

# Use of e-learning tools in integrated clinical biochemistry

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## Author's Contribution

<sup>1</sup> Manuscript writing, Editing, Data Collection

<sup>2</sup> Concept Initiation, Editing

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## A B S T R A C T

**Objective:** To evaluate usefulness of e-learning tools in teaching integrated clinical biochemistry.

**Methodology:** The study was carried out on the 1st year medical students of Shifa College of Medicine, Shifa Tameer-e-Millat University. Students were given questionnaire to fill. Statistical procedures were performed with the SPSS software. The qualitative data is presented in the form of frequency and percentages.

**Results:** More than half of the students were already aware of some form of e-learning tool. Most beneficial tool was YouTube followed by Dropbox, WhatsApp. Most of the students wanted recorded video lectures, more online books and more handouts. Majority students wanted a combination of both forms of learning.

**Conclusion:** e-learning means learning which involves technology. It aids in understanding concepts. The best form is blended learning, which is a combination of e-learning and traditional learning. Students found e-learning to be effective and economical. Students of Pakistan are using smart phones, iPads, computers, etc. Their integration will require development of computer systems and training of faculty members. Different institutes may select different modalities depending on their requirement, faculty training and financial resources.

**Keywords:** e-learning, traditional learning, blended learning

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## Introduction

Modern day technology has introduced different e-learning tools in medicine. E-learning is defined as use of technology to enhance learning. E-learning is also called web-based learning, online learning, distributed learning, computer-based instruction or internet-based learning. E-learning modes are broadly classified as distance learning and computer-based learning. Distance learning is used to give education to learners who are remotely located and their direct access is difficult. Computer based learning uses computers for learning and teaching.<sup>1</sup> In both modes of learning, internet becomes the point of integration. E-learning uses text, graphics, animation, audio or video, to produce content that learner's access via computer. Traditional learning involves the use of lectures and face-to-face learning. Blended learning is a combination of e-learning technology with traditional

learning, for example, a lecture or demonstration is supplemented by graphics, animation, audio or video.<sup>2</sup>

The advantages of e-learning include easily accessible information, personalized learning, the content is standardized, can be easily updated and is easily distributed.<sup>3</sup> Accessibility means the student is able to access what is needed whenever it is needed. Improved and easy access to educational materials is vital, as each student has a unique routine of learning. It is easier to update than updating the printed material. It allows educators to review their content simply and quickly.<sup>4</sup> Students have control over the learning material, time, order of learning, pace of learning and media which lets them meet their personal learning objectives.<sup>5</sup>

Content delivery may be either synchronous or asynchronous. Synchronous delivery refers to same content of information being given at the same time by an instructor. There is direct communication with other learners such as teleconferencing, WhatsApp, etc. In asynchronous delivery, the information is received and given at different times so the learners have their own pace of learning. There has to be a centrally placed distributor who sends the information to the instructors and students such as e-mail or other feedback technologies, Facebook and Dropbox.<sup>5</sup>

Course of content and delivery is standardized in e-learning as compared to a lecture given to different groups by separate instructors. It allows learning to be individualized which is known as adaptive learning and promotes interactions with others also referred to as collaborative learning. Internet lets the widespread distribution of digital content to many users concurrently.<sup>6</sup> e-learning can be designed to include assessments such as quizzes, multiple choice questions, electronic Problem Based Learning. Most of the formative assessments are limited to Multiple Choice Questions.<sup>7</sup>

## Methodology

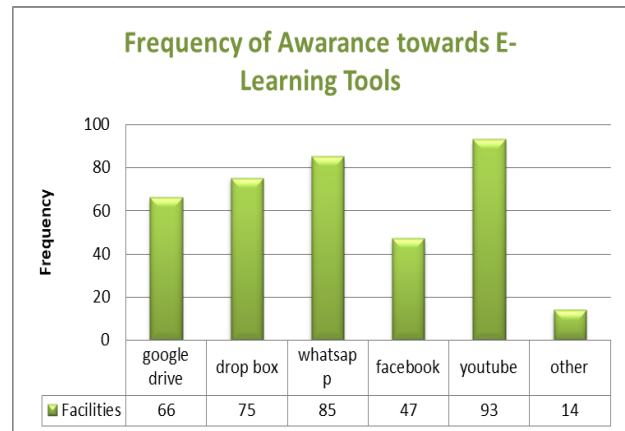
The study was carried out on the 1st year medical students from Shifa College of Medicine, STMU (Shifa Tameer-e-Millat University), Islamabad, Pakistan, class of 2023. There were 106 students. It was carried out in the first block, Y-1 which included modules of Essentials of Medicine, Cell Structure and Function, and Hematology and Lymphoid System for duration of four months. Students were given a questionnaire to fill after which qualitative and quantitative analyses were performed. All statistical procedures were performed with the SPSS software version. The qualitative data is presented in the form of frequency and percentages. There were no side effects or any potential hazards of this study.

