

Impact of E-learning as a supplementary teaching learning tool in physiology

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Abstract

Background: The present teaching- learning activity caters to the requirements of average learners. E-learning has the potential to promote learning at learner's convenience and pace. In the present study, learning outcome following the administration of e-learning module and students' perception as a supplementary teaching learning tool was evaluated. **Materials and Methods:** Forty four first year medical students participated in the study. Case scenario of Parkinsonism was used as a trigger to start the discussion. Reading material was provided on weekly basis in the form of text, power point, and video. Pre-test and post-test were conducted to evaluate the learning outcome. Student's perception about e-learning as a supplementary T-L tool was assessed by using a satisfaction survey. **Results:** Pre-test and post-test mean scores for learning outcome for knowledge and application were 6.11 ± 1.77 and 8.27 ± 1.14 respectively, which were statistically significant. In satisfaction survey, 73% of students felt that overall experience of e-learning was good. It helped in improvement of the knowledge (36%), effective in learning complex concepts (25%), helped in revision (25%) and facilitated learning at the place of convenience and time (7 %). Hindering factors were e-learning platform related technical difficulties (32%), lack of mobile app (34%), less time for interaction (18%) and time of academic year not suitable for taking up e-learning activity(20%) as it was close to university examinations. **Conclusions:** E-learning could serve as a useful supplementary learning tool. There was a demonstrable improvement in the knowledge after intervention using the e-learning module. Student's preferred mobile app based platforms for administration of e-learning modules.

Key Words: E-learning, pre-test and post-test scores, supplementary learning tool.

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INTRODUCTION

Teaching- learning activity in the classroom setting satisfies the average requirements of the group of learners. In this conventional method, need of the individual learner is not met by matching their learning abilities¹. The need of slow learners and high achievers

could not be addressed based on their learning capability². Additional relevant information cannot be provided due to non-availability of dedicated quality time. Computer based teaching learning activity delivered through the internet may address the problems of both the groups. Surprisingly e-learning has not been utilized to the fullest extent in medical institutions. Internet is popularly used and widely accepted by the students for social networking with very limited use for teaching learning activities³. There is a potential to use this powerful tool to promote self-directed learning of students for satisfying their individual learning needs⁴. E-learning refers to the use of internet technologies to deliver a wide variety of modules that enhance learners' knowledge and performance. It promotes learning at learner's pace, place of choice and convenience of time. It will also help in horizontal and vertical integration of the topics which will give the comprehensive knowledge of the subject. In this method,

involvement of the students happen without peer inhibition, promotes reflective learning, provides opportunity for discussion, helps in clarifying all kinds of doubts, interested students can do in depth study, they can participate in discussion as there is no restriction of time, it can promote lifelong learning to satisfy the felt need of the learner. There is ample evidence to establish that e-learning potentiates traditional teacher facilitated learning activities in a blended-learning educational environment. Medical students have greater access to internet facility these days and they can learn and use any online technologies in a short period². Earlier studies have reported a positive reinforcement through e learning. This method also creates opportunity for the faculty to give feedback and address specific requirements of each of the students. E-Learning tool is able to impart and assess the components like knowledge, skills and attitude. It also helps to familiarize with e-learning platform which is likely to be the integral part of the higher education in the future. In the present study an attempt has been made to evaluate the learning outcome following the administration of the e-learning module and to understand the perception of medical students about introduction of e-learning as a supplementary tool.

MATERIAL AND METHODS

First year medical students who are willing to participate in e-learning program were recruited for the study. Moodle Version 2.01 was used as an e-learning platform. Total of 77 students enrolled for the project. It was a prospective, mixed type study where both qualitative and quantitative components evaluations were involved. Specific case study based topic which had analysis, synthesis and application components of cognitive domain was selected. Pre-test was conducted before introducing the topic to evaluate their initial knowledge and understanding of topic proposed for discussion.. Later students were asked to register their participation in the Moodle through invitation link which was sent to their e mail ID. Students were asked to accept and create their username, password. Admin and moderator had an access for verification and the authentication of the registration. After the registration, students were asked to go through the contents and assignments which were uploaded by the administrator. Three weeks module was prepared by the research team members. Basic reading material in the form of power point presentation, animated videos, text materials, reference books and related links to further studies on the topic was made available in Moodle platform to students who are participating in the program. Students were given one week time to study and discuss online each subtopic. Two tests in the form of MCQs and one quiz having different segments were conducted

online to encourage the competition and maintain interest of the students. Total three weeks duration were allotted to complete the study. Post-test was administered during the 4th week to assess the impact of e-learning intervention. This change in the knowledge component was assessed objectively using MCQs. Subjective evaluation was done using online satisfaction survey to understand students' acceptability, ease of learning, benefits and limitations of e-learning module.

