

## The Effective Planning and Delivery of the Large Group Lecture in Medical Education: Not a thing of the past

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### Abstract

All medical professionals will be expected and required to deliver lectures throughout a medical career. This instills fear in many: the lecturer, and the attendee. Despite an overwhelming increase in smaller-scale learning environments and situations, lectures continue to be well-utilized; they are effective means to easily access the largest group possible with the smallest intervention.

Many lecturers continue to not identify the need for incorporating attendee participation, nor do they target information appropriately to attendees. This can easily create disinterest and non-engagement...and frustration in both lecturer and audience. Good and effective lectures require a clear plan, preparation, and practice. This article seeks to highlight practical steps to ensure that the information delivered by the lecturer is tangible and clear, adhering to principles of "adult learning theory". The basic principles of effective visual aids (including a PowerPoint "6x6" guideline) and keys to audience participation is implemented throughout the presentation. Examples of this include assessing the audience needs prior to lecture preparation, a change in pace (or approach) every 10 – 15 minutes, different means of audience engagement (even amongst themselves). The excellent lecture is not necessarily delivered by the best speaker, but by those that plan well.

**Key words:** audiovisual aids; visual aids; learning; lectures; teaching/methods; active learning; adult learning theory; public speaking

### INTRODUCTION

When one imagines the medical education environment, a picture of a white-coat clad individual standing at the front of a lecture hall full of young faces may come to mind. Indeed, the large group teaching format is still a cornerstone of not only medical education, but the entire medical profession. Those who have completed their formative education will no doubt be asked, or even compelled, to give a lecture to younger generations of learners as well as to their peers. The continued reliance on large group teaching in medicine raises an interesting paradox, though – medical professionals are expected to give lectures, but are rarely, if ever, taught the skills needed to execute an effective lecture. Anyone in the field could certainly recount numerous hours spent in low-quality lectures. However, there are recommendations derived from experts and research that lecturers can implement in order to deliver an engaging transfer of knowledge.

Although the large group lecture format has been criticized for being inconsistent with adult learning theory – it is passive, teacher-centered, and associated with low knowledge retention – it is still widely used. Moreover, it is a more efficient teaching method compared to smaller-scale (small group) settings, such as problem-based learning or bedside teaching<sup>1-3</sup>. Since lectures are here to stay, the critiques levied at them can be addressed by incorporating elements of "adult learning theory": adult learners tend to be self-motivated, seeking out learning opportunities that incorporate or expand upon their prior knowledge. They prefer to play an active role in the learning process, as opposed to being "talked at". Adult learners desire to actively think through tasks, and implement their new knowledge immediately<sup>1,4,5</sup>. Therefore, delivering a lecture (with these considerations in mind) can result in a more positive experience for learners.

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## PREPARING A LECTURE

### Content

Often the topic of a lecture is predetermined, but there may be instances when you are asked to lecture on a topic of the learners' choosing<sup>2</sup>. In the latter case, investigate what topics are relevant to them<sup>1</sup>. If they are medical students, for example, a program (or course) director would be a valuable resource. When the learners are peers, asking colleagues – or even the potential learners themselves – may prove useful. Whenever possible, choose a topic in which you have prior knowledge, and which is of interest to you (the lecturer). This should immediately result in a more effective lecture<sup>2</sup>.

Once the topic is chosen, define the primary learning points to be delivered and the allotted duration. It is recommended that a one-hour lecture should contain only three to five salient learning points; you can adjust the number up or down depending on the amount of time allotted for the lecture<sup>1,6</sup>. It is better for the learning points to be concepts, as opposed to facts. Effective lectures provide learners with new information and ways to apply it<sup>6</sup>.

Furthermore, ensure that the learning points are appropriate for your audience<sup>1,5</sup>. For example, imagine you are lecturing on pulmonary hypertension. If your learners are cardiologists, presenting the epidemiology, presentation, and diagnosis of the disease process as primary learning points are far too basic (and unnecessary). These would be more appropriate for junior medical students. Alternatively, discussing the indications, side-effects, and comparative studies of novel therapeutics for pulmonary hypertension would be a better selection for the audience of cardiologists.

