

Recorded Versus Live Online Lectures: Physiological Role in Learning

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Abstract

Background: The Covid pandemic has changed the education system especially in terms of how we take lectures for the medical students. There has been a compulsively shift from traditional teaching to online teaching and learning.

Learning content can be delivered through synchronous process where live interaction with the students is possible using various platforms like zoom, go to meeting etc. Another way of learning can be using asynchronous technology where video recording of lectures is sent to students as study material. Both these form of learning have their own advantages and disadvantages. **Objective:** The aim of the study is to examine the student's perception of online live versus recorded lectures, which is preferred and explaining physiology basis of learning. **Method:** 200 first professional medical students were divided into 2 groups to attend online and recorded lectures respectively on a chosen topic simultaneously. After the lecture a post test was conducted to evaluate the effectiveness of the lectures taken by both methods. Feedback on 20 items relating to the effectiveness of the teaching method on understanding of concepts, retention, doubt clearing, reproducibility in examination and time management was analysed. **Results:** Among 164 students who responded to our survey, 75.8% preferred recorded lectures over online live lectures due to its convenience, time saving and flexibility. **Conclusion:** A blended form of learning and innovative teaching learning methods help students in improving their learning outcomes.

Key words: recorded lectures, memory, attention span, dopamine

Introduction

The Covid pandemic has altered the educational system, particularly in terms of how we deliver lectures to medical students.¹ A compulsive shift from traditional teaching to online teaching and learning has occurred.¹ Learning content can be delivered in a synchronous manner, with live

interaction with students possible via various platforms such as zoom, go to meeting, and so on. Another method of learning is to use asynchronous technology, which sends video recordings of lectures to students as study material.^{1,2}

Live lectures are more interactive in nature, allowing students to interact with the learning material; this interaction may provide the learner with long-term memories.² It is essential to provide quality learning to students by making online sessions more interactive and virtually compensating for the lack of physical presence.² Online educational platforms allow students to learn on their own time and at their own pace.³

However, this advantage is associated with challenges that students may not encounter to the same extent in the classroom. Students, in particular, are left to regulate the quality of their learning experience. Thus, self-regulated learning is critical in online education.³

Thomas et al investigated the reasons for students' preference for live or recorded lectures. They discovered very little difference in the effectiveness of the sessions. The live group answered correctly 78.283 percent of the time, while the video group answered correctly 78.605 percent of the time. .³

Rehana et al. conducted a qualitative study with 60 medical students to assess the efficacy of synchronised online learning. They are conducting virtual focus group discussions with the assistance of a discussion guide comprised of seven open-ended questions. The study discovered that online sessions saved time and improved participant performance, even though participants' learning experiences were influenced by their individual learning styles and levels of engagement in online classes. .¹

Maidul Islam and colleagues compared Pre-Recorded Video Lectures to Live ZOOM Lectures. According to the study, students prefer pre-recorded lectures because they are more convenient, flexible, and effective than live online lectures. Students can watch the recorded lecture as many times as they want to understand the concepts, but motivation to learn at their own pace and meet deadlines is a major factor in determining the learning outcome² .

Bianka Patel et al. discovered no clear advantage or disadvantage to students having access to recorded lectures in terms of test performance or retention of learning in their study to understand how recorded lectures influence the learning process.⁴ Trish L. and colleagues investigated students' learning experiences through live and video lectures. The study concluded that the lecture format affected memory performance but not mind wandering, with live lectures providing better memory. Students also reported increased interest and motivation during the live lectures.⁵

Due to the pandemic, online lectures were held for first-year medical M.B.B.S. at a medical college in Mumbai. The teaching faculty each had their own unique method of delivering online lectures via synchronous or asynchronous technology. This study aims to find out, do students prefer recorded or live online lectures and the reasons behind it. The research also offers theoretical insights into how to improve learning on both platforms. This necessitates an understanding of key concepts in learning and teaching, such as the reticular activating system, the amygdala, and the role of dopamine in learning

