

Blended learning – integrating E-learning with traditional learning methods in teaching basic medical science

J.G. Bagi^{1*} and N.K. Hashilkar²

¹Department of Physiology, K.L.E. University's, Jawaharlal Nehru Medical College, Nehru Nagar, Belgaum-590010, Karnataka, India and ²Department of Pharmacology, K.L.E. University's, Jawaharlal Nehru Medical College, Nehru Nagar, Belgaum-590010, Karnataka, India

Abstract: *Background:* Blended learning includes an integration of face to face classroom learning with technology enhanced online material. It provides the convenience, speed and cost effectiveness of e-learning with the personal touch of traditional learning. *Objective:* The objective of the present study was to assess the effectiveness of a combination of e-learning module and traditional teaching (Blended learning) as compared to traditional teaching alone to teach acid base homeostasis to Phase I MBBS students. *Method:* The entire batch of 200 students who had exposure to traditional lecture teaching on acid base homeostasis was randomly divided into two batches and the integrated e-learning module was implemented for 100 students of MBBS Phase I (200 students). The mean scores of both the groups were compared using unpaired t-test. *Result:* The mean performance scores of the students of blended group was statistically ($p < 0.05$) significant as compared to that of the students who received only traditional teaching. *Conclusion:* The concept of understanding the complex contents like acid- base homeostasis and its application on patient care was better among the group of students who had exposure to blended learning than those, only to traditional class room learning.

Keywords: Blended learning, E-learning, Medical teaching

Introduction

Physiology is one of the disciplines taught for phase I MBBS students that deals with physiological principles and homeostatic mechanisms of normal human body to understand the disease pattern better. In light of this, in the medical setting to understand the clinical case related disease, cause, diagnosis and treatment it is necessary to acquire core knowledge in basic sciences [1]. This course builds on the students' growing understanding of normal structure and function, laying the foundation for exploration into pathophysiology and pharmacological effects on organ systems [2].

The course content in physiology at KLE University's J N Medical college, Belgaum is delivered in the form of lectures for large groups, small group discussions in the form of tutorials and practicals in the form of experimental sessions. Lecture continues to be the most common method of delivering information in university course and no doubt is an efficient teaching strategy that delivers an up-to-date summary of material adapted to a particular

student group regardless of size. However, the retention of the material by the students is poor [3] and is a less desirable vehicle for developing skills of critical thinking and life long learning [4]. Also, just memorization of facts does not ensure that the students have understood concepts of care that they will need in practice [5].

The teaching/ learning activities of the KLE University are over packed with teaching sessions being conducted from 8.00 am to 5 pm with just an hour lunch break. And too much course content is delivered in each session wherein students face difficulty in concentrating. Thus, students' ability to master subject matter in face-to-face classes becomes limited as students learn at different paces and there is no mechanism to ensure that they are intellectually [6-7] engaged with material for explanations of difficult concepts in subjects taught in didactic lectures. The other mode of teaching learning strategy followed is tutorials for small groups which encourage teacher-student interaction, questioning, discussion, working cooperatively and deeper

understanding of the subject material [8]. But often the tutorials end up again with more lectures by more faculties [9] and less student participation and no scope for critical thinking and application of the knowledge thus to be acquired. In addition, with 200 admissions every year, with existing staff strength, conducting conventional tutorial for small groups is becoming more and more impractical. With these problems of passive teaching methods, lack of faculty and time for students there is a need to shift from existing pedagogy to andragogy approach. As in pedagogy teacher directs how a subject is learnt and is more of content model, while in andragogy which is a processed model, the teacher acts as a facilitator and includes discussions, problem solving, is need based and self directed [10].

Learning can be enhanced by placing the responsibility of learning on the student (Learner Centered Education-LCE) with the instructor's role shifting from lecturer to facilitator. Studies have revealed that student-generated learning issues serve as critical determinants for self-learning and help to improve skills and attitude of the students [11]. To overcome these shortcomings in the present teaching/learning strategies and to help students to learn and understand the course content at their own pace with repetition as a complement to lectures, there is a need to blend traditional teaching with additional teaching/learning methods.