## Results

Of the 106 eligible participants, 100 students responded to the survey and completed the survey in full. One participant was excluded from data analysis as the participant did not make any choices.

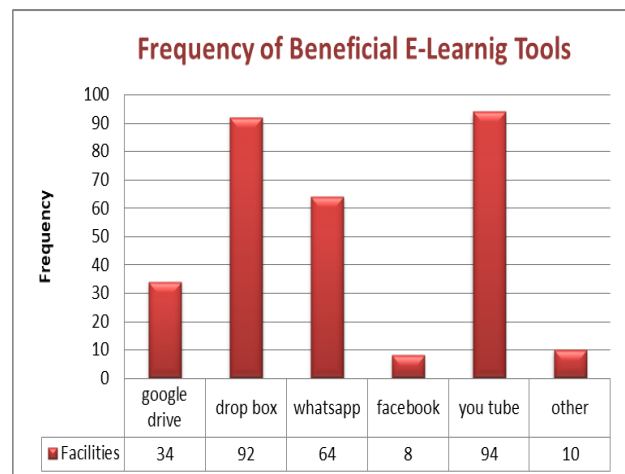
The students were asked about the e-learning facilities that they were already aware of. 93% of them knew about

YouTube, 85% knew about WhatsApp, 75% knew about Dropbox, 66% knew about Google Drive, 47% knew about Facebook and 14 % knew about other e-learning tools. This shows that more than 50% of the students were aware of the e-learning tools as presented in figure 1.



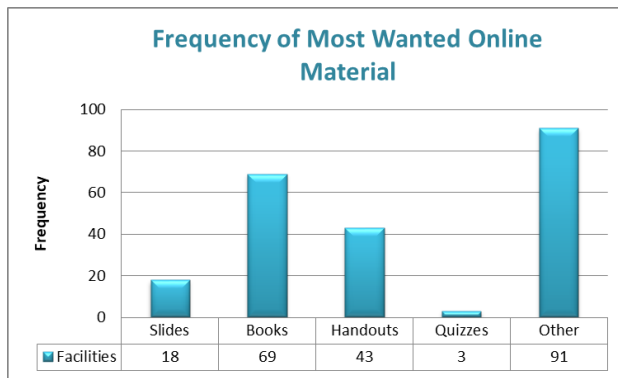
**Figure 1: Frequency of awareness regarding different e-learning tools**

Students were questioned about the usefulness of e-learning tools. Most useful tool was YouTube (94%) followed by Dropbox (92%), WhatsApp (64%), Google Drive (34%), Facebook (8%) and other apps (10%). This is shown in figure 2.



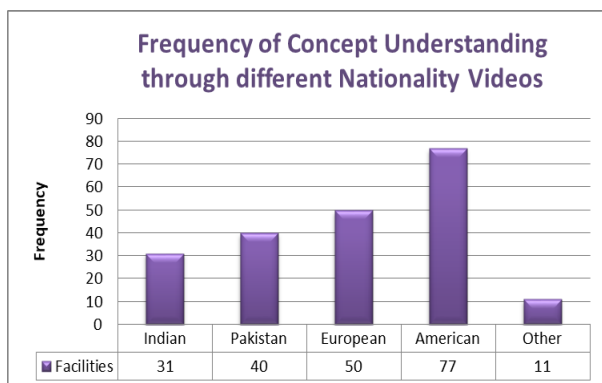
**Figure 2: Frequency of useful e-learning tools.**

Students were asked which material they would want to be provided online. 91% of the students wanted other materials. 69% wanted more online books. 43% wanted more handouts. 18% wanted more slides. 3% wanted more online quizzes as shown in figure 3.



**Figure 3: Frequency of most wanted online material.**

YouTube videos are made by people of different nationalities. The students found that American videos are most conceptual followed by European videos, Pakistani videos and Indian videos. Videos of other nationalities are also helpful. The data is presented in figure 4.