Material and Methods

This was a cross-sectional, observational study of first-year M.B.B.S students at a medical college in Mumbai. An online questionnaire and consent form were created. The research was carried out between June and August of 2021. Odd and even numbers were used to divide 200 first-year professional M.B.B.S students into two WhatsApp groups. A topic was selected for the study to go live on a social media platform. The faculty had pre-recorded the same topic. The lecturer, date, time, and approximate duration of the lecture, as well as the PowerPoint presentation used, were all the same for both events. The odd-numbered group attended a live lecture via the Go to Meeting platform. Another group with even roll numbers

received a link to a previously recorded lecture at the same time. The link to the recorded lecture was sent via WhatsApp. Following the lecture, a Google link was sent to all students via WhatsApp. Subjects were automatically directed to the purpose of the study and informed consent after clicking the link. Subjects filled out their information and answered several questions after agreeing to take the online survey. Students provided feedback on 20 items using a Likert-type scale ranging from 1 to 5 (1 = strongly disagree, 5 = strongly agree), as well as open-ended suggestions for improving the effectiveness of the sessions. To assess student understanding of the two teaching modalities, an immediate post-test of ten items was administered. All participants' confidentiality and anonymity were maintained throughout. Finally, all of the complete responses were analysed.

SPSS statistical software was used to analyse the data. The p value for each type of item in the questionnaire was determined using an independent sample t test. $P < 0.05$ was considered as statistically significant.

Results

A total of 164 complete responses were received. 78% of students preferred recorded lectures over 22% preferred online live lectures. The immediate post test score did not show statistically significant values between the 2 modalities. (Figure-1)

Table No. 1 shows the means and standard deviations of the student ratings for both teaching modalities regarding understanding of concepts, retention of concepts and arousing interest in the subject. The students have rated recorded lecture higher than the online lecture in understanding the concepts (mean \pm SD = 3.84 ± 0.85 and 3.12 ± 0.95 for recorded lecture and online live lecture respectively) and for retention of concepts (mean \pm SD = 3.82 ± 0.836 and 2.79 ± 1.07 for recorded lecture and online live

lecture respectively). There was a significant difference between recorded lecture and online live lecture regarding arousing interest in the topic ($p = 0.019$) (Figure2). Interestingly there was no significant difference in motivation to study ($p = 0.6$) and ability to concentrate ($p = 0.24$) using either mode of lecture. (Figure1) There was no significant difference when asked about time management ($p = 0.84$) and meeting planned deadlines ($p = 0.33$) with both the lecture formats. In response to the open-ended question asking students which mode is preferred by them and asking reasons for the same, the students reported that recorded lectures help absorb the topic according to their convenience as per their speed of understanding, can make repetitive use of videos and saves time. Students suggested "take a quick revision online while explaining the topic in detail in recorded. This helps to retain the concepts." Students also suggested to take separate online doubt sessions apart from recorded videos to help understand important topics. Overall students' preferred recorded lectures over online lectures. (Figure3)

Discussion

Lectures have been an integral part of medical education. Various methods of attending lectures have emerged as a result of the use of online platforms. Students clearly preferred recorded lectures in the current study because they were more convenient and flexible to use in their own space and time. According to studies, a combination of online and live lectures is more effective than either alone. Motivation to study on their own and attend lectures, whether live or recorded, has been a major challenge for students during the pandemic. The study emphasises this finding, as well as the students' inability to concentrate for both lecture modalities. With this in mind, this article will provide a discussion on the physiology of structures involved in learning, as well as assist students in engaging and concentrating on the teaching in class. Both of these factors play a

role in memory retention and improving learning for a successful exam outcome.

Sensory receptors provide a wealth of information to the brain. It is critical that the brain filters out unwanted stimuli so that it can focus on important information. The ascending reticular activating system projects to the thalamic intralaminar nuclei, which project to the cerebral cortex diffusely. The ascending projections of the reticular activating system improve the cortex's attentive state and enable conscious perception of sensory stimuli. Students are distracted by their surroundings during lecture classes, and they lose their ability to focus for extended periods of time. Faculty can present information in a novel way to keep students' attention spans. This allows the data to pass through the RAS filter.⁶ The following are some strategies that teachers can use to maintain student interest and avoid distraction.

1. To modulate the tone of one's voice. Students quickly lose interest when they hear the same monotonous voice.
2. To begin the lecture in an interesting manner, state new discoveries, relevant history, or a case study to start off the discussion.
3. A significant pause can be used to draw the attention of students when saying something important.

