Original Research Article

Medical students' reflection on the implementation of a blended E-learning modality versus conventional E-learning model at Faculty of Medicine Helwan University

Hebat Allah Ahmed Amin[1], Mohamed Alaaeldin Abdulmonem[2,] Donia Tarek Mahdy[3] and Omar Gamal Goda[4]

Abstract

[1]Pathology Department, Faculty of Medicine, Helwan University, Cairo, Egypt

[2,3,4]First Batch (2016-2022), Faculty of Medicine, Helwan University, Cairo, Egypt.

*Corresponding Author's E-mail:
hebatallahahmedamin@gmail.com
hebatallah.a.amin@med.helwan.edu.eg
Mobile: +20- 01002430090

In Egypt, there is a national concern towards a transition to integrated modern medical educational system. However, the lack of students' motivation and engagement have been frequently observed and reported. Therefore new strategies should be adopted to improve the quality of education and inspire students and encourage them. This includes implementation of E-learning modality to introduce a variety of teaching materials, to meet the various teaching and learning styles. We aim to report the students' perception to the newly applied online modality and to compare the level satisfaction of the first three batches. In this retrospective, cross-sectional study, we compared students' satisfaction regarding the e-Learning tools introduced throughout Phase I. First batch students experienced interactive blended e-Learning, whereas second and third batches received a less interactive e-learning modality. Students' satisfaction and comments were collected by questionnaires. Results of the feedbacks of the three batches are compared regarding the students' satisfaction. The mean scores of the rating the blended online modules of the first batch are 4.63±0.69, compared to the second and third batches 1.95± 1.10, and 3.00±1.26 respectively. The entire first batch students agreed that e-Learning is a convenient tool, in contrast to the second and third batches that showed lesser levels of satisfaction owing to the inconsistency of the content. All three batches recommended implementing it regularly and efficiently in all other disciplines.

Keywords: Blended learning, E-learning, Integrated curriculum, Online learning, Self-directed learning

INTRODUCTION

The learning environment in medical schools is greatly changing over the past 2 decades. Nowadays the Internet plays a dominant role in medical education (Harden, 2018 and Roy, 2017). E-learning platforms are now increasingly utilized by medical schools around the world and comprise lectures, audiovisuals, tutorials, and

online quizzes. These educational media possess several distinct advantages over traditional didactic models of instruction, including the ability to update the material in a timely manner to ensure delivery of the latest evidence-based content to trainees (Ruiz et al, 2006).

E-learning is considered to be an effective tool and can be used to enhance self-directed learning. It encourages medical students to exert greater control over their learning by allowing flexibility over the content and pace (Choules, 2007). In such models, educators can evaluate student competence via online assessments, enabling students to receive personalized feedback for self-improvement.

In our new medical school campus, we are facing great challenges. These mainly include the sudden shift to integrated modular curricula, the progressively increasing numbers of students referred each year and the very limited number of the staff members as well as the small capacities of teaching spaces like classes and laboratories in comparison to the students' numbers.

We have to face these obstacles by adopting initiative approaches. Thus we present our experience in the implementation of e-learning in Phase I. We expect that the consistency and integration of the content, together with the use of all the features of the Learning Management System (LMS) will affect the students' satisfaction. We will compare the initiative blended integrated content of the first batch to that of the conventional content of the subsequent two batches. The aspects of comparison include the students' engagement and satisfaction, using the electronic engagement reports and the questionnaires on the implemented e-learning modality. We aim at providing ways for improvement and upgrading.

METHODS

Study Design

A retrospective, cross-sectional study has been conducted among Phase I students. The study is conducted at the Faculty of Medicine, Helwan University (FMHU).

The pathology department has had an initiative implementation of blended e-learning on the first batch. The used platform is https://www.pathbrite.com. The same platform has been subsequently implemented by the Faculty in the second and third batches.

We have distributed a survey questionnaire regarding the students' reflection on the implemented e-learning modality for the first three batches.

The engagement indices from the website students' reports are also recorded.

Questions from the First batch feedback questionnaire are used in the study (Table 1). These are compared to

the data collected from similar questionnaires of the second and third batches (Tables 2 and 3 respectively).

A comparative analysis of the students' feedback and engagement is performed.

The online courses' design

We have four modules per year, each of average 10 weeks. Average credit points per module are 15. The average of student's effort per module is 390 hours. Basically all the conventional lectures and practical classes are required to be uploaded, together with complementary tutorials, audiovisuals, videos, etc.

