Original Article

Blended learning: An innovative teaching strategy to teach dermatology to the family medicine residents of a teaching hospital

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Abstract

Context: Medical educators face different challenges in this digital era with the pressure for clinical practice as well as teaching. In blended learning Internet technologies are used along with face-to-face teaching to deliver learning methodologies. **Objective:** To assess the efficacy of the blended learning dermatology course on Family Medicine residents at a teaching hospital. Methodology: It was interventional (pre and post) study with purposive sampling. All the Family Medicine residents enrolled at The Aga Khan University Hospital participated in the study after giving consents. The course covered most common skin conditions. Multiple slide sessions, online lectures, clinical presentations, case-based scenarios, and quizzes were included in the course. Knowledge was assessed through pre- test by multiple choice questions. Post tests were taken after completion of the modules to assess the improvement in the knowledge of residents about basic dermatological conditions by multiple choice questions. After completion of sessions a survey questionnaire was administered to evaluate the perception of participants about blended learning strategy. **Results:** The tests scores were significantly higher in the post test. The majority of the residents were satisfied with the course delivery. A statistically significant difference was found between pre and post test results with a *P* value 0.000. **Conclusions and Recommendation:** Blended learning is an effective and innovative teaching strategy that helped family medicine residents to enhance their learning more effectively. We recommend that this method of teaching strategy should be used in other clinical disciplines in different contexts.didifferent contexts.

Keywords: Blended learning, dermatology, family medicine residents

Introduction

In the current digital era, medical educators face different challenges than their predecessors in teaching tomorrow's physicians.[1] In the past few decades, changes in health care delivery and advances in technology have increased the pressure on academic faculty, as they have less time for teaching than has previously been the case. Currently, traditional instructor-centered teaching is moving toward a learner-centered model that puts the learners in control of their own learning.[2] Blended learning refers to the use of Internet technologies along with face-to-face teaching to deliver a broad array of solutions that enhance the knowledge and performance of students.[3] It can be used by medical educators to improve the efficiency and effectiveness of educational interventions in the face of social, scientific, and pedagogical challenges. Its use is highly variable in medical schools and appears more common in basic science

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courses than in clinical clerkships. It also refers to the use of Internet technologies to deliver a broad array of learning modes that enhance learners' knowledge and skills toward learning in a flexible manner.[4]

The main purpose of conducting this study is to bridge the gap between theory and practice among family medicine residents toward dermatology. Dermatologic conditions are seen extensively in family medicine; hence, they need to have a strong foundation in the diagnosis and management of common dermatoses. The salient feature of the program is the flexibility of provision, which will attract the students toward it. The intention would be to help them to pace their study between their clinical activities. Access to the wide range of online asynchronous options along with synchronous strategies will surely make learning more exciting, effective, applicable, and likely to be retained, and would help students to become better physicians in the future.[5]

The term blended learning has been in use for more than 15 years, but its meaning has been constantly changing during this period. In the late 1980s, the Workers Education Association, Ruskin College, and the Open University collaborated on what was called a blended learning program for adults.[6,7] While there has been widespread publication of the potential benefits of e-learning, it is not yet clear how practitioners and their institutions are choosing to make use of these approaches. There are different approaches highlighted, but it has never been practiced using it as secondary clerkship implicated within a primary clerkship to identify their learning outcomes and their attitude toward this sort of blend. It is along these axes that we would like to see the potential of blended learning emerge as a transformational practice. It is likely that this approach is most productive and flexible in making the best use of blended learning.[8,9]

The literature highlighted that this sort of learning improves the learning outcomes. These outcomes can be measured in two domains, cognitive domain and affective domain. Learning outcomes in the cognitive domain refer to academic performance measuring learners' ability to remember and apply knowledge, and the affective domain involves learners' attitudes, appreciations, values, and emotions. This study would highlight a unique approach to blending and measuring the learning outcomes by using cognitive and affective domains.[10,11]

Objective

To assess the effectiveness of the blended learning dermatology course in improving the knowledge and satisfaction levels of the family medicine residents by assessing cognitive and affective domains at a teaching hospital.

Materials and Methods

This study was an interventional study (pre- and post-test), and the participants were all family medicine residents enrolled in the family medicine residency program at The Aga Khan University Hospital. The duration of the study was 6 months. The dermatology course was divided into five modules, comprised of both an online asynchronous virtual learning system and through Zoom. This study aims to investigate the approach of blending learning and measure the learning outcomes by using cognitive and affective domains. The topics of the modules covered the most common dermatoses, such as acne vulgaris, eczema, psoriasis, drug rashes, skin infections, and skin with systemic issues. Multiple slide sessions, online lectures, slide presentations, case-based scenarios, and quizzes were included in this module. Counseling skills were taught through role plays using multiple simulated patients. Knowledge had been assessed through (pre and post) tests by 25 multiple choice questions. The questions were scenario-based set by content experts and reviewed by a multidisciplinary team to assess the content validity. The multiple-choice questions were regarding the appropriate diagnoses, differential diagnoses, and management plans. Both pre- and post-tests were taken on the Quizezz app. Post-tests were taken after completion of the modules to assess the improvement in the knowledge of residents about basic dermatological conditions. After that session, another survey was administered to evaluate the perception of participants about blended learning. After the data collection, it was analyzed by using Statistical Package for Social Sciences (SPSS). A descriptive analysis was done, and results were presented as frequencies/percentages, the mean, and the standard deviation for quantitative variables. Paired T-test was used to assess the difference in the scores. $P < 0.05$ was taken as significant. This study was ethically approved by the Ethical Review Committee (ERC# 2021-5656-16810) of Aga Khan University Hospital.