### Visual aids

Next, determine what – if any – visual aids you will employ to support your lecture. It is recommended to utilize visual aids as they have been shown to improve learning and retention<sup>1,2</sup>. It is advisable, though, to investigate the lecture venue well in advance: supported visual aids, available equipment, and general layout all need to be determined<sup>6</sup>. The most commonly used medium by far is PowerPoint, but paper flip charts or handouts can also be useful. Given its prevalence, strategies for creating effective PowerPoint slides will be presented, but these can be easily applied to other electronic and the non-electronic media as well.

The best PowerPoint slides serve merely to support a lecture, rather than being the focal point. When creating effective slides, the principle that underlies all recommendations is: "Keep it simple". For every twenty minutes of lecture time, approximately ten slides should be used. While this is not a firm rule, the key point is to limit the visual content so as not to overwhelm learners<sup>1</sup>. Use a font size of at least 28 and font style that is "sans serif" (e.g. – Arial, Helvetica), as opposed to "serif" fonts (e.g. – Times New Roman), as these are easier to read on slides<sup>5,6</sup>. Choose text and background color combinations with high contrast (i.e. – navy letters on a white background, or white letters on a black background) to further ensure the text is easy to read<sup>1,6</sup>. The slide background should be a single color and free of designs, and red-and-green combinations should be avoided as these can appear gray to those with colorblindness<sup>1</sup>.

The text on the slides should be kept to a minimum and guided by a "6x6" rule: no more than six words per line, and no more than six lines per slide. Variations in the text style (different colors, italics) should be used sparingly, if at all<sup>1,6</sup>. Moreover, the use of slide animations is best avoided as it is distracting. Using appropriate/applicable images in addition to, or even instead of, text is encouraged. Additionally, graphs or charts can be utilized to present data, but avoid copying them directly from sources as they can be complex and distracting. Rather, make new, simpler charts or highlight one or two key elements for learners to focus on<sup>1,5,6</sup>. Regardless of the exact content of the slides, they should be simple enough to be easily taken in and used to complement the orally delivered content<sup>6</sup>. An example of an effective slide is shown in Figure 1.

### An Effective Slide

- Keep it simple
- Background and text with high contrast
- Avoid red/green combinations
- 6 x 6
- Sans serif font
- Avoid using animations

**Figure 1:** An example of an effective PowerPoint slide. It adheres to recommendations and incorporates an image that supports the text.

### Structure

It is helpful to consider the overall structure of your lecture and how you will deliver your content. Creating an outline or flow chart can aid in your initial planning and ensures that the content is delivered in a logical fashion<sup>1,2</sup>. Several suggested models are listed in Table 1, but are not meant to be absolute, rigid, or exhaustive.

The first few minutes should be spent introducing the topic. This should include what the learners can expect to gain by the end of the session, commonly achieved by providing a list of learning objectives (concise, discrete, measurable behaviors or outcomes). Since adult learners prefer to play an active role in learning, these allow them to benchmark their own learning. The objectives need to provide a reference for you (the lecturer) to ensure that the subsequently delivered content fulfills the stated objectives<sup>1,7</sup>. Bloom's taxonomy (and subsequent revisions of it) provides a framework for creating learning objectives by organizing educational goals into a hierarchy of increasing complexity. While a review of Bloom's taxonomy is beyond the scope of this paper and can be viewed elsewhere<sup>7</sup>, Figure 2 provides an overview of the hierarchy and examples of verbs associated with each level. When creating learning objectives, include a verb from the targeted level along with a measurable outcome. For example, "Explain the differences between primary and secondary forms of pulmonary hypertension."

**Table 1:** Models used for structuring a lecture. Each is presented with a brief description<sup>1,2</sup>

| <b>MODEL</b>             | <b>Description</b>  |
|--------------------------|---|
| Hierarchical             | One unifying topic, with parallel subgroups branching out   |
| Problem-centered         | A problem is presented along with solutions supported by evidence                                 |
| Chaining or Storytelling | And idea or problem is presented along a timeline, and sequential reasoning leads to a conclusion |
| Comparative              | Two or more methods or sides of a problem are presented and evaluated                             |
| Thesis                   | A declaration is made, then proved or disproved using reasoning and evidence                      |
| Cause and effect         | Events or issues are explained relative to what caused them                                       |

