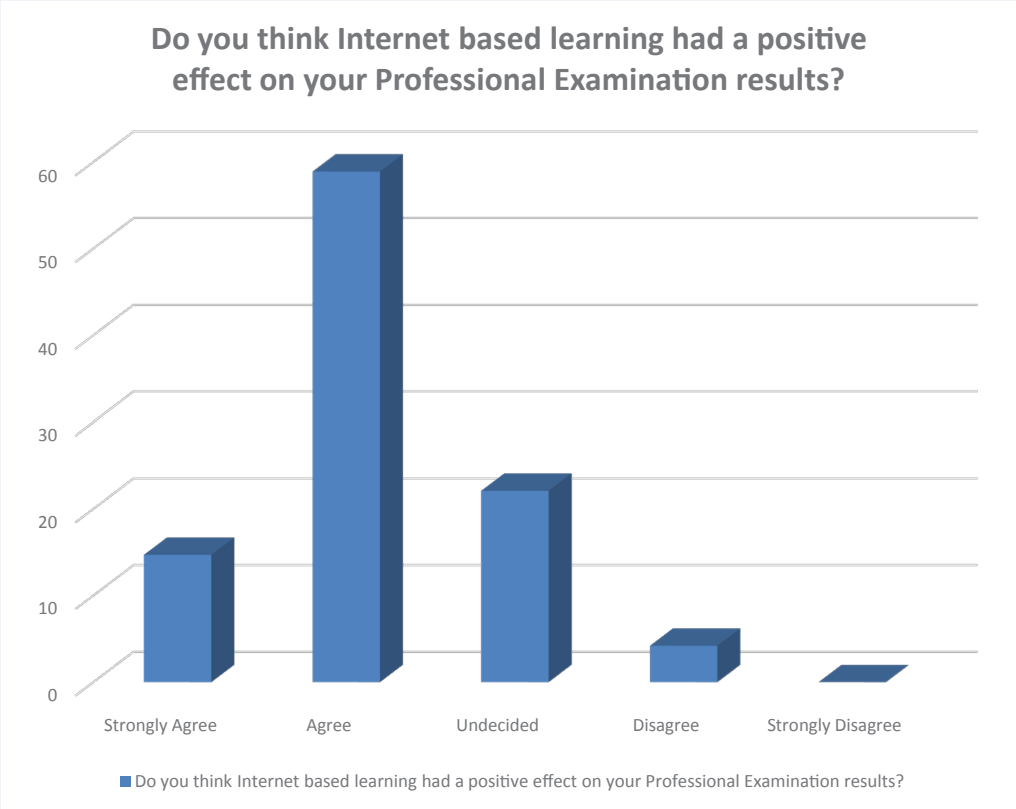

Figure 8 Subjects were also asked about the effects of e-learning on their professional exam results, among them 58.9% of the students agreed that internet based learning had positive effect on their professional exam result, 22.1% were undecided.