It is equally important to maintain attention throughout the class period once it has been achieved. Students may be asked to predict answers to questions posted in between lectures to keep them focused. MCQs can be used to teach students how to predict correct answers. Students can also respond to questions in the chat box for recorded lectures. This aids in the retention of curiosity and attention. This brings us to the topic of dopamine's role in learning and attention. Dopamine is produced by neurons in the ventral tegmental area (VTA), which are involved in a variety of reward-related behaviours. Dopamine release, it has been

proposed, facilitates reinforcement learning via a reward prediction error. When the student correctly predicts the answer, the frequency of dopamine spikes increases. This aids in the formation of associations between new learning and previously learned associations. Dopamine represents the reward's motivational value and promotes learning behaviours such as paying attention to get the reward.⁷ Dopamine is released during activities such as peer interaction, being read to, humour, choice, and prediction. This, in turn, encourages curiosity, motivation, pleasure, and perseverance. So, when planning a lesson, teachers should consider whether the material presented is novel, evokes curiosity, will the content pass through the RAS filters so that the student pays attention to the content, and does the content have something to predict and receive a reward.

Trish L. conducted a study. It was discovered that the lecture format affected memory performance but not mind wandering, and that memory in live lectures was enhanced. Students reported greater interest and motivation in the live lectures in this study. The study concluded that the classroom environment and the presence of the professor have an impact on student performance, motivation, and interest.⁵

Many times during lectures, students are only physically present without actually paying attention to the content. So, in order to understand how we can assist students in remaining attentive, we will discuss the role of the amygdala in learning. After passing through the RAS, the amygdala is involved in encoding value to the incoming information and then allows for decision making.^{8,9} It also participates in the fight or flight response to a stressful situation. The amygdala is unable to process information to its logical conclusion in a stressful situation. This results in behavioural outputs similar to the fight or flight response - in terms of learning, the students are zoned out, i.e. they appear to be listening to the content but are

bored and unable to process the learning material to achieve the desired learning objective. Stress can impair one's ability to retain information and shorten one's attention span. If the content taught in a lecture class, whether live or online, is not relevant to the students' interests, they will become bored. When students are not made aware of the significance of what they are learning, they lose interest. As a result, it is critical to keep students engaged throughout the lecture. In a stress-free environment, the amygdala can send important information to the prefrontal cortex for decision making and long-term memory formation. Students can engage in learning activities to help them overcome their fears and develop strategies for staying focused. Teachers can use various strategies to encourage students to learn. This can be accomplished by linking the learning objectives to the students' goals, emphasising the importance of these objectives for future learning, allowing students to expand their learning, and providing time for students to complete assignments and present them to the class. Teachers can also motivate students by

praising their efforts and encouraging them even if they fail on the first try. Teachers can thus motivate students to achieve the best possible learning outcomes.

Conclusion

According to the observations, students prefer recorded lectures, but lack of motivation and ability to concentrate are concerns for both lecture formats. The article emphasised the importance of the RAS, dopamine, and amygdala in learning and attention. It provided insights into methods for motivating students to study and achieve their learning objectives. Teachers should use quizzes, case-based discussions, novel ideas, and MCQs in their lectures to keep students' attention. A blended learning approach can be used. Recorded lectures can be used to deliver initial information, and later live question and answer sessions can be recorded to be more interactive. Regular assignments, as suggested by the students, can be scheduled after each topic. This will encourage students to study on a regular basis and prevent study backlogs.