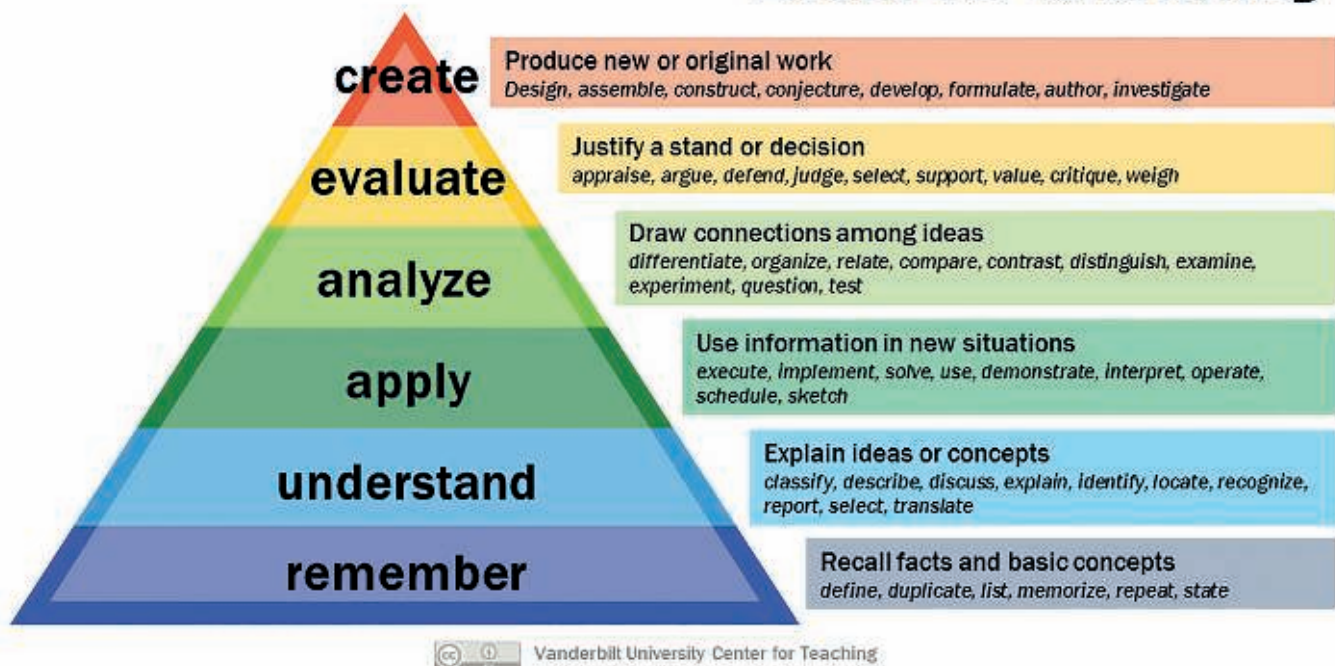
Once you set your learning objectives, try to engage or “hook” your learners by priming their interest in the topic. This can be as simple as a brief overview of what they already know, thus activating their prior knowledge<sup>1</sup>. An interesting clinical case or vignette can stimulate interest, or even a personal anecdote<sup>5</sup>. After this, provide an overview of the structure of the lecture, and refer back to it periodically during the lecture. Providing brief reviews or summaries of what has been covered so far can enhance consolidation for your learners<sup>1</sup>.

After the introduction, much of the lecture is spent delivering the key points and supporting content. Evidence shows that retention is highest at the beginning and end of lectures<sup>1,5</sup>, so take this into consideration when timing the delivery of new information. Interactive lectures (teacher and learners engage with each other, and information flows both ways) have, not surprisingly, shown better learning outcomes compared to a passive, unidirectional flow of information<sup>1,5,6</sup>. This is consistent with adult learning theory.

Moreover, learners begin to lose focus after only ten minutes<sup>5</sup>. Therefore, it is recommended to incorporate interactive techniques into your lecture (Table 2) and to change the learning activity approximately every ten minutes to maintain learners’ attention. For example, you could spend ten minutes giving the learners new information, then present a clinical scenario to which they can apply the new information using a “think-pair-share” activity for another ten minutes. It is vital to ensure that engagement is a priority throughout the lecture, and not just a novelty<sup>3</sup>. As you create your lecture, resist the urge to incorporate many details on the topic as this may overwhelm your learners<sup>2,5</sup>. Focus instead on conveying your primary learning points; spend the majority of the time providing support to those points<sup>1,6</sup>.

