Mini-lectures: a taster to engage the audience for the main event

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ABSTRACT This article explores the use of pre-recorded video mini-lectures to support and enhance traditional face-to-face lectures for undergraduate students. Mini-lectures guide students through key concepts so that they can understand and assimilate key content before attending lectures.

Traditional face-to-face didactic lectures are often considered to be old-fashioned but remain the most widely used format to convey valuable information about a subject to an audience. They are widely used to disseminate information in education and public engagement. However, traditional didactic lectures can last 1 or 2 hours and hence require prolonged concentration. This is fine in the case of an isolated lecture, where appropriate time is available to reflect upon the content learnt; however, for students in higher education or further education there are often a host of lectures within a single day and they are required to concentrate for up to 6 hours on a given day. This places a significant cognitive load on students to be able to concentrate for this period of time. Ideally, students would prepare for lectures by reading around the subject area, but this is optional at best. All in all, this places pressure on the students' ability to acquire the required knowledge from lectures to progress in their chosen field.

It's all about cognitive load

Cognitive load indicates the total amount of mental effort that is being used by memory (Hadie *et al.*, 2016). Figure 1 shows the three main types of load, which are intrinsic, extraneous and germane. Each has a different relationship to our memory and our ability to learn. Intrinsic load refers to how much we focus on complex learning that is delivered, and therefore if the nature of the topic is more complex this provides greater load than something simpler. Extraneous load is anything that can distract the learner from the topic they are studying and therefore makes the learning process more difficult. In this current era, with social media prevalent, students in a lecture can often be distracted by social media such as *Snapchat* and *Twitter*. Both intrinsic and extraneous load utilise the short-term (working) memory and to limit the strain on this memory we need to minimise the intrinsic load and eradicate as much as possible of the extraneous load.

Finally, there is germane load, which focuses on your ability to solve and tackle complex problems through processing examples from your long-term memory. It is the most effective load when related to learning and it is often considered to be vital that it be maximised in order to facilitate higher learning skills.

Listening to multiple lectures within one day utilises your intrinsic load and therefore places significant pressure on your short-term memory. This form of learning perspective is not effective and thus implies that the current format of lecturing is not well suited to reducing or managing overall cognitive load. Various approaches have been taken to reduce cognitive load, including:

- pre-lecture activity (including short videos);
- intra-lecture activity (including revisiting previous learned knowledge);
- post-lecture activity (including quizzes).

Emergence of mini-videos

Many of the strategies to reduce cognitive load are focused on the use of short videos or lectures. It has often been said that longer lecture durations (longer than 50 minutes) limit the attention span of the listeners. Therefore numerous studies have reduced the duration of the lecture (either face-

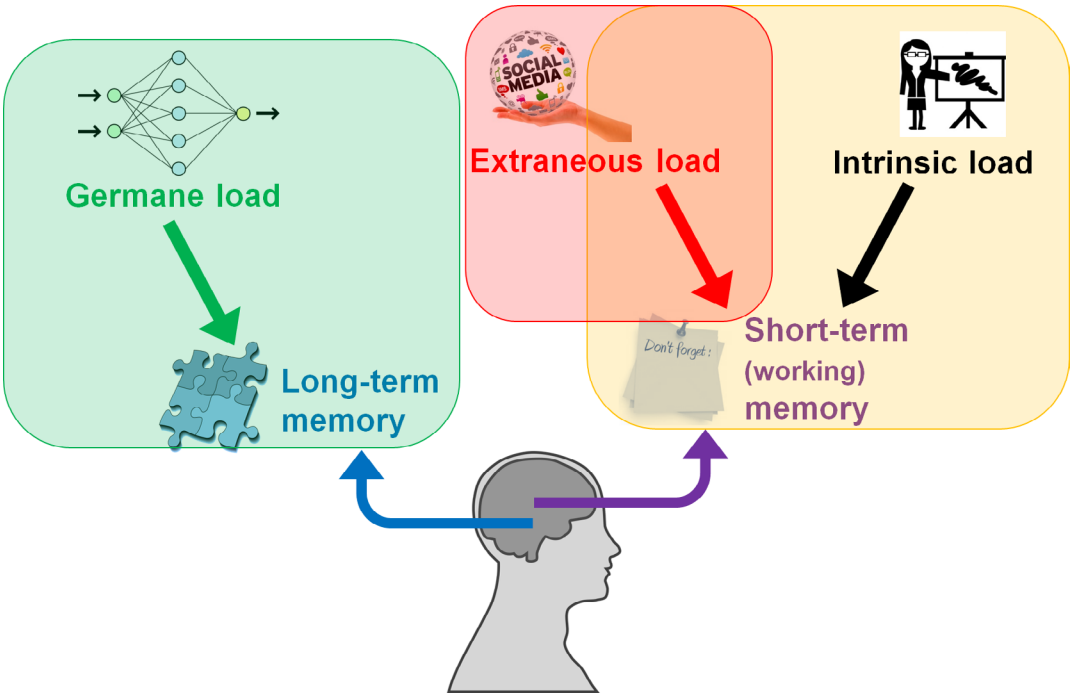

Figure 1 The impact of various forms of cognitive load on short-term and long-term memory

to-face or electronic), and these have shown that reducing lectures to short bursts has increased the attention span. Studies have also shown that prior reading or preparation for lectures increases awareness and focus on the topic being presented, but students seldom conduct any reading before the lecture. Therefore, having a guided video in the form of a mini-lecture should help students to prepare better.