The initiative first batch pathology online course content

The first batch's Learning Management System (LMS) has been designed to be interactive with variable materials. The students are also allowed to contribute to their uploaded material.

The content delivered by the pathology instructor included

Didactic lectures, CBL sessions, tutorials on certain subjects of interest, audiovisuals and videos, mind maps, an open link to two International Virtual Medical Schools with libraries of gross and microscopic pictures, some examples of virtual patients, links to online examination and quizzes for formative assessment. Besides; the schedules, announcements, bylaws, and questionnaires are uploaded. Only online submission of assignments is permitted. Resubmission, custom resubmission in selected cases is permitted. The students receive their marks and grades online and their module work is archived as an e-portfolio.

The content added by the first batch students included

Their students' presentations (group presentations), their designed mind maps, added videos and any preferred materials such as documentation of their field visits, etc.

The second batch online course content

a. The content - delivered by the different participating departments - on the website of the second batch included: only didactic lectures, and labs, besides the schedules, announcements, bylaws, and questionnaires.

Assignments are delivered manually to all of the departments, no online submission is permitted.
b. No content has been added by the Second batch students. They have not been allowed by their tutors.

The third batch online course content

a. The content - delivered by the different participating departments - on the website of the third batch included: only didactic lectures, and labs of all the participating departments, besides the schedules, bylaws, and questionnaires. The uploaded material is delayed for a few days by most of the departments. Online assignment submission is permitted only by three departments. Other departments require manual delivery with no online grading or feedback to the students.
b. No content has been added by the third batch students. They have not been allowed by their tutors.

Design of the questionnaires

The questionnaire has been designed and developed using the results of the earlier students' comments and feedback to the coordinator on the website during the academic year.
    It includes 6 questions addressing the students' satisfaction regarding the various components of the courses. It ends with a seventh open-ended question so that the students could freely reflect their experiences.

First batch questionnaire

Q1: Overall, how would you rate the pathology online modules?
Q2: How helpful was applying the E-learning modality and the online activities in the modules?
Q3: How useful was the courses' material?
Q4: How responsive has the instructor been to your questions or concerns?
Q5: How helpful were the online assignments?
Q6: How well do the supplied educational materials meet the various teaching and learning styles?
Q7: What are the most important suggestions for improvements?
Response: Five levels of satisfaction (Likert scale) were measured. Excellent= 5 - Poor=1

Second and third batches' questionnaire

Q1: Overall, how would you rate the online modules?
Q2: How helpful was applying the E-learning modality and the online activities in the modules?
Q3: How useful was the courses' material?

Q4: How responsive have the instructors been to your questions or concerns?
Q5: How helpful were the online assignments?
Q6: How well do the supplied educational materials meet the various teaching and learning styles?
Q7: What are the most important suggestions for improvements?
As a pilot, the questionnaire has been answered and reviewed by two students prior to its distribution. Then it has been sent to the three batches.
The results of the 3 batches are then compared with one another and analyzed.
Ethical clearance has been obtained from FMHU-REC (serial: 16-2019).

Statistical methods

Data is analyzed using the statistical package SPSS, version 25. Parametric analysis including the mean, standard deviation, frequencies and percentages for categorical variables is used. Comparisons between groups were done using analysis of variance (ANOVA) with multiple comparisons post hoc Tukey test for comparing every two batches (Chan, 2003). P-values less than 0.05 were considered as statistically significant.

RESULTS

- 128 students out of 134 of the first batch responded to the online questionnaire representing 95.5% of the students. (Table 1, Figure 1).
- 63 students out of 203 of the second batch responded to the online questionnaire representing 31% of the students. (Table 2, Figure 2).
- 130 students out of 503 of the third batch responded to the online questionnaire representing 25.8% of the students. (Table 3, Figure 3).
- The means for the first batch questions are: Q1=4.63±0.69, Q2=4.69±0.51, Q3=4.51±0.58, Q4=4.86±0.37, Q5=4.30±0.78, and Q6=4.46±0.72 (Figure 1).
- The means for the second batch questions are: Q1=1.95± 1.10, Q2=2.32±0.84, Q3=2.63±0.87, Q4=2.69±1.04, Q5=2.70±1.35, and Q6=2.27±1.07 (Figure 2).
- The means for the third batch questions are: Q1=3.00±1.26, Q2=3.07±1.16, Q3=2.90±0.98, Q4=2.95±1.05, Q5=3.36±1.38, and Q6=2.56±1.09 (Figure 3).
- The group sizes are unequal. The harmonic mean of the group sizes is used. Type I error levels are not guaranteed.
- Post-Hoc pairwise comparisons between the first and the second batches in each question yield statistically