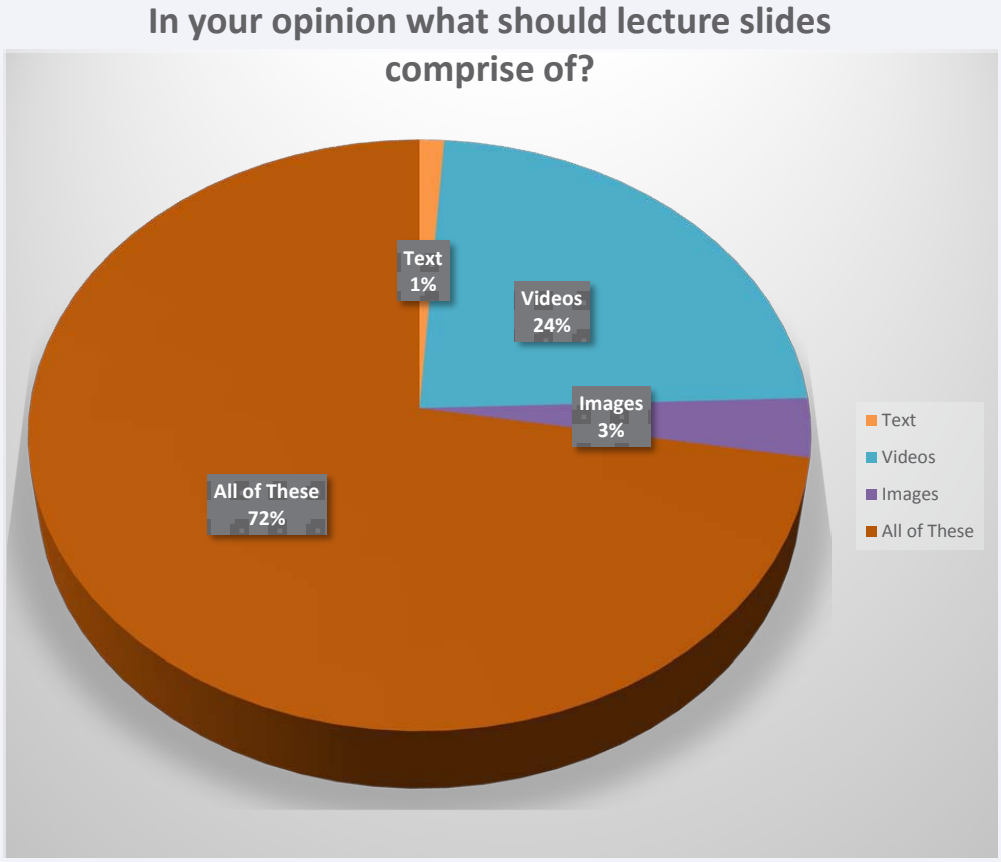

Figure 9 Lecture Slides as represented in the figure, most of the students (72%) think that the multimedia lecture slides should include text, images, and videos.

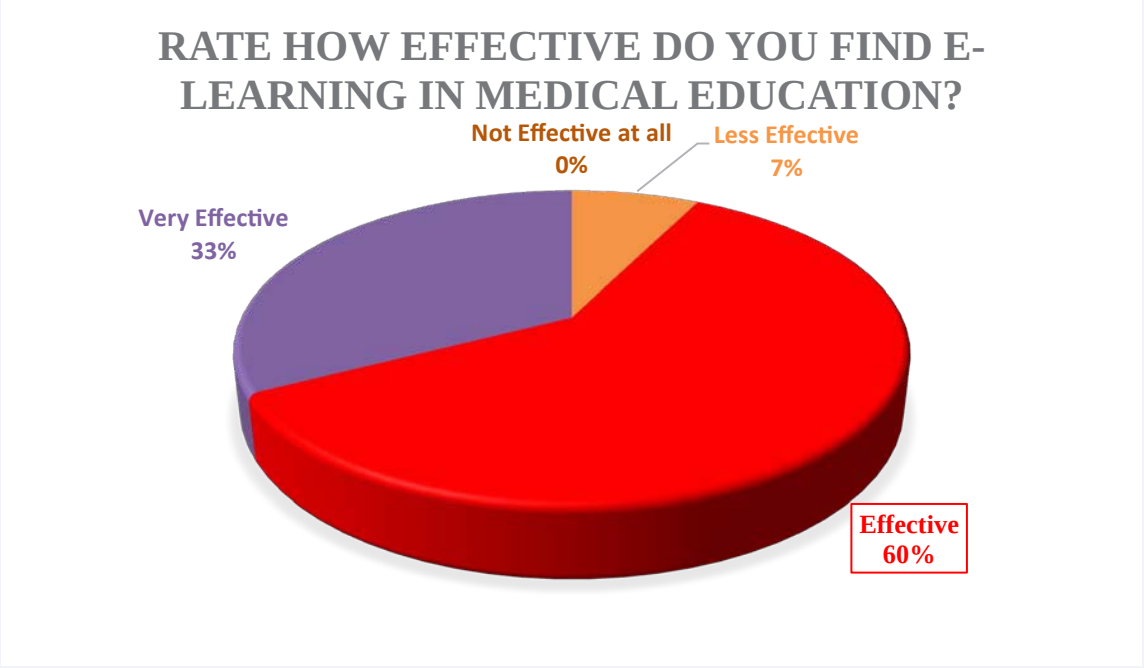

Figure 10 This survey also shows that quite large proportion of the undergraduates (60%) find e-learning effective, 33% very effective while 7% find it less effective in medical education.

theorized that majority of students believed that because of technology data has become easier, faster, and more convenient to use than even before. It is easier to acquire the required information from internet and store the relevant data in devices directly without any worry of jotting down lectures in notepads. Students can design their learning environment according to their preferences and choices. In contrast, half of the respondents in our research said that they seldom used internet for study purposes. An explanation to this may be that most of the study material available on internet is not considered valid and credible. This is important in case of medical education as one must have clear and authentic knowledge for the development of diagnosis and devising a management plan.

