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Adding Live-Streaming to Recorded Lectures in a Non-Distributed Pre-Clerkship Medical Education Model

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Abstract. Background: Live-streaming video has had increasing uses in medical education, especially in distributed education models. The literature on the impact of live-streaming in non-distributed education models, however, is scarce. **Objectives**: To determine the attitudes towards live-streaming and recorded lectures as a resource to pre-clerkship medical students in a non-distributed medical education model. **Methods**: First and second year medical students were sent a voluntary cross-sectional survey by email, and were asked questions on live-streaming, recorded lectures and in person lectures using a 5-point Likert and open answers. **Results**; Of the 118 responses (54% response rate), the data suggested that both watching recorded lectures (Likert 4.55) and live-streaming lectures (4.09) were perceived to be more educationally valuable than face-to-face attendance of lectures (3.60). While responses indicated a statistically significant increase in anticipated classroom attendance if both live-streaming and recorded lectures were removed (from 63% attendance to 76%, p =0.002), there was no significant difference in attendance if live-streaming lectures were removed but recorded lectures were maintained (from 63% to 66%, p=0.76). **Conclusion**: The addition of live-streaming lectures in the pre-clerkship setting was perceived to be value added to the students. The data also suggests that the removal of live-streaming lectures would not lead to a statistically significant increase in classroom attendance by pre-clerkship students.

Keywords. Medical Education, Video Streaming, Pre-clerkship, Medical Student, Attendance, Lectures

1. Introduction

As medical education continues to evolve, video streaming of lectures and teaching sessions has become a prominent resource to students. Video streams of lectures can be either synchronous (live), or asynchronous (recorded or delayed).[1] A common reason to historically utilize video streaming in the setting of medical education at varying levels of training has been to include students at distant sites. The opportunity of having students at remote sites be included in lecture attendance has been found to be an acceptable alternative by medical students in comparison to travelling from a remote site for in person attendance, with likely increased approval with improved consistency of the same technology.[2] Similarly, resident physicians have utilized live video

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conferencing, in order to remove travel time for residents between teaching sites in order to deliver didactic teaching sessions.[3] Additionally, surgical resident physicians have the ability to increase their exposure to surgical procedures with the use of video, without disturbing the work completed in the operating room, and being limited due to the size of an operating room.[4]–[6]

Further, when comparing clerkship students performance on testing of material taught to students with traditional in person lectures, and concurrently to medical students at a distant site attending the same lectures using interactive videoconferencing, no statistically significant difference in results have been previously found, while giving students a larger variety in clinical exposures by learning from distant sites. [7] Analogous results have been found when comparing pre-clerkship students who viewed lectures by means of recorded video(s) as opposed to those who attend lectures in person, both by choice or through randomization, without significant difference in subsequent testing. This particular study completed by Bridge et al. utilized student performance on the USMLE Step 1 examinations as a surrogate to compare the feasibility of streaming video lectures in pre-clerkship medical education in comparison to those who predominantly viewed lectures in person. Although previous literature reveals that upwards of 96% of students who do not attend non-mandatory lectures use recorded streaming lecture videos, equivocal findings have been put forth in regards to medical students preference for in person lecture attendance due to increased engagement of the student, or for recorded video lectures giving the student increased adaptability in learning style[1], [8], [9].

The effect of the availability of recorded lectures in the setting of non-distributed medical school models on attendance has been examined previously. Cardall and colleagues concluded that students avoided attending lectures, as they preferred other styles of learning that better suited their own preferences. In addition, when using recorded lectures, students had the ability to utilize video accelerating technology and watch lectures at an average rate of 1.67 times the normal speed, and subsequently save time.[10] Others have also concluded similar findings in regards to medical students foregoing in person attendance of lectures due to variability in quality of lecturer with differing presentation styles, and a pre-existing significant drop off between attendance in first and second year medical school, and throughout the school year[11], [12].

Less has been concluded in regards to perceived value by medical students and their consequential in person lecture attendance in the context of synchronous live-streaming of lectures in a non-distributed pre-clerkship medical education model, with pre-existing recorded lectures available.

2. Methods

At the Max Rady College of Medicine of the Faculty of Health Sciences at the University of Manitoba, live-streaming lectures, concurrent in real time with the live lecture, have recently been made available to pre-clinical students in September 2014. The live-streaming lectures did not give the ability to students watching outside of classroom to interact with the lecturer.