Results

The cognitive component was assessed by multiple choice questions, and the affective domain was assessed by a survey questionnaire.

A total of 23 residents of family medicine from all years were enrolled in the dermatology modules. Most of the residents were from second year and fourth year (31.8%). Out of 23, 27.30%

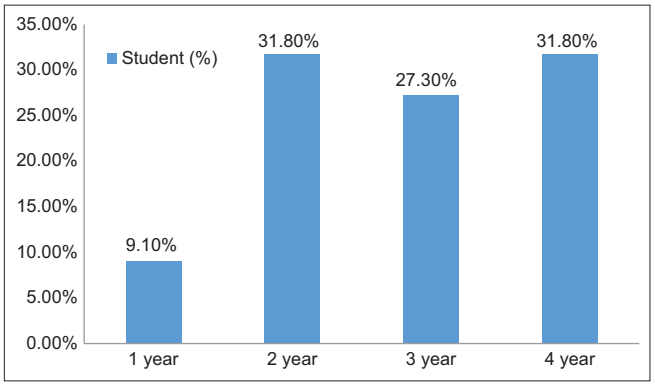

Figure 1: Graphical representation of residents year percentage

were third-year and 9.10% were first-year residents [as shown in Figure 1].

Perception of a resident about blended learning

To analyze satisfaction with the modules, a questionnaire was filled out by students, and we found 100% satisfactory results. Fifty percent showed that the objectives of these modules were excellently defined and the rest of the 50% were satisfied with the smooth delivery of these modules. 72.2% showed that the content was excellently defined, and 27.3% were satisfied with the content covered as per objective. Overall, 59.1% marked excellent on that the presentations were well understood by all the students, and 40.9% showed satisfaction with overall presentations in this module. 59.1% gave excellent responses on the level of interaction between students and teachers during this module, and 40.9% showed satisfaction with the level of interaction between teacher and student. 81.1% commented that they acquired new knowledge on dermatology. 63.6% responded that time was managed efficiently by teachers of this course, and 36.4% were satisfied with time management. 86.4% of students showed that all the queries were answered excellently on time. 68.2% showed that the overall activities were organized excellently. 68.2% were excellently satisfied with the quality of course material. 63.6% of students gave excellent to the overall assessment of this module, and 36.4% were satisfied with the overall assessment of this activity [as shown in Table 1].

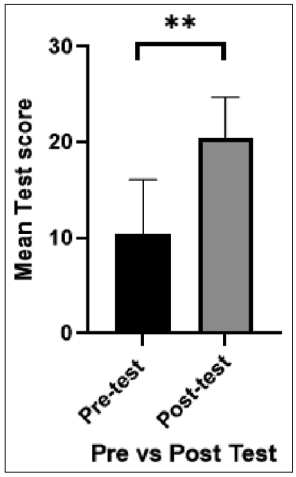

Figure 2: The mean test score of pre- and post-test: the Y-axis shows the mean test score. The line with asterisk sign shows significant difference (**$P < 0.001$) of mean test score in pre- and post-test

Blended learning improved students' exam results

To measure the effective learning in family medicine residents through blended learning, we assessed through pre- and post-tests and found a significant increase in post-test scores as compared with pre-test results [Figure 2]. The mean of the pre-test result was 10.43 ± 5.67, the post-test result mean was 20.52 ± 4.17, and the denominator was 25. A statistically significant difference was found between the pre and post-test results of a student with a mean difference -10.09 and $P = 0.000$.

Discussion

Blended learning is known as the combination of face-to-face and electronic learning, which is getting attention day by day since a large number of medical universities are utilizing the Internet as a medium for teaching and learning.[5] Virtual learning discovered new technologies in education, as well as interactive learning, simple access, and self-learning study. Face-to-face instruction should be included in the course to compensate for the lack of an instructor in a real classroom. This principle is put into practice through blended learning.[6] This model of learning includes multiple instructional approaches, for example, traditional teaching with e-learning.[7] Blended learning gives opportunities for collaborative learning and transforms the role of the teacher from a disseminator of knowledge to a facilitator.[8] Combining traditional and online learning provides an integrated approach for both instructors and students. It is ideally suited for practice-based disciplines such as the medical sciences.[9] Studies in both the medical and non-medical literature have repeatedly demonstrated that students are content with e-learning; however, they do not regard e-learning as a replacement for traditional instructor-led training, but rather as a supplement, as part of a blended learning strategy.[10,11] Another advantage of virtual learning for teaching family medicine and other clinical science is that it can be provided at any time and in any context; furthermore, it can be customized according to individual needs. Although initially it was advocated to save costs and increase learning and teaching efficiency, it has also been discovered to