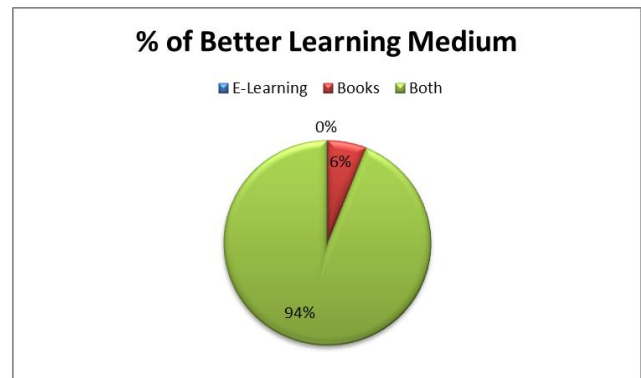


**Figure 4: Frequency of Concept Understanding Through Different Nationality Videos.**

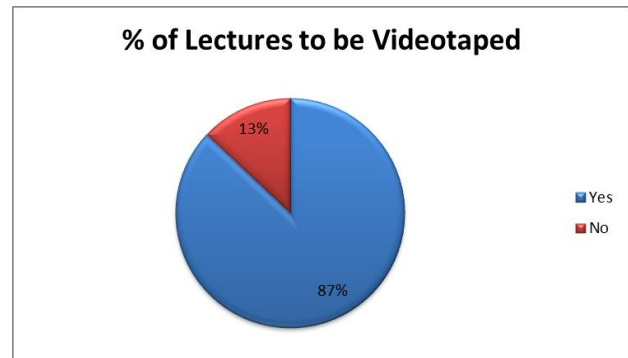
Students were asked which medium of learning was better. 94% of the students found blended learning to be useful. 6% of students were in favor of traditional learning. None of the students was in favor of only e-learning as shown in figure 5.

87% of the students wanted the lectures to be videotaped. 13% were not in favor of it as shown in figure 6. 56% of students found mobile to be more useful while 44% of them found laptop to be more useful electronic device as shown in figure 7.

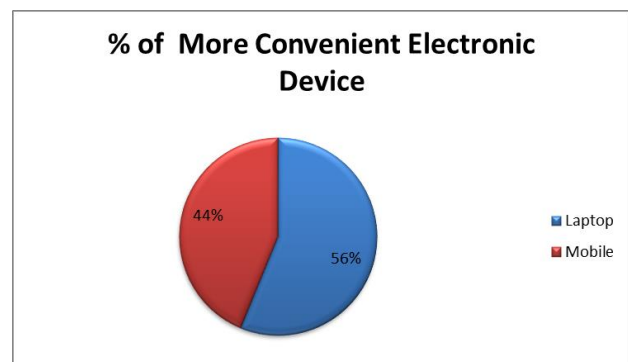
The students were asked about the cost effectiveness of different learning methods. 12% found books more economical, 26% found e-learning more economical while 62% found blended learning more economical as shown in figure 8.



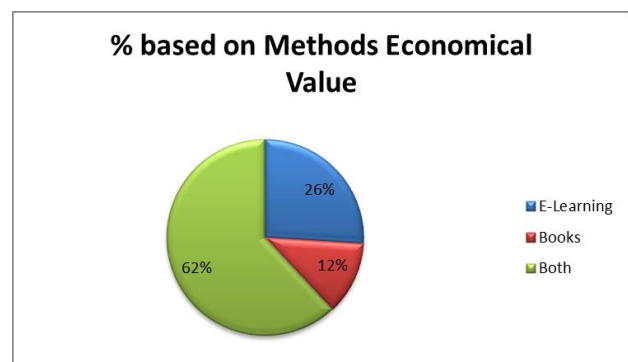
**Figure 5: Better learning medium**



**Figure 6: Lectures to be videotaped.**



**Figure 7: More Convenient Electronic Device.**



**Figure 8: Comparison of cost-effectiveness of different learning methods.**

Suggestions regarding the e-learning package highlighted the benefits of using a blended learning approach and showed the interest of students regarding e-learning. There were a number of suggestions by the students. Six students suggested that "Lectures should be videotaped." One student suggested that "Credible online courses such as HarvardX should be provided." Four students suggested that "Online assessments or quizzes or multiple-choice questions practice sheets should be provided." Three students suggested that "More handouts, summaries, concept maps and diagrams should be uploaded in the Dropbox." One student suggested that "There should be more online YouTube lectures." Four students suggested that "Demonstrations and Shifa Clinical Integrated Learning examinations should be videotaped." One student suggested that "e-Books should be uploaded in Dropbox."