This live-streaming lecture was in addition to an established practice of recording all non-mandatory lectures and providing them to the students' online learning portal later in the day. Although lecture attendance is recommended, the faculty view is to ensure most didactic lectures are not mandatory to allow for individual styles of

learning. The practice of having live lectures recorded and being posted after the conclusion of the class had been installed for many previous pre-clinical classes. Furthermore, all live lectures recordings and live-streaming can by opted out by the lecturer.

To understand whether or not students found the availability of synchronous live-streaming lectures in addition to the asynchronous lectures helpful, why they may have found the synchronous live-streamed lectures helpful, and how they used the resource was to be assessed. This was done by means of a cross-sectional, voluntary survey put forth to the first and second year pre-clinical students. The first and second year medical students were contacted by email, informing them of the purpose of the survey and a link to the survey. No compensation was provided to the students. The survey consisted of multiple choice questions and open ended responses.

The students were asked to evaluate on a Likert scale from 1-5 if they agreed that these three methods of viewing lectures were of high educational value:

- Face to face lectures?
- Watching pre-recorded lectures at a later time?
- Watching live-streaming lectures at a remote site?

Students were also asked to estimate a percentage of lectures they would attend in person if:

- Lectures were neither live-streamed or recorded for later viewing.
- Lectures were not live-streamed concurrently with the lecture, however, were recorded for later viewing?
- Lectures were live-streamed and recorded?

Students were also asked to estimate what percentage of recorded lectures do they watch:

- At normal speed?
- Increased speed?
- Uninterrupted?
- With regular pausing, rewinding, fast-forwarding?

Finally, open-ended questions were examined for common themes that students put forward.

3. Results

Of the 118 responses (54% response rate), the data suggested that both watching recorded lectures (Likert 4.55) and live-streaming lectures (4.09) were perceived to be more educationally valuable than face-to-face attendance of lectures (3.60), with statistical significance ($p<0.001$). (Figure 1)

While responses indicated a statistically significant increase in anticipated classroom attendance if both live-streaming and recording lectures were removed (from 63% attendance to 76%, $p =0.002$), there was no significant difference in attendance if live-streaming lectures were removed but recording lectures were maintained (from 63% to 66%, $p=0.76$). The addition of live-streaming lectures in the pre-clerkship setting was perceived to be value added to the students. The removal of live-streaming

lectures would not lead to a statistically significant increase in classroom attendance by pre-clerkship students (Figure 2).

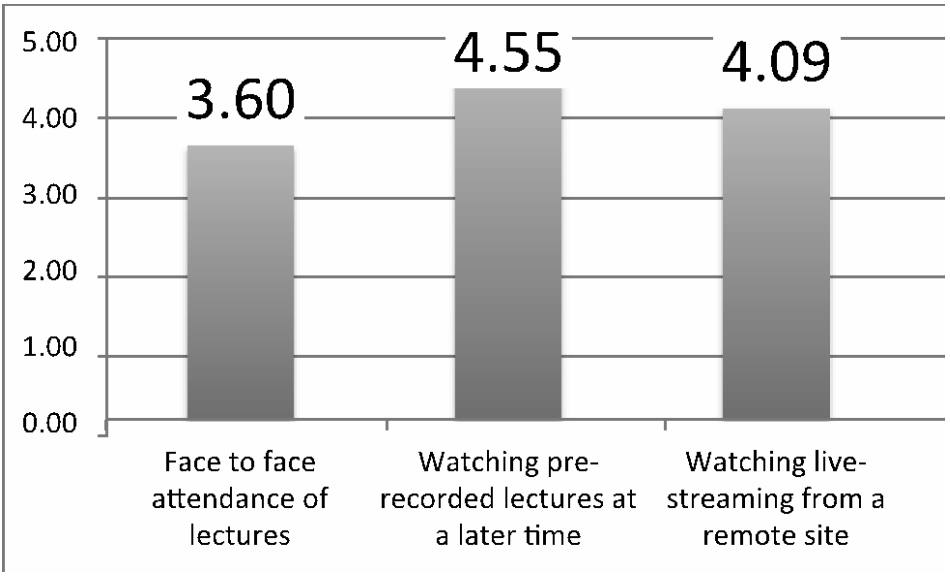

Figure 1. Perceived educational value of different teaching delivery modalities (1-lowest value, 5-highest value).