Table 1: Satisfaction of participants about the course

Question	Excellent, *n* (%)	Satisfactory, *n* (%)	Unsatisfactory, *n* (%)
Objectives of the activity defined	11 (50)	11 (50)	0 (0)
Content covered as per defined objectives	16 (72.7)	6 (27.3)	0 (0)
Overall presentations at the participant level of understanding	13 (59.1)	9 (40.9)	0 (0)
Level of interaction	13 (59.1)	9 (40.9)	0 (0)
Acquired new knowledge	18 (81.8)	4 (18.2)	0 (0)
Time management	14 (63.6)	8 (36.4)	0 (0)
Queries responded	19 (86.4)	3 (13.6)	0 (0)
Organization of the activity	15 (68.2)	7 (31.8)	0 (0)
Course material was of appropriate quality	15 (68.2)	7 (31.8)	0 (0)
Overall assessment of the activity	14 (63.6)	8 (36.4)	0 (0)

improve learning and spread information.[12,13] Therefore, the goal of this study was to assist the effectiveness of a blended learning strategy in family medicine and measure the learning outcomes by using cognitive and affective domains.

To assess the perception and quality of blended learning, we filled out the satisfaction questionnaire by each student and we found that all the students were overall satisfied with the online module. Similar results were reported by Makhdoom N *et al.*, according to their students, blended learning was better than traditional learning and this approach is an effective way to teach family medicine, and it might be applied to other clinical medical disciplines as well. 61.6% of students of blended learning have a perception that course organization moving in the right direction.[14] A similar result was found in our study that our 68.2% of students were also satisfied with the organizer activity. In our study, 63.6% of students of blended learning were satisfied with an overall assessment of the activity. Similar results reported that 75% of students of blended learning showed a more positive perception of blended learning.[14] Another concordance study also reported that their students were satisfied with their experience of the course. Online individual learning activities were rated higher than collaborative discussions.[15] One more study also described related results, they found an association between nursing ethics students' satisfaction ratings and their attitudes in a blended learning environment. The results revealed how students felt about their blended learning experiences, with most questions scoring between 3.27 and 3.76 (the highest score WAS 5). Another self-evaluation of the scenario analysis tool found mean scores ranging from 2.87 to 4.19. More than 50% of the participants had graded the training as 'extremely helpful' or 'very helpful'.[16]

Furthermore, in this study, we found that family medicine residents gained significant knowledge from the blended learning method. There was a significant increase in post-test results as compared to pre-test results (pre: 10.43 ± 5.67 and post: 20.52 ± 4.17) and $P = 0.000$. This proved that blended learning is an effective way of teaching and learning. Similar results were published by Gordan D *et al.*, there was a significant gain in knowledge for all learners (pre: 53.9% and post: 85.4%) with P value of 0.001. There was a significant improvement in clinical and communication skills with $P = 0.0001$ from the blended learning technique. Another concordance study also reported that all the medical students who learned from blended learning showed significant improvement in written tests ($P = 0.011$), clinical examination ($P = 0.000$), and scenario-based examination ($P = 0.02$). Thus, students taught by blended learning gained more knowledge and clinical skills and had better problem-solving, critical thinking, and decision-making skills and attitudes.[14] Another study also showed a similar result: the student who participated in virtual discussion in combination with face-to-face activities had shown significantly greater post-test scores (9.0 ± 0.8) as compared to those who only took onsite classes (7.75 ± 1.8) with a $P = 0.01$.[18]

Like all the educational modalities, blended learning also has advantages and disadvantages. In this study, we demonstrated the family medicine residents' experience with blended learning. Through this study, residents improved their insights about blended learning since they experienced a flexible manner of learning without a specific place or time, problem-solving, and decision-making clinical skills.[17] Moreover, average and below-average students benefited by using the electronic material several times until they were satisfied and moved at their own pace, without having to ask a teacher to repeat information or face embarrassment in front of the class.[14]

Conclusion and Recommendation

Based on the findings of this study, we concluded that blended learning courses helped family medicine residents to improve learning and apply knowledge to solve problems. According to this, the blended learning strategy improved the overall results of residents, and they gained significant knowledge about this course that was found statistically significant. We recommend this method of teaching to be used in other clinical disciplines as well. In addition, we recommend using different assessment methods, such as objective structured assessment of clinical skills (OSCE) or task oriented assessment of clinical skills (TOACS), to get a better overview of the effectiveness of this teaching modality.

Limitations of the study

1. Access to the Internet facilities for the residents at times was a challenge.
2. Limited face-to-face interaction with residents.
3. Lack of real patient examples for the residents.

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Nil.

Conflicts of interest

There are no conflicts of interest.

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