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Online teaching as supplementary tool during lockdown among undergraduate medical students in an Indian medical college

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ABSTRACT

Introduction: Education is undergoing profound changes due to permanent technological innovations. During covid pandemic, students were struggling with authentic study material due to the sudden lockdown.

Objectives: In order to supplement and assess the impact of online lectures during covid pandemic a course was designed using an online learning management system (LMS), 'Moodle' (modular object-oriented dynamic learning environment.

Methods: The teaching approach was supported by multimedia didactic materials to introduce the concepts of Web-based learning environments. We assessed the student's online activity logs to know the student's interests and engagement. The study was conducted among 170 first-year MBBS students of batch 2020. The five-point Likert scale was used to measure student attitudes related to supplementary material use.

Results: The majority of students gave positive feedback: 79% of students were in agreement that supplementary material added extra interest to the topic and 88% stated that it was useful and relevant. Students displayed positive attitudes towards using LMS and gained adequate knowledge in an information-rich environment.

Conclusion: The integration of Moodle in Physiology teaching improved student's interest and motivation as suggested by student's active participation to access supplementary resources. Such efforts also give insights to course administrators for setting teaching plans and providing meaningful learning experiences.

KEYWORDS: Electronic Courses, LMS, Moodle in Physiology, Web-based learning environments

INTRODUCTION

In India, the lockdown due to Covid 19 pandemic was sudden. The students were sent home and the teaching was shifted to online mode. It was observed that most students were encountering a lack of enthusiasm for their studies and a few felt helpless due to a lack of study material. [1]Due to the challenges of student access to the library, it was felt to give them access to reading materials that can be used outside the lecture hours. Although a lot of material is available online, its authenticity cannot be confirmed. In order to address this problem, online teaching was supplemented with Moodle (modular object-oriented dynamic learning environment)-based online learning management system (LMS). [2]It is important to focus on electronic courses as supplementary tools as they may help students and faculty during the pandemic as was planned to come out of this highly contagious public health crisis. This approach was used to demonstrate the effectiveness of supplementary learning resources as an additional tool in blended learning and provide students with meaningful learning. Efforts should be made to understand the benefits of hybrid and blended learning and how it can be utilized in novel and innovative ways to make learning more effective. This could also help medical educationists and administrators as everyone works together to streamline teaching and learning practices within academic settings. This form of blended learning attempted to make teaching more interesting, engaging, interactive, and effective by supplying additional supplementary materials. Moodle has been used mainly at the University level in STEM (Science, Technology, Engineering, and Mathematics) programs and results show improved student performance, satisfaction, and engagement. [3] The aim was to incorporate Moodle in Physiology Module and to assess the impact of Moodle-based e-learning by providing supplementary materials.

MATERIAL AND METHODS

This prospective cohort study was conducted in a North Indian medical college from October 2021 to December 2021. All the students of 1^{st} year MBBS of batch 2020 were enrolled in the course designed with 'Moodle' based four-quadrant approach. [4] A sample of a total of 161 students was selected for the study. The study was approved by the Institutional ethical committee (IECHR-2021-50-21 dated 16/9/21) and written informed consent was obtained from the participants.

Inclusion criteria- The first-year undergraduate medical students who were willing to participate, were included.

Exclusion criteria- Students who did not register for the course or were not willing to participate were excluded from the study.

Out of the total 170 students of the 1^{st} year MBBS of batch 2020, 9 students were not willing to use Moodle therefore a total 161 students registered on Moodle.

MS Teams synchronous online classes were supplemented with Moodle-based LMS on the "Physiology of vision" module for one week. The course material was accessible to students for 2 more weeks on Moodle. The module was uploaded under six topics with various supplementary resources in each topic (Figure 1 andTable 1). A course on Moodle has resources having interactive as well as static traditional components in the form of a page created with HTML editor, a book which is series of pages, a file, URL etc. [5]Page was used as a resource tool for uploading Open Educational Resources (creative commons) videos of 5-10 minutes duration with embed code from you tube, images and hyperlinks text to enhance student learning. PowerPoints were shared in downloadable PDFs via google drive. The activity of every logged-in user was automatically recorded in Moodle as a component of the report system. [5] Students' online log activity was calculated based on the total time spent by each student on the platform and the total number of clicks students made on the site for accessing the course content during this time. A feedback questionnaire was shared with students through a web link using Google Forms to evaluate student's perceptions related to supplementary material use.

Online activity logs of students were downloaded and analyzed offline in Microsoft Excel worksheet to assess the number of clicks students made for various supplementary materials.Five-point Likert scale in the feedback questionnaire was collapsed down to three-point scale, having negative, neutral and positive responses.

The data were analyzed by using a Microsoft excel sheet. For supplementary material use, no. of students accessed the supplementary material and no. of clicks were taken from the activity logs by the report system of Moodle site. Answers to Feedback questionnaire regarding supplementary materials were analysed in Microsoft excel sheet via Google forms and the data was presented as percentage.

RESULTS

Results demonstrated that electronic courses on Moodle platform proved to be a valuable supplementary resource for students. Activity logs were used to access patterns of usage of each resource by the students. User click is recorded within the site software and data is extractable in log files of each participant. These log files can be sorted by participant, activity or time. We have filtered the log file data to determine the number of times participants accessed (no. of clicks) the specific supplementary resource. Of 170 students, 161 (94.70%) accessed the Moodle dashboard, showing a video on how to use Moodle, with a total of 2077 clicks. 157 (92.35%) students accessed the front page of the course outline with 4417 clicks. An indication of the overall usage of various supplementary resources can be obtained from the log of clicks. (Table 1)

The number of clicks is used to demonstrate the general level of interaction students had with each Moodle resource. Some students may have accessed particular resources several times so further analysis of the individual clicks is required to determine the actual activity with respect to number of students.