Table 1. Descriptives (percentage, mean and standard deviation). First batch n=128

Answer Choices	Excellent %	Very good%	Good %	Fair %	Poor %	Mean	SD
Q1	71.09%	24.22%	2.34%	1.56%	0.78%	4.63	0.69
Q2	71.09%	26.56%	2.34%	0.00%	0.00%	4.69	0.51
Q3	54.69%	41.41%	3.91%	0.00%	0.00%	4.51	0.58
Q4	85.94%	12.50%	0.78%	0.00%	0.00%	4.86	0.37
Q5	46.88%	38.28%	12.50%	2.34%	0.00%	4.30	0.78
Q6	59.38%	27.34%	13.28%	0.00%	0.00%	4.46	0.72

Data are presented as mean - standard deviation (SD).
P-value < 0.001
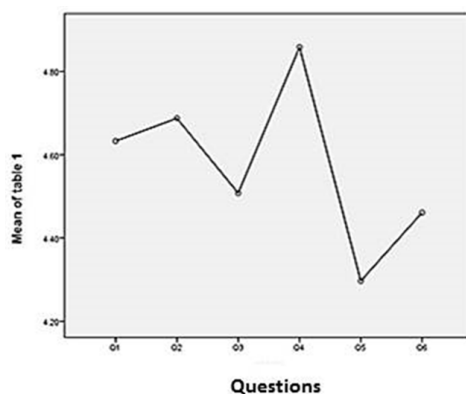
Figure 1. First Batch means

Table 2. Descriptives (percentage, mean and standard deviation). Second batch n=63

Answer Choices	Excellent %	Very good%	Good %	Fair %	Poor %	Mean	SD
Q1	1.59%	7.94%	23.81%	17.46%	49.21%	1.95	1.10
Q2	0.00%	7.94%	31.75%	44.44%	15.87%	2.32	0.84
Q3	1.59%	11.11%	46.03%	31.75%	9.52%	2.63	0.87
Q4	3.28%	16.39%	42.62%	21.31%	16.39%	2.69	1.04
Q5	9.52%	23.81%	20.63%	19.05%	26.98%	2.70	1.35
Q6	1.59%	12.70%	25.40%	31.75%	28.57%	2.27	1.07

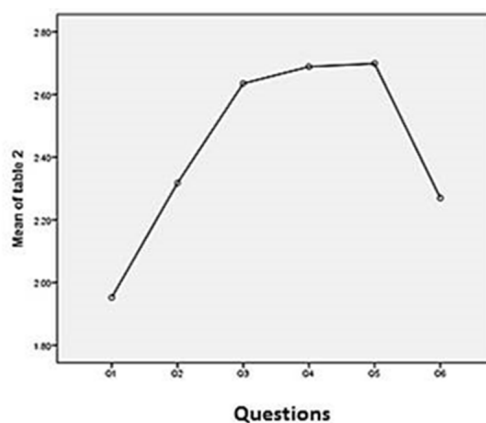Data are presented as mean - standard deviation (SD).
P-value < 0.001

Figure 2. Second Batch means

Table 3. Descriptives (percentage, mean and standard deviation). Third batch n=130

Answer Choices	Excellent %	Very good%	Good %	Fair %	Poor %	Mean	SD
Q1	13.85%	20.77%	33.08%	16.15%	16.15%	3.00	1.26
Q2	10.77%	26.15%	33.85%	17.69%	11.54%	3.07	1.16
Q3	4.62%	19.23%	47.69%	18.46%	10.00%	2.90	0.98
Q4	8.59%	17.19%	44.53%	20.31%	9.38%	2.95	1.05
Q5	23.85%	31.54%	17.69%	10.77%	16.15%	3.36	1.38
Q6	2.33%	17.83%	17.83%	23.26%	21.71%	2.56	1.09

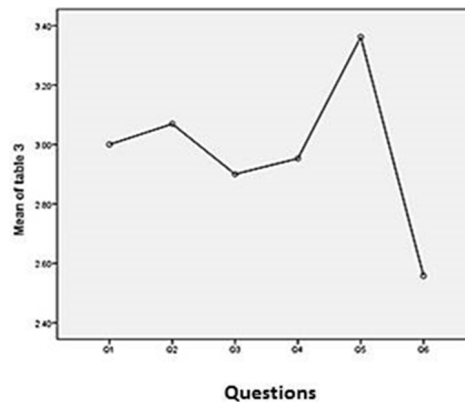Data are presented as mean - standard deviation (SD).
P-value < 0.001