Table No.1: Online Versus Recorded Lectures

	online mean	Variance	Recorded Mean	Variance	P-value
1) Enabled understanding of concepts	3.12	0.95	3.84	0.85	0.026*
2) Allowed retention of concepts	2.70	1.07	3.82	0.836	0.032*
3) Aroused interest in with subjects	2.71	1.245	3.56	1.248	0.019*
4) Time management	3.12	1.297	3.99	1.069	0.84
5) Meet with planned deadline	3.14	1.244	3.75	1.112	0.33
6) Convenient and flexible	2.98	1.749	4.33	0.997	0.72
7) Motivation	2.81	1.281	3.43	1.071	0.6
8) Better concentration	2.54	1.450	3.81	1.101	0.24
9) Cleared doubts	3.02	1.306	2.86	1.219	0.64
10) Better correlation with other topics	2.89	1.195	3.49	1.076	0.41

*p value<0.05, statistically significant

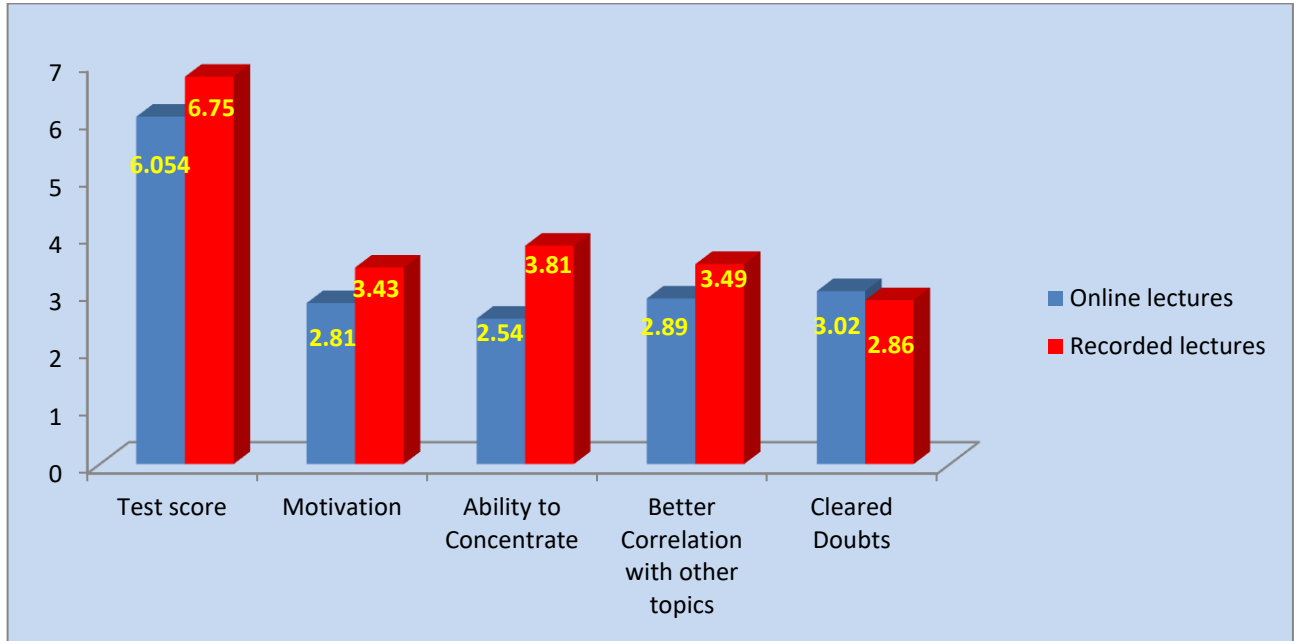


Figure 1: Online Versus Recorded Lecture

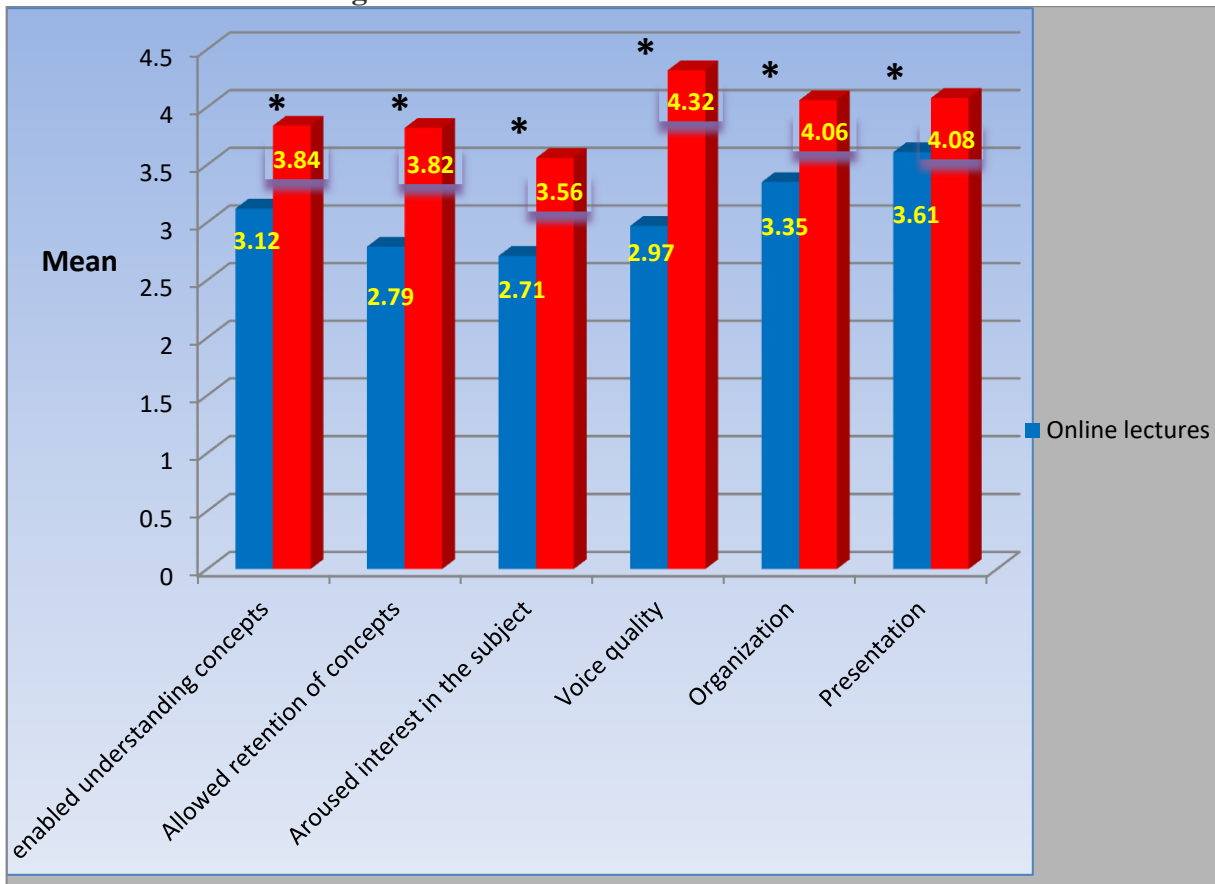


Figure 2: Online Versus Recorded Lecture Significant Differences

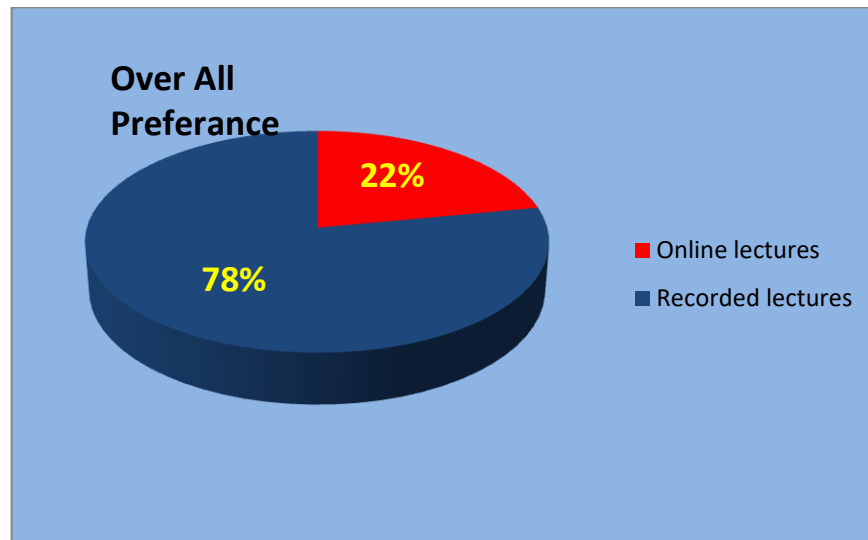


Figure 3: Overall Preference

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