The mini-lecture concept

The mini-lecture concept is that students are provided with a short video mini-lecture that presents some insight into the key aspects of the topic that will be delivered in the subsequent lecture. After watching the mini-lecture, the students should know what the aim of the forthcoming lecture is and what they should be able to do once they have attended the face-to-face session; this is essentially pump priming the students' engagement. This study investigated whether this format provided students with a degree of key content preloaded within their long-term memory. Subsequently, would this 'preload' place less pressure on the short-term memory when reflecting on key aspects of the face-to-face lecture?

Content and style of mini-lectures

Within our study we created mini-lectures that lasted 5 minutes, as a previous study suggested that 3–5 minutes is an optimal duration for this format of presentation (Brame, 2016). Generally, standard 50 minute lectures have an associated *PowerPoint* presentation that aims to cover the learning material of that session. Within this presentation, the introduction slides would be dedicated to an overview of the session to come. Therefore, it was decided to use those as the subject matter for the mini-lecture in the pharmaceutical science lecture series. Mini-lectures were prepared by the educator using three, four or five slides as described above and recording an audio narrative over them using *Camtasia*. These mini-lectures were made available via email one week before the lecture topic using the *Blackboard* virtual learning environment.

Study design

The project was approved for ethics by the University of Brighton. All first-year pharmacy course students at the University of Brighton were invited to take part in the study. These

students were chosen as this was a large cohort (>150 students) from diverse backgrounds being educated with a variety of subject materials.

Students were asked to evaluate the impact of mini-lectures by participating in a *Poll Everywhere* survey conducted in one of the face-to-face sessions. Students who were not present were able to participate in the poll after the session. The survey was conducted by two student representatives in the absence of academics to avoid possible bias. Of the possible 159 students, 56 completed the survey. In addition, students were all asked to comment on whether they had conducted any standard preparation for lectures.

Results

Following our study, students felt that anywhere from 5 to 15 minutes would be ideal for a mini-lecture (Figure 2). The time provided for the mini-lecture is important as it needs to be long enough to reduce cognitive load within the face-to-face lecture. A minority of students felt that the mini-lecture should be longer than 30 minutes, suggesting that they would prefer their lecture provided electronically.

Engagement with mini-lectures

Only five students indicated that they routinely used information provided on the virtual learning environment for guided study and evaluated the lecture slides prior to face-to-face lectures. However, approximately one-third of the students engaged with the mini-lectures. This shows that students do not use the guided study material provided and that mini-lectures may provide an alternative approach for lecture preparation. Nevertheless, since only one-third of the cohort engaged with this format, more needs to be done to understand why so many students do not conduct any pre-study for lectures. This first implementation of part of the cognitive load theory based lecture model in the form of a pre-lecture activity was not made compulsory; future work would need to be cognisant of this and decide whether a compulsory activity needed to be imposed.

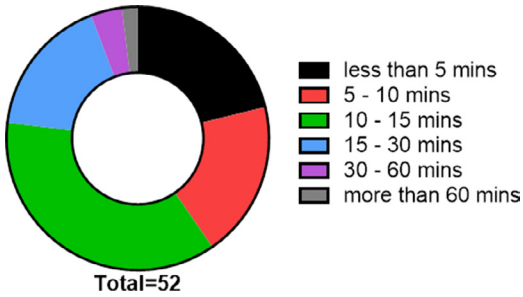

Figure 2 The most suitable duration for a mini-lecture prior to the main face-to-face lecture

From the survey, 60 students found the mini-lectures to be useful and effective in preparing for the main face-to-face lectures. Significant numbers of students stated that this format provided them with a basic understanding of what the lecturer was going to explain and enabled them to ask relevant questions if they were not addressed in the face-to-face version of the full lecture. This would suggest that for a number of the students the use of mini-lectures provided a means to reduce cognitive load and aid student preparation for the face-to-face lecture.

Finally, students were asked which aspects of the mini-lecture they felt would require development for this platform to be useful. Table 1 shows some of the key responses and their frequencies.

The students were keen to have the videos as part of a package available through the virtual learning environment, arranged in themes, which is most likely to be a means towards preparation for revision. They would also prefer mini-lectures created for a wide range of topics rather than just

Table 1 Free-text comments on how mini-lectures should be developed to provide a useful educational tool

Comment	Frequency
Make the video more accessible through virtual learning environments	3
Should be created for a wide range of topics	5
Keep these concise and informative	5
Include information on assessments or example exam questions	8
Only focus on complex theories and greater content	11
Create them so that if a student cannot attend they would not miss anything	1

pharmaceutical sciences, which was the focus for this study. The course covers three core disciplines and therefore students would have preferred content in therapeutics and pharmacy practice as well.

One of the more interesting aspects of the feedback was the split between those students who wanted more concise information within the mini-lecture focused entirely around the learning objectives and those who would have preferred more content that was technically challenging and focused on complex problems or theories. This contradiction suggests that students are not sure about what they want to, or should, be doing prior to the lecture. Wanting more information in the mini-lecture would limit the purpose of the main lecture in the conventional model, and suggests that these students might prefer the flipped model of teaching and learning (Covill, Patel and Gill, 2013).

Finally, students were keen to have the mini-lectures solely focused on the assessments or practice exam questions, which is hardly the desired spirit of learning and is just 'learn to test'. This also does not really fit the model of pre-lecture but could be a suitable alternative for post-lecture.

Conclusion

Overall, the mini-lecture has the potential to be a taster for the main event, but much thought needs to be given to the content provided within the mini-lecture and how this would be structured relative to the main lecture itself. It is clear that the mini-lecture can aid awareness and therefore potentially preparation for the actual lecture; however, mini-lectures need to be kept succinct and should not exceed 10 minutes in length. The main lecture itself will need reforming if a mini-lecture is used, as it will need to shift some of the balance from content into problem solving or complex concepts, which should lead to more interaction within the lecture. It is still not clear whether the mini-lecture reduced cognitive load within the main lecture, and this will require further investigation.

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