Figure 3. Third Batch means

significant p-value < 0.001.
- Post- Hoc pairwise comparisons between the first and the third batches in each question yield statistically significant p-value < 0.001.
- Post- Hoc pairwise comparisons between the second and the third batches in questions (1, 2, and 5) yield statistically significant p-value < 0.001. However, it is non-significant for questions (3, 4, and 6) with p-values= 0.089, 0.109, and 0.122, respectively.

According to the website reports

- First batch students: Engagement index is 6,800 for the 134 students. Mean value =50.7 for the pathology only.
- Second batch students: Engagement index is 2,310 for the 203 students. Mean value =8.9 for all the disciplines.
- 26,000 participations from the 510 students of the third batch are reported by the site. Mean value =50.9 for all the disciplines.

DISCUSSION

According to the results, there is a significant satisfaction among the first batch students regarding the blended e-learning modality using a variety of conventional and interactive innovative content. This satisfaction is reflected by the results of the questionnaire where the mean value of their responses ranged between 4.30±0.78 (level of satisfaction of the online assignments) and 4.86±0.37 (instructor's responsiveness).

The high level of interaction and the permission of students' participation in the online content increased the students' engagement (mean value =50.7 for the pathology only).

95.5% of the first batch responded to the online questionnaire reflecting a high level of satisfaction, enthusiasm and active support to this initiative modality in the campus.

The blended online modality is highly rated (4.69±0.51) together with the supplied material content (4.51±0.58). The accessibility, asynchronous communi-cation, variability in the content, and students' interaction, all have participated in the high grade of satisfaction to the various learning styles (mean 4.46 ± 0.72).

The active interaction between the instructor and the students is confirmed by the recorded highest results of satisfaction (4.86±0.37).

The third batch students highly appreciated the pathology online modules (4.63±0.69).

Collectively, comparing these results to the conventional content uploaded to the second and third batches we find a statistically significant difference

(p-values < 0.001).

The second batch showed the least level of satisfaction where the mean value of their responses ranged between 1.95± 1.10 (level of satisfaction of the online modules content) and 2.70±1.35 (online assignments). This reflects the relative dissatisfaction with the conventional lectures. The poor participation of some departments aggravated the condition.

Even the supposedly useful online submission of the assignments showed only a mean of 2.70±1.35 as most of the departments haven't taken advantage of this feature.

Only 31% of the second batch responded to the online questionnaire reflecting their disinterest in the process. The extremely low level of interaction is reflected by the students' engagement (Mean value =8.9 for all nine disciplines).

Regarding the third batch, the results disclosed the lower level of satisfaction compared to the first batch (however they were superior to the second batch) where the mean value of their responses ranged between 2.56±1.09 (convenience of the various learning styles) and 3.36±1.38 (online assignments). This again reflects the relative dissatisfaction with the conventional lectures, even though all the departments have uploaded their lectures.

The online submission of the assignments showed the highest degree of satisfaction with a mean of 3.36±1.38 which can be increased if this feature is used by all of the departments.

Only 25.8% of the third batch responded to the online questionnaire reflecting their disinterest in the process. The relatively low level of interaction is reflected by the students' engagement (Mean value =50.9 for nine disciplines).

Comparison between the second and the third batches yielded a statistically significant p-value < 0.001in questions (1, 2, and 5). These represent the general rating of the modules, rating of the E-learning modality, and the online assignments).

However, the results were non-significant for questions (3, 4, and 6) with p-values= 0.089, 0.109, and 0.122, respectively. These values represented the rating of the courses' material, the responsiveness of the instructors, and the convenience to the various learning styles (Herman, 2015).

It is evident that the blended modalities provide more effective learning with higher levels of students' satisfaction (Sadeghi et al., 2014; Blissitt, 2016). The interactive model provided by the pathology department for the first batch students helps developing an attitude and provides self-motivation (Boshra, 2016; Christopoulos, 2018). It fosters commitment reflected by their engagement index and their responses to the delivered questionnaire.

The students' satisfaction is proportionate to the quality and variability of the online courses. Such fulfill

ment is also influenced by the accessibility and efficiency of the e-learning platform (Kyong-Jee and Giwoon, 2019).