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## Discussion

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Our goal in this study was to determine whether the students were aware of e-learning. In case they were aware, which tools of e-learning were effective, which tools would they want to access more online; did they find it economical and what form of learning did the students prefer, e-learning, traditional learning or a blend of both. We hypothesized that students were already aware of e-learning to some extent and our results also suggest that. Students found different tools to be beneficial. They wanted more material to be made available online and they found e-learning easier and economical. They also pointed out that videos from some nationalities were more helpful than others.

This study is consistent with the finding of other studies in the context of preference for blended learning instead of traditional learning only or e-learning only. E-learning has been found to augment or support traditional learning since replacing traditional learning is not an option. Both modes of learning have their own benefits.<sup>8</sup> Blended learning can be more helpful for postgraduate learners who need to be lifelong learners to keep up-to-date. Another study on Internet-based learning in health professionals found it to be favorable and effective compared with no intervention and showed a similar effectiveness as traditional methods.<sup>9, 10, 11</sup>

It was found that more than half of the students were already aware of some form of e-learning tool. The students had been using YouTube, Dropbox, WhatsApp, Facebook, Google Drive and other apps. They found Dropbox and YouTube to be most beneficial followed by Google Drive and WhatsApp. The undergraduate student found YouTube videos helpful for understanding concepts.<sup>10, 11</sup> On an enquiry regarding online availability of materials, the students responded that most frequently available material were lecture slides followed by books, handouts and quizzes. They wanted more books, handouts and other material such as video lectures to be made available online. One half of the students found laptop to be more convenient while the others found the mobile phone to be more convenient e-learning tool. This showed that it had more to do with personal preference.

More than half of the students found it more economical when traditional learning was mixed with e-learning. The students wanted to buy the books because it allowed them to underline and add stuff, whereas they wanted the reference books to be available online because it saved them the cost of buying the books or saved them the hassle of borrowing books from the library. Also, it saved them the cost of photocopying. It also allowed the material to be easily exchanged using Drop Box, WhatsApp or Facebook. This also allowed standardization of the content as the same material was being distributed to all the students. Previously, when the students had to be given additional notes, they had to be photocopied and distributed, utilizing a lot of paper. With the use of these e-learning tools the notes are easily distributed using Drop Box, WhatsApp etc. and thus save lots of paper. One study suggested that it was more economical for the student, but development of these e-learning modalities such as online libraries, etc. will require finances and heavy investment, but the long-term results would be worthwhile. The institute will also need to recruit qualified and experienced faculty members and install related computer systems. There will also be a need to train faculty and students on how to use the system in order to use it efficiently and effectively.<sup>12</sup>

Most of the students wanted the lectures to be videotaped. This is very convenient for the teacher as well as the student. The teacher can record the lecture carefully and easily. If there are any mistakes, they can be

edited. For the students, it would allow them to decide when to watch it and the number of times they want to watch it. Each student has his or her own pace of learning. These tools are especially useful before exams when they can be revisited. The disadvantage is that the active interaction in the lectures and especially the demonstration will be lost. In a study by Tang and Qureshi, 45 articles were retrieved from databases, including MEDLINE, PsycINFO, Education Source, FRANCIS, ERIC, and ProQuest, from 2006 to 2016 to find reviews related to online lecture use in undergraduate medical education. They found that online lectures were well received by the students and they were effective in improving learning outcome.<sup>13</sup>

The videos of American nationality followed by European, Pakistani, Indian and others were found by students to be helpful. This shows that America and Europe being more developed nations are many steps ahead of the developing nations in using e-learning tools and thus have developed better videos. This also shows that the world in general and developed countries in particular are developing and including more and more of these tools in medical education. This also gives advantage to the students because they are not limited by their nationality and can learn from the videos of people from other nationalities, as well.

Potential limitations of this study included the small participant numbers. Larger number of students would get us a more comprehensive view. Secondly it was carried out on students who had not yet given their professional examination. The analysis of utilization of e-learning facilities during the professional exam would give us more information. Thirdly we did not take in the gender opinion. Generally, males are more interested in using technology as compared to females.

## Conclusion

E-learning is a relatively new form of learning. It supports traditional learning not replacing it. The best form is a combination of these two i.e. blended learning. The students of Pakistan are using smart phones, iPads, computers and other electronic devices but it seems they are mostly used for entertainment purposes and less for academic purposes. They have just started using them for academic purposes. It was found that more than half of

the students were already aware of some form of e-learning tool. Their integration will require development and installation of computer systems and training of faculty members. Different institutes may select different modalities depending on their requirement, faculty training and financial resources.

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