Schedule of course delivery	
Week 1	Students recruitment
	Student registration
	Pre-test
Week 2	Subtopic 1, Text, PPT and Animation
	Subtopic 2, Text, PPT and Animation
	Test 1- MCQs
Week 3	Subtopic 3, Text, PPT and Animation
	Test 2 and QUIZ
Week 4	Post test
	Satisfaction survey

Statistical Analysis: Scores of the Quantitative assessment was compared by paired 't' test and qualitative assessment of questionnaire was done by thematic analysis.

RESULTS

Table 1: Scores of Pre-test and Post-test of students participating in E-learning

	Pre-test	Post-test
Mean	6.12	8.27
SD	1.77	1.14
n	59	59
P value	0.000*	

*p value is considered significant at <0.05

Total of 71 students of first year medical college in the age group of 16-18 years were enrolled for the study. In that, 59 candidates completed the study. The mean scores of pre-test and post-test for students who completed the e-learning module was 6.12 ± 1.77 and 8.27 ± 1.14 respectively. Comparison of pre-test and post-test scores was done by applying the paired t test. This test shows statistically significant difference between the two scores ($p < 0.000$).

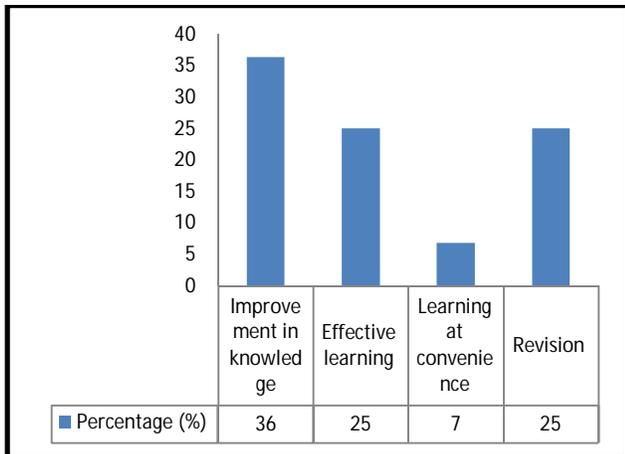


Figure 1: Students feedback on benefits of e-learning

The student’s feedback on benefits and limitations of the e-learning module is depicted in graph. Around 36% of the students felt that e-learning helped them in improvement of the knowledge. Twenty five percent of the students opined that it was effective learning tool and another 25% of them felt it also helped them in revision of the topic. Only 7 % of the students felt it was useful for learning at their convenience.

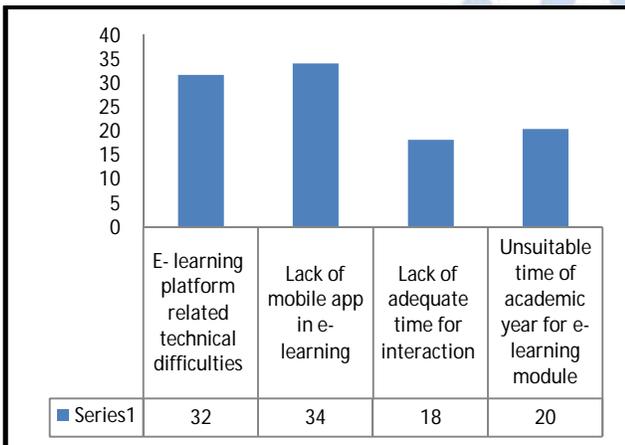


Figure 2: Students feedback on limitations of e-learning

Limitations of the e-learning module as stated by students in their feedback are depicted in the graph 2. Majority of the students (34%) expressed that lack of mobile application based platform for e-learning portal was a major handicap for them to utilize it effectively. Around 18 % of them felt that they did not get adequate time to interact with peers and faculty members. Twenty percent of them mentioned time was unsuitable for them to focus on e-learning as it was close to university examinations. Thirty two percent of the students faced technical difficulties.