Students' engagement is also proportionate to the level of permitted interaction. It helps the learner to manage processes.

It also allows student guidance by following the students' engagement. The students with poor engagement have been easily sorted early in the course and guided.

The comments reveal high degrees of satisfaction among the first batch students but also present several ways by which the system can be further modified and upgraded to meet their demands.

These are accounts of actual first batch students' comments on the endorsement of the blended modality:

The students greatly appreciate the direct connection between the instructor and her students, as well as the availability of the assignments, lectures, and CBL (course contents). They considered online learning to be very efficient and time-saving because all the material has been readily available and clear with demonstrative videos and extra exercises which helped to further deepen their understanding. This model has proved to be more convenient as it provides the students with the necessary tools from resources to assessments all in one place.

The online assignment and logbook submissions have saved the hassles of printing papers and having to physically go to the department to submit providing such a convenient and relieving way. The online checking and grading of the papers have also been very important, as students can review their mistakes and read the annotations. These feedbacks throughout the module help in understanding the material and make lectures more efficient.

Students suggest supplying live or recorded lectures as an easy alternative to attending didactic lectures; therefore, attending the campus can be spared only to interactive and practical sessions.

Many students support the blended model introduced in the pathology course and that they will continue to use it recommending that other disciplines should implement a similar model to achieve the educational goals that are not all met in the lecture hall due to insufficient time. They suggest more tools and resources such as more audiovisuals, online quizzes, and Q banks that aid the model to deliver quality learning and content.

Having the students more involved in developing their own learning materials and introducing their projects - along with supervision by the teaching staff- ensures their engagement, enthusiasm, and support to the blended E-learning modality.

Such a blended modality should be gradually introduced to the newer patches synchronous to changing education model from pedagogical to andragogical model.

We think that it is preferable that our institution would

provide access to a standardized model besides our personalized content. This mixed approach could help the staff members to redirect their energies towards curricular upgrading and allows benchmarking of our content. This is crucial for the execution of our school's mission.

Finally, there is a consistently significant higher level of satisfaction and self-motivation among the medical students with the interactive, blended learning environment compared to conventional methods (Herman, 2015; Kyong-Jee and Giwoon, 2019). Students' satisfaction regarding e-learning depends on the accessibility, efficiency and the quality content of the courses. The successful implementation of e-learning reduces the need for a campus site and other direct and indirect costs. Students' feedback is a cornerstone for upgrading the teaching methods. Orientation courses should be given to students to inform them and give insight into using the e-learning facilities effectively.

ACKNOWLEDGEMENTS

Conflicts of Interest

The authors report no declarations.

REFERENCES

Blissitt AM (2016). Blended learning versus traditional lecture in introductory nursing pathophysiology courses. J Nurs Educ. 55:227–230.

Boshra H, Mohammad JM, Zahra L, Saiideh AS, Mahin GS (2016). Comparison of blended and lecture teaching methods of satisfaction in introduction to clinical medical students (pathophysiology level). Future Med. Educ J. 6(4): 44-47.

Chan YH (2003). Biostatistics102: Quantitative Data – Parametric and Non-parametric Tests. Singapore Med J. 44(8): 391-396.

Choules AP (2007). The use of e-learning in medical education: a review of the current situation. Postgrad Med J. 83:212–216.

Christopoulos A, Conrad M, Shukla (2018). Increasing student engagement through virtual interactions: How? M. Virtual Reality. 22: 353.

Harden RM (2018). Ten key features of the future medical school-not an impossible dream. Med Teach. 40(10):1010-1015.

Herman Dwi Surjono (2015). The Design of Adaptive E-Learning System based on Student's Learning Styles. IJCSIT (International Journal of Computer Science and Information Technologies), 201; 2(5): 2350-2353.

Kyong-Jee K, Giwoon K (2019). Development of e-learning in medical education: 10 years' experience of Korean medical schools. Korean J Med Educ. 31(3):205-214.

Roy H (2017). The Role of E-Learning in Medical Education. Letter to the Editor, Acad Med. 92(4): 430.

Ruiz JG, Mintzer MJ, Leipzig RM (2006). The impact of E-learning in medical education. Acad Med. 81:207–212.

Sadeghi R, Sedaghat MM, Sha Ahmadi FB (2014). Comparison of the effect of lecture and blended teaching methods on students' learning and satisfaction. J Adv Med Educ Prof. 2:146–150.