Our research propounded that 53.7% of the respondents often gained a better understanding of a topic by studying it on the internet. A plausible logic behind it may be that internet web is one giant hub of different modalities of study such as texts, videos, graphs, animations, flowcharts etc and all of these study designs when combined enables the learner to comprehend knowledge effectively and efficiently. Another benefit of online lectures is that student is able to pace his studying according to his mood and intellectual capacity. In accordance to this we also found out that topics learnt through e-learning were easier to memorize and recall by respondents. 51.6 % of sample size said that during an evaluation they were able to reproduce a concept in a better way when they learnt it through a video lecture or an animated video. Another research conducted by El-Syed R and El-houseni S [19], also suggested that using video based teaching is beneficial in enhancing students' learning. Also this type of pedagogy facilitates proficient knowledge transfer to the students for polishing their skills. The research conducted by Jawaid M [6], proffered that 40% of the respondents found learning animations to be useful in their studies which supports the preference of e-learning.

In our study, 31% of the respondents preferred interactive lectures using multimedia over old school methodology. A research by El-Syed R and El-houseni [19], and work of Bell B.S [9], corresponds with our findings. A study by Jawaid M [6], concluded that 68% of the respondents agreed that medical teaching should include web based programs. These results can be explained by the fact that traditional blackboard teaching has become redundant as students nowadays are more inclined towards interactive learning using multimedia and internet. Internet information tools provide flexibility of time and place, and unbounded educational discourse which facilitates simultaneous, independent and collaborative learning experiences. In case of medical education, sophisticated animations and simulations have made it easier for the students to understand difficult concepts.

Contrary to the above mentioned findings, 16% of the respondents preferred old school methodology over web based programs. A study mentioned in review article by Chumley HS. [20], also corresponds with our results. It may be due to increased chances of distraction while surfing for study material online. Also, some students may feel intimidated by e-learning as they lack the required skills to operate e-learning tools.

In our research, when students were queried about the ease of access to e-learning, 76% of the students responded that it was easy and convenient for them to acquire the study material online. Study by Jawaid M. [6], reported that majority of students had personal computers, laptops and wireless internet connection thus making it easy for them to reach the online platform to acquire the study material. A major reason behind this result might be the continuing efforts of IT sector to make technology cheap, accessible and common. On contrary, 16% of the students in our research found it difficult to access e-learning. This may be due to the fact that in some countries such as Pakistan, power shortage, networking issues, lesser download speed like problems prevail, many students hold back from using e learning devices due to their unreliability and instability.

Our research also inquired about the preferred device for using e-learning and found out that female respondents were inclined to use mobile phones more for e-learning while most of the male respondents preferred laptops for the same purpose.

In our study, in order to evaluate the output results of e-learning, medical students were asked about the positive effect of e-learning on their professional examination. Majority of the students were of the view that e-learning had positively influenced their academic performance. But some of the respondents (22%) were undecided. This indecisiveness reflected that students were unable to identify and pinpoint the factors contributing to their improved performance in professional examination.

Limitations of the current study must be acknowledged. The sample size is small. All subjects belonged to a single institution so they might not truly represent the majority of medical students. Another limitation is self-reported academic performance. Moreover research comprised of a paper based questionnaire and such questionnaires suffer from low response rates. Our research could not find association between e-learning and professional exam results. The undergraduates in King Edward Medical University are being taught with blended learning methodology which includes both old school methodology and multimedia based learning. So our research could not evaluate the sole impact of e-learning on students' academic performance.

CONCLUSION

Majority of the undergraduates have the required facilities and positive attitude towards e-learning. Our research establishes that most of the medical students prefer use of e-learning in their course of study. However, no association was found between use of e-learning and improved academic performance.

RECOMMENDATIONS

- There is a need to organize introductory studies about e-learning for students as well as faculty members to improve their skills and attitudes for proper implementation and success of e-learning in medical education.
- Proper infrastructure plausible for e-learning must be provided.
- A high speed internet connection must be provided in the institution for easy and rapid transfer of data.

- Suggestions regarding e-learning must be acquired regularly both from the faculty and students to equip and upgrade the available infrastructure of campus.

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