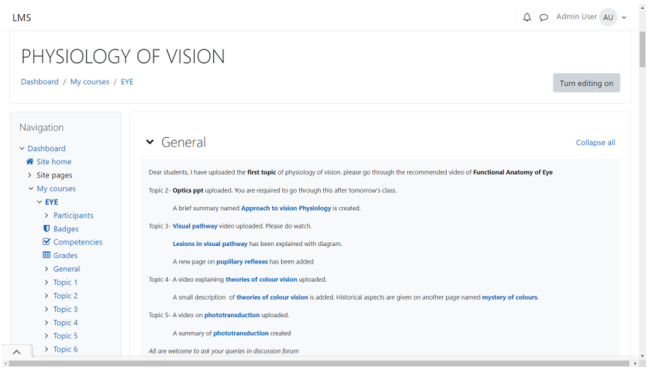

Figure 1: Supplementary resources used in Moodle

Student feedback from 121 respondents (75% response rate) taken at the end of the module indicated that LMS added extra interest in the topic by viewing the supplementary videos, PowerPoints and text materials (79% of students agreed). Students reported that the supplementary material was appropriate, relevant and useful (88% of students agreed).

DISCUSSION

The study aimed to evaluate student's attitude, interest and engagement (by their online activity logs) and perceptions (by feedback questionnaire) related to supplementary material use on Moodle platform at the time of COVID pandemic. 94.70% students registered in the online course and

Topic	Supplementary resources used	No. of students accessed	No. of clicks
Functional anatomy of the eye	An electronic page on summary of the Physiology of Vision	51	106
	Video on 'anatomy of eye'	105	500
Optics- image-forming mechanism	PowerPoint on Optics	91	227
Visual pathway and visual cortex	Video on visual pathway	98	332
	Video on theories of color vision	79	243
Color vision	PPT on color vision	39	74
	An electronic page named 'Mystery of Colors'	28	52
Photoreceptor mechanism	Video on phototransduction	78	311
Processing of visual signals	An Electronic page on 'Mechanism of bipolar cells'	34	64

Table 1: Total resource clicks (N= 161)

Feedback Questions	Negative responses (%)	Neutral responses (%)	Positive responses (%)
Lecture material on Moodle was appropriate, relevant and useful	2.5	9.8	87.7
Lecture material was easy to download and print	3.3	24.6	72.1
It added extra interest along with regular classes on the same topics on Microsoft teams	7.3	13.9	78.7
It complemented traditional learning through online classes	2.5	17.2	72.1
Queries were addressed promptly and effectively by resource materials uploaded on Moodle	2.5	17.2	80.3
Information technologies complement traditional ways of teaching in an excellent way	7.4	22.1	70.5

Responses 1& 2 as negative, response 3 was neutral and responses 4 & 5 wereconsidered positive responses on the Likert scale.

Table 2: Feedback questionnaire regarding supplementary materials

accessed the various supplementary resources as evident from the activity log of clicks.

The concept of sharing supplementary reading materials in various forms via Moodle was beneficial, 79% of students agreed also reported by other researchers, who found video assignments stimulated interest in the topic and increased foundational knowledge [6]. students learn new material better and can remember it longer when they revisit important ideas multiple times and in different ways—that is, by using different parts of their brain [7] Online courses are popular among students due to their interactive nature (lesson, quiz, task, forum) and learner's option of multiple access to the course material resources. A student repeatedly refers to the previously analyzed issue, with better understanding, gaining knowledge on the topic, and also tests independently their knowledge on the subject [8]Moodle has an adaptable array of methods for presenting educational resources to students. These components are limited only by the concepts of the administrator adopting the software, as all users are free to develop and reconfigure the source code to meet their needs [9]

Activity logs suggest a good number of clicks on various supplementary resources by the students. Previous studies

have suggested an improvement of knowledge and higher exam success rate with the usage of Moodle platform in terms of page hits. [10, 11]Martin et al. 2009 stated, the usage of Moodle platform regularly throughout the academic year seems to get better grades for students than those who rarely or never use it [11, 12] Some researchers did not find an association of increased Moodle usage with academic success, they also suggested higher acceptance of Moodle by all students irrespective of academic success. [13]

Previous studies also suggest a combination of on-campus and online work in the form of blended mode is ideal and can prove to be very effective compared to either online or offline work alone. [6, 14]Blended learning has the potential to create additional opportunities as it allows in-person instruction on a regular basis [15] and also allows the flexibility to choose the timings. Blended learning is gaining wide acceptance. It combines the strategy of different technologies, web-based tools, and various learning theories, to make learning more effective as suggested in our study by feedback questionnaire and also student log activity.

Moodle has many features which can be used for collaborative learning. We plan to use those options in the coming studies. Setting e-learning courses available to students in medical fields is advisable [2] and justified because of the intensity of the different types of activities demanded of medical students, i.e. theory classes, practicals, group activities, clinics and hospital postings. The amount and scope of audiovisual materials available on an online education site can potentially be much greater than the availability of data in textbooks. This blended teaching mode enhanced students' learning opportunities during pandemic.

CONCLUSION

Moodle collects a vast amount of data about students' usage patterns and is also helpful in tracking student progression. This empowers educators to scale the course logs rapidly.

Moodle supplements the traditional educational delivery as it facilitates in developing, delivering and supplementing the course material. This also helped students to find relevant reading material and made it easily accessible in this extraordinary situation. The feasibility in higher educational Institutions like Medical Colleges is the limiting factor as Moodle software has to be subscribed to by the institution or an individual has to it purchase for running a course.

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