Blended learning includes an integration of face to face classroom learning with technology enhanced online material [12]. It provides the convenience, speed and cost effectiveness of e-learning with the personal touch of traditional learning [13]. E-learning technologies offer educators a new paradigm based on adult learning theory, which states that adults learn by relating new learning to past experiences, by linking learning to specific needs, and by practically applying learning, resulting in more effective and efficient learning experiences[14]. With the explosion of online social network activities, it give us the opportunity to reach the students (User-driven healthcare) at the place where they can spend a considerable amount of their time that forms a Virtual Learning Environments (VLEs) and these are now becoming part of mainstream learning activities[15].

However, over the past two decades, there has been increasing recognition in the physiology education literature as to how innovative interventions can be used to address issues [5] like lack of motivation of students, concepts that students consistently struggle with, lack of retention and inadequate preparation for performance of procedures [5]. E-learning can be used to make the basic concepts that are complex, understandable and clear to the students. E-learning technologies offer learners control, learning sequence, pace of learning, time, and allowing them to tailor their experiences to meet their personal learning [14].

Feedback from the students of MBBS Phase I revealed that one of the most complex concept is molecular basis of acid base homeostasis which is integrated to different systems of physiology. Hence, the present study was planned to teach acid base homeostasis to MBBS Phase I students using e-learning modules in addition to traditional lecture, since our institute is well equipped with essential infrastructure like digital library to manage access to e-learning materials and for interaction among faculty and learners.

Objectives: The objectives of the present study are: (1) To assess the effectiveness of a combination of e-learning module and traditional teaching (Blended learning) as compared to traditional teaching alone to teach acid base homeostasis to phase I MBBS students. (2) To obtain a feedback from the students regarding their perceptions about blended learning.

Material and Methods

The present study was conducted in Physiology department of J.N. Medical College, for MBBS Phase I regular batch consisting of 200 students. The ethical clearance was obtained from the Institutional ethical committee. The study protocol was explained to the students and informed consent was obtained. The molecular basis of acid-base homeostasis was taught to the entire batch in two sessions. First session was in the form of traditional lecture with the help of flowcharts and power point presentation. Second session involved interactive exercises

on various case scenarios related to real world problems. Following this, the batch was randomly divided into two groups using computerized random table numbers. Group A received only the traditional teaching/learning method.

These students were informed to read the topic from the text manual during the next one week. At this same period Group B in addition to traditional teaching received e-learning resources. These students were given individual user password to get access to SmarTeach (www.smarteach.com) module on acid-base homeostasis that included animations, video demonstrations, video clips of experts and exercises related to real world problems. These students were allowed to access this e-module at their own pace and through repetition.

Data analysis: To assess the effectiveness of blended learning of traditional and e-learning over traditional learning alone, a common test was conducted for both the groups consisting of ten multiple true /false questions and five case based problems related to acid-base homeostasis after the completion of module. The mean scores of both the groups were compared using unpaired t-test. $p < 0.05$ was considered significant. In order to assess students perceptions regarding blended learning, the students of this group were

asked to mark their experiences on a Likert scale (strongly disagree 1 to strongly agree 5).

Results

The mean performance scores of the students of blended group was statistically ($p < 0.05$) more as compared to that of the students who received only traditional teaching (Table 1).

	Traditional alone	Blended learning
Mean performance score (Mean± SD)	15.9±3.37	18.1±3.55 *
* $p < 0.001$		

Regarding the students perceptions about the innovative strategy most of the students expressed that it was a valuable learning experience. Most of them agreed that blended learning helped them to understand the complex concepts easily and provided additional information (that was not understood in the lecture class). Students also expressed that they were able to review the topic at ease and as many times as required at their own pace (Table -2).