Once you have delivered your content, it is vital to spend a few minutes summarizing the material, reminding the learners of your

## Bloom’s Taxonomy



**Figure 2:** An illustration of the hierarchy of Bloom’s Taxonomy which can be used to create learning objectives. Each level of the pyramid represents a higher-order educational goal. A brief description of each level appears to the right, along with examples of verbs relating to each level (Anderson).

**Table 2:** Examples of techniques to increase in-lecture interaction; the descriptions and tips for utilization appear alongside.<sup>1,5,8</sup>

| <b>Activity</b>   | <b>Description</b>  |
|-------------------|---|
| Ask questions     | <ul style="list-style-type: none"> <li>• Can be posed to individuals, groups, or everyone</li> <li>• Try to encourage higher-order thinking or application of new knowledge, rather than learners reciting facts</li> <li>• Ensure you wait several seconds for someone to respond</li> </ul> |
| Brainstorming     | <ul style="list-style-type: none"> <li>• Pose question to audience and invite multiple responses</li> <li>• Write responses so everyone can see them</li> </ul>   |
| Buzz groups       | <ul style="list-style-type: none"> <li>• Learners break into groups of 3-5</li> <li>• Give a problem to solve, question to consider, or ask them to discuss something that was not clear</li> <li>• Group nominate spokesperson to share their thoughts</li> </ul>                            |
| Think-Pair-Share  | <ul style="list-style-type: none"> <li>• Pose a problem or question</li> <li>• Learners think about the question for about two minutes</li> <li>• Then pair up with another learner and share thoughts</li> <li>• You can have a few pairs share their thoughts</li> </ul>                    |
| Pause and reflect | <ul style="list-style-type: none"> <li>• Ask learners to spend two minutes re-examining the material just covered</li> <li>• Invite them to share their thoughts with a neighbor</li> </ul>   |
| Show a video      | <ul style="list-style-type: none"> <li>• Reinforce new knowledge with a video example</li> </ul>  |

key points, and providing closure to the topic<sup>1,6</sup>. You can have them reflect on an image, a quote, or how they will apply the new knowledge. Providing your contact information (if you so choose) can also be helpful. After you are done speaking, it is important to leave several minutes for questions from the audience, and you should actively invite them<sup>1</sup>. It is also recommended that you create a slide to leave up at the end, as opposed to ending the slide show with the dreary (and blank) “exit to end slide show”<sup>6</sup>.

### **Finalizing**

Once you have created your presentation, it is time to refine it. Practise! Deliver the lecture to yourself, but also to a small, trusted audience of valued colleagues. Time yourself delivering your lecture to ensure it fits within the time you are allotted. Practise speaking clearly and deliberately, implementing pauses between ideas. Keep in mind, though, that the time it takes to deliver your lecture on your own will likely be shorter than when you deliver it to your learners<sup>2</sup>. You can also pre-identify portions of the lecture that could be skipped over if you find yourself running out of time on the day<sup>1</sup>. Practising your lecture will also help you gain familiarity with your material so you are less nervous<sup>1,6</sup>. You should rehearse your lecture enough so that you can deliver it in a natural, conversational style; this is opposed to a rigid, flat, read speech (not unfamiliar to most readers). If needed, you can create notes to refer to while giving your lecture, either on a piece of paper or in the notes section of PowerPoint (below each slide), but avoid relying on them while you speak<sup>1</sup>. It is further suggested to have a complete hard copy (printed) of your entire lecture to overcome any potential technological failure.

### **Giving Your Lecture**

On the day of the lecture, ensure you arrive early enough to set up any visual aids and other equipment. This may include logging onto a virtual platform ahead of time, to ensure that you are familiar with

the format. As you begin, lead off with enthusiasm and maintain eye contact with the audience: this can make learning more effective<sup>1</sup>. Speak in a deliberate, conversational style, and try to read your learners’ reactions and cues to help tailor your lecture<sup>2,6</sup>. Lectures have generally focused on the lecturer delivering content to a passive listener. This, however, can impactfully change<sup>3</sup>. Use clear, simple language, and ensure your learners can hear you, using a microphone if available. Establish rapport by inviting them to actively participate in the lecture and to ask you for clarity if needed<sup>1,8</sup>. Finally, keep track of time and have a plan in place to truncate your lecture if needed<sup>1</sup>.