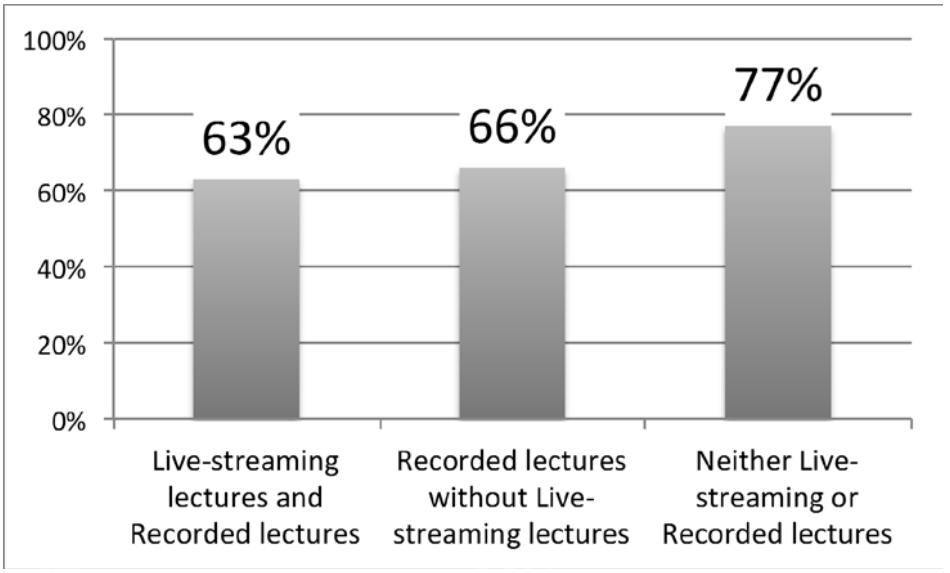

Figure 2. Estimate the percentage of lectures attended with different teaching modalities.

Table 1. Comments in response to why face-to-face attendance of lectures, watching recorded lectures or watching live-streaming lectures from a remote location are of high value, or are not of high value.

Theme	No. of Students
Having the ability to pause rewind, re-watch the lecture.	43
Unable to attend class.	25
Speeding up, or slowing own the pace of the lecture	15
Less distractions while watching lectures alone	14*
Asking questions to lecturer with face-to-face attendance	13
Individual learning Style	13
Flexible schedule	13
Learning most efficiently	8
Avoiding commute time	7
Teaching style of lecturer	6

* one student endorsed having less distractions attending face-to-face lectures

Medical students revealed many important themes in their responses. Forty-three medical students stated that while using recorded lectures they often pause, fast forward and re-watch parts of lectures. Other themes stated that the ability to speed up or slow down the pace of the lecture, was important to students. Notably, the medical school does not provide students with the software to modify video playback, in contrast to other medical schools in the literature.[10] Please see Table 1.

Additionally, individualizing their learning style by using live-streaming lectures and recorded video lectures and schedule flexibility were also important from the medical student perspective. Schedule flexibility is only gained when using recorded lectures. This flexibility can be interpreted as viewing lectures at a time and in an order as preferred by the student. No restrictions as to when the lectures are utilized are in place, and similarly the student is able to pause, fast forward and re-watch parts of the lecture at their own choosing as revealed by the comment themes. Consequentially, this in turn allows the student to spend more time on subject materials they may find difficult to grasp. Conversely, students are afforded flexibility by spending less time on subject material they may have had previous educational exposure to.

In contrast, medical students also valued the ability to ask the lecturer questions, which is only an option when attending lectures in person. Another important idea put forth by students was that teaching style of lecturer alters the value of in class attendance, a theme previously stated in the literature. [11], [12]

4. Discussion

Although, the addition of live-streamed lectures to recorded lectures seems to be a welcomed change for medical students, faculty and lecturers may be much more hesitant in embracing this change of educational format. Common concerns included the worry of decreased student attendance, and the loss of interaction with students. The data from this study suggests that classroom attendance would not be changed by the addition of live-streamed lectures when the recording of lectures is already established. New technologies such as mobile audience response systems may also help improve lecturer-student interaction with live-streamed sessions.

To the authors' knowledge, this was the first cross-sectional study done regarding novel use of live-streaming lectures in addition to recording lectures for later viewing. Future studies would require multiple non-distributed models of medical education that use both recorded and live-streaming lectures to draw upon the experiences of their own students with these resources, and longer term application of these resources to monitor any further change in trends in regards to the use of these resources. By having students assess subjectively their educational value attributed to certain resources, these may be under or overvalued by the students, and additionally be subject to recall bias. Further studies should assess the educational value attributed to these resources by faculty members involved in teaching pre-clerkship medical students.

5. Conclusions

Medical students in this study reported watching recorded lectures to be of highest educational value, and both recorded lectures and live-streaming of lectures were found to be of higher educational value than in person lecture attendance.

Furthermore, the data suggests that removing live-streaming of lectures in a non-distributed pre-clerkship model of medical education would not lead to a statistically significant increase in live lecture attendance if recorded lectures remained.

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