Students perception towards blended learning	1	2	3	4	5
Understanding the course content	-	-	-	20	80
Additional information to learn	-	-	-	04	96
Review the material at any time and as often as necessary	-	-	-	00	100
Self paced learning encouraged to think more deeply about the subject matter	-	-	5	10	85
More of self directed learning	-	-	-	5	95
Student centered learning	-	-	3	16	81
5-point Likert scale (strongly agree -5 to strongly disagree 1)					

Discussion

The objective of the present study was to assess the effectiveness of a combination of e-learning and traditional teaching as compared to traditional teaching alone to teach acid base homeostasis to MBBS phase I students. The

results of the study indicate that blended learning (combination of e-learning and traditional teaching) is better than by traditional teaching alone. These results can be explained based on previous studies [14-16]. The process of learning should involve

the progression of students from lower order thinking (recall) to higher order thinking (analysis, application, synthesis) as listed in bloom's taxonomy [17]. It is essential that learners move from passive learning to active learning [18] and this is possible by shifting from unidirectional flow of knowledge as in lecturing to more interactive self directed teaching learning session [19]. Also because most of the students involved in lectures learn by listening, this could be a disadvantage for the students who learn using other learning styles, and learn at different pace for understanding the content [6].

Thus these demerits of the traditional teaching can be overcome by interactive; student centered teaching/learning methods. One of the key factors that affect students performance is learner self motivation and research indicates that this is particularly true with online learning resources. Secondly the most important factor influencing motivation is students interest in the content and students perceived relevance of the course [20]. These factors could be responsible for the better learning in the present study as the e-learning modules were completed as self study independent modules.

The content that is covered in the traditional class is not accessible to students outside the class and students do most of the reading at their own time. In the present study, the type of blended learning involving e- learning provided flexibility and convenience for the students to learn when and where they desired. E-learning not only delivers additional information but reinforces effectively other course information through examples, explanations, assessments and exercises [21]. The video mode lecturing powered by animations, exercises provided in thee-learning module used in the present study were appreciated by the students. E-learning also has the potential to enhance the effectiveness and efficiency of meaningful experience [22]. This is proved in the present study which showed improved performance of the students who received blended learning.

Studies have shown that the retention rate by using this method could be increased by 20-75% when compared to conventional lecture method of teaching [12-23]. Studies also suggest that integrating technology in teaching-learning

increases the retention rates [23], as technology plays a key role in building concepts of some complex chapters in basic medical sciences, which demand high level of imagination and simultaneous understanding from the first year medical students, who have just entered the medical schools [16-18]. This is evident from the results of our study as this module focused on one of the most complex course content i.e. acid base homeostasis. 85% of the students in this study expressed that such learning encouraged them to think more deeply about the content material.

It can be concluded that better learning with blended learning model in the present study is attributable to the various principles of blended learning (more so e-learning). However, for the use of technology for teaching and learning process there is need for new competencies in both teachers and students. Drop out rates as observed from one of previous study is 20-35%, and reasons are lack of motivation, quit after the information is obtained, could not get the information as per their requirement [24].

These limitations can be overcome by some of the recommendations like 1. The teaching/ learning system must be supported by a strategy that is reviewed regularly 2. Module course access and content should be determined by clear standards, and should be subject to quality monitoring within existing structures. 3. New E-learning strategy should be actively supported with lecture material.

Therefore, considering the favorable results of the present study, the limitations and recommendations to overcome, further application of blended learning to other complex course content is recommended [25].

Conclusion

The results of the present study shows that the concept of understanding the complex contents like acid- base homeostasis and its application on patient care was better among the group of students who had exposure to blended learning than those, only to traditional class room learning. However, this needs to be implemented to other complex topics in physiology. This innovative method when

implemented might help the students as they progress to second year of clinical phase were they have to be spend more time learning independently.

Acknowledgement

The authors immensely thank Dr S.S Goudar for his guidance and support and express their gratitude to all the students and HOD of Physiology in conducting the study.