### **AFTER YOUR LECTURE**

The final component of giving a lecture is obtaining evaluations of the lecture after its conclusion<sup>1,2,8</sup>. Evaluations can serve to either ensure learners’ comprehension of the material, or to improve the lecture itself. Opinions on the teacher or lecture can be solicited from the learners in verbal format or through an evaluation form (Figures 3a & 3b). The “one minute paper” has also been utilized, which allows the learner to reflect on the content of the lecture (Figure 3c). Evaluations and papers can be collected and reviewed after the lecture and be used to inform adjustments<sup>2,8</sup>.

Evaluations of learners’ comprehension of the material, for example through examinations, may also give a glimpse into the effectiveness of the lecture. You may assign these if you wish, or they may already be in place if your lecture is part of a wider curriculum. Potential confounders may include learners who have prior knowledge of the material covered, or if the evaluation is far removed in time from the lecture learners may have acquired the knowledge elsewhere<sup>1,2</sup>.

Additional methods for evaluating your lecture are peer evaluation and reflection. For the former, you can ask a peer to observe all or



**Figure 3A: Please rate the lecture on the following items:**

|                         | <b>Strongly agree</b> | <b>Slightly agree</b> | <b>Strongly disagree</b> | <b>Slightly disagree</b> |
|-------------------------|-----------------------|-----------------------|--------------------------|--------------------------|
| Clear                   |                       |                       |                          |                          |
| Interesting             |                       |                       |                          |                          |
| Easy to take notes from |                       |                       |                          |                          |
| Well organised          |                       |                       |                          |                          |
| Relevant to the course  |                       |                       |                          |                          |

**Figure 3B: Please rate the lecturer on the following items:**

|                          | <b>Strongly agree</b> | <b>Slightly agree</b> | <b>Strongly disagree</b> | <b>Slightly disagree</b> |
|--------------------------|-----------------------|-----------------------|--------------------------|--------------------------|
| Was enthusiastic         |                       |                       |                          |                          |
| Was clearly audible      |                       |                       |                          |                          |
| Seemed confident         |                       |                       |                          |                          |
| Gave clear instructions  |                       |                       |                          |                          |
| Encouraged participation |                       |                       |                          |                          |

**\*One-minute\* paper worksheet**

Name: \_\_\_\_\_

Date: \_\_\_\_\_

Lecture title: \_\_\_\_\_

Directions: Take a moment to think about the lecture you have just attended, and then answer the following questions.

1. What was the most important thing you learned in today's lecture?  
\_\_\_\_\_

2. What question remains uppermost in your mind at the end of today's lecture?  
\_\_\_\_\_

3. What was the "muddiest point" in today's lecture?  
\_\_\_\_\_

**Figure 3A-C:** These present examples from Cantillon<sup>8</sup> of written evaluations of a lecture (A) and the lecturer (B), and of a "One minute paper" (C). In A & B, ordinal responses are selected. In C, the evaluation is less structured, and learners can write freely.

part of your lecture and provide feedback to you. Reflection is a self-directed evaluation in which you set aside some time think through your experience of giving the lecture. It may be helpful to write some thoughts down as soon as the lecture is over. For example, try to recall reactions you observed from your learners, questions they asked, or if your time management was effective. Decide what things you would change, and what you want to keep<sup>1,2</sup>.

## CONCLUSION

Even though medical professionals are rarely given the skills to execute an effective lecture, it can be accomplished with some preparation and forethought. We need to aim to apply the same fervor in becoming better clinicians to our approach to improve lecturing skills<sup>2</sup>. Make no mistake: implementing the recommendations presented here require time and dedication, but are easily achievable if you begin preparing well in advance. A "bad talk," on the other hand, characterized by transcribing numerous details into endless wordy slides, is relatively easy to prepare<sup>6</sup>. Moreover, a lecture that simply repeats facts (printed elsewhere) obviates the need for a lecturer; learners would do just as well off reading it for themselves<sup>2</sup>. The teacher's role in a lecture should be that of a guide – showing learners how to apply new knowledge and concepts through a focused delivery of a few key and applicable concepts at a time.

Student-focused learning and engagement occurs when lecturers actively create platforms, as well as opportunities (and cultural change) for sharing and participating.

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