DISCUSSION

E-learning is a method of learning in which information technologies and electronic devices are utilized to deliver and access educational material. It is a different mode as the teaching is done outside of a traditional classroom setting. There is an urgent need to integrate e-learning in medical education. But the effectiveness of e-learning has been difficult to quantify and there are concerns regarding the quality as well as consequences of such informal educational activities in a conventional setting. The lack of e-learning standards is also one of the key limiting factors for the acceptability of such teaching method. It’s a challenge for medical teachers to utilize such technology in teaching- learning activities. There are several advantages and disadvantages of e-learning which has been studied in the voluntary student participants. In a study by Dhir *et al* 2017 students and faculty were in favour of adopting e-learning along with traditional learning, and the advantages far outweigh the likely discomfort associated with adoption of this new method⁵. In the beginning, students were excited about the novel method of study using internet portal but as the study progressed week by week there were dropouts in the study. There was total of 17% dropouts in the study. The reason for dropout was not same for all the students and also it was more attributed to the general motivational levels of the students rather than any specific reason. In a study by Rostaminezad *et al*, 2013 a similar finding with dropout rates between 20 to 80 percent has been reported in e-learning, so decreasing dropout rate is one of the major challenges of e-learning⁶. In another study by Park *et al* 2009, it was found that the satisfaction level of the e-learning course was the most important factor which prevents dropouts. Students who dropped out of the study reported to have significantly lower satisfaction with e-learning than students who successfully completed the same e-learning courses⁷. It also observed that self motivated and voluntary participants had better compliance and performance⁸. The statistically significant difference between the pre- test scores and post test scores in the present study was suggestive that the e-learning tool implemented had an impact on student acquiring the knowledge. It also suggested that students were interested in trying this new method of learning as it enriched their knowledge with a different learning experience. Student had pointed out the advantages and disadvantages in this as reported in the results. With respect to advantages of e-learning, majority of the students reported that it improved their knowledge, it is an effective learning method, easy to revise and also convenient. Similar study by Masic 2008, had reported the several advantages of e-learning which included more efficiency, economy, uniform distribution of material to

all the seekers over a period of time. It enables to access to educational resources across several countries and several institutions at the same length of time^{11,12}. According to Trukhacheva *et al* 2012, the integration of e-learning into medical education can catalyze the shift towards applying adult learning theory, where educators will no longer serve mainly as the distributors of content, but will become more involved as facilitators of learning and assessors of competency¹³. Other added advantages of e-learning presents numerous research opportunities for faculty, along with continuing challenges for documenting scholarship. Innovations in e-learning technologies point toward a revolution in education, allowing learning to be individualized (adaptive learning), enhancing learners' interactions with others (collaborative learning), and transforming the role of the teacher¹⁴. Limitations of the study includes e-learning platform related technical difficulty, lack of mobile app in e-learning, lack of adequate time of interaction, time was unsuitable for them to focus on e-Learning. It the present generation of students basic skills of the use of computers and networks seem to be the integral part of all future medical curriculums¹⁵. In this line the medical colleges are upgrading themselves with basic infrastructure favouring the e-learning. The support within medical education includes repositories, or digital libraries, to manage access to e-learning materials, consensus on technical standardization, and methods for peer review of these resources^{16,17}. One of the technical challenges in was introducing mobile as a tool for e-learning platform for the students. It was introduced in the latter half of the study but did not have much impact on outcome. Similar finding was reported by Lee *et al* 2015 who concluded that the mobile phone might offer more valuable learning opportunities when compared to computer alone. The benefits offer more learning and several topics simultaneously along time period¹⁸. The several advantages associated with mobile learning like high accessibility, low cost, contextual learning, and convenience for the learner. The communication becomes continuous with all possible interaction between learner and tutor: between learner and other learners, and opportunity for self-assessment while learning. In the future, it is likely that the strategy of mobile first, whereby providers of e-learning think of the user experience on a mobile first, will result in learners who increasingly expect that all e-learning provision will work seamlessly on a mobile device¹⁹. Another limitation is that the part of academic year during which the e-learning tool in administered. It was started in the middle of the year which was very close to regular summative assessment sessions. This was an added burden to the students and the effective use of the e-learning study

material could have been reduced. So it is important that study material is made available to the students at the beginning of academic year. This gives more time for the student to utilize such online resources. Similar finding has been reported in a study by Back *et al* 2016, where they have emphasized the importance of getting early e-learning material and also quality material which has been review and finalized by the experts in the field²⁰. It can be concluded that, the e-learning is an acceptable platform of medical education provided there are sufficient technical support, devices and desire to establish and maintain topic teaching modules.

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