References

- Hapuarachchi CT, Gunarathne NP, Goonathilak, Jayawardena A. Factors affecting Performance at the IBSS examination. *Student Medical Journal, Colombo*. 2009; 2(1): 11-16.
- Medical University of America' MUA makes MD'S-focused curriculum, excellent faculty and clinical rotations in US and Canada Retrieved from <http://www.mua.edu/mua/index.php/curriculum/view-all-basic-science-courses>. accessed on 15/2/2014
- Bligh DA. What's the Use of Lectures? San Francisco: CA 2000: *Jossey-Bass publisher* 1999.
- Bransford JD, Brown AL. How People Learn: Brain, Mind and Experience at School. Washington, DC; *National Academy Press* 2000.
- Letassy NA, Fugate SE, Medina MS, Stroup JS, Britton ML. Instructional Design and Assessment using Team-Based Learning in an Endocrine Module taught across two campuses. *American Journal of Pharmaceutical Education* 2008; 72 (5):103.
- Bonwell CC. Enhancing the Lecture.Revitalizing a Traditional Format in Sutherland TE and Bonwell, CC. (Eds) using active learning in college classes: Arange of options for Faculty, *New Directions for Teaching and Learning* 2011; 67.
- Cashin WE. Improving Lectures. Idea paper No 14 Manhattan: Kansas State University Centre for Faculty Evaluation and Development. September 1994.
- Karve AV. Tutorials: Students Viewpoint. *Indian Journal of Pharmacology* 2006; 3:198-199.
- Parmelee DX, Stephen DD, Borges NJ. Medical student's attitudes about team based learning in a pre-clinical curriculum. *Med Educ Online* 2009; 14:1-7.
- Medical Education Technology: Medical education Cell. *St. Johns Medical College* 2009.
- Sivagnanam G, Saraswathi S, Rajasekaran. A Student-Led Objective Tutorial (SLOT) in Medical Education. *Med Educ (serial online)*.2006; 11:7.
- Blended learning research reports & examples of best practices. Retrieved from www.ut.ee/blearn.
- What is e-Learning. Retrieved from <http://www.e-learningconsulting.com/consulting/what/e-learning.html>
- Ruiz JG, Mintzer MJ, Leipzig RM. The impact of E-learning in medical education. *Acad Med*. 2006; 81(3):207-12.
- Medical Education has to be Aligned to the Needs of Healthcare 2012 Academic Medicine: *IT in Medical Education*. 2006; 81:207-212.
- Khogali SE, Davies DA, Harden RM, Mc Donald, Pippard MJ. Integration of e-learning resources into a medical school curriculum. *Informa Health*. 2011; 33: 311-318.
- Bloom's Taxonomy. Retrieved from http://en.wikipedia.org/wiki/Bloom's_Taxonomy.
- Rajashree R, Parineeta P, Ravishankar MV. Effective use of E-learning in Basic Medical Sciences. *National Journal of Basic Medical Sciences. Electron J Biomed* 2009; 2:56-61.
- Yawar A, Shah SS .Methods of Imparting Knowledge suitable for Undergraduate Medical Students. *Pakistan J. Med. Res*. 2003; 42:3.
- Karl L, Cappel J, Cappel S. Students' Perceptions of Online Learning. *Journal of Information Technology Education* 2006; 5:201-219.
- McEwen T. Communication training in corporate settings: Lessons and opportunities for the academe. *Mid-American Journal of Business*.1997; 12:49-58.
- Garrison RD, Heather Kanuka. Blended learning: Uncovering its transformative potential in higher education *The Internet and Higher Education*. 2004;7: 95-105.
- Doese-Learning Training Really Increase Retention? Retrieved from <http://elearntraining.wordpress.com/2009/07/23/'c'mon>.
- Hubbard B, Mitchell NA chievement of online students drops over time, lags state averages on everyindicator. 2011. Retrieved from <http://www.ednewscolorado.org/>
- MBBS E-learning Strategy. Key Recommendations. Retrieved from www.ucl.ac.uk/.../staff.../mbbs-new.../Strategy-MBBS-elearning

*All correspondences to: Dr. Jayasheela G. Bagi, Associate Professor, Department of Physiology, K.L.E. University's, Jawaharlal Nehru Medical College, Nehru Nagar, Belgaum-590010, Karnataka, India. E-mail ID: jbagi@rediffmail.com