

AMEE Medical Education Guide No. 22: Refreshing lecturing: a guide for lecturers

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SUMMARY *This guide provides an overview of research on lecturing, a model of the processes of lecturing and suggestions for improving lecturing, learning from lectures and ways of evaluating lectures. Whilst primarily directed at teachers in the healthcare professions, it is equally applicable to all teachers in higher education. Lectures are the most ubiquitous method of teaching so they are an important part of a teacher's repertoire. Lectures are at least as effective as other methods of teaching at imparting information and explaining. Intention, transmission and output are the basis of a model of lecturing. The key skills of preparing lectures, explaining and varying student activities may be derived from the model. Preparation is based on purposes, content, various structures of lectures and the preparation of audiovisual aids. The essential ingredients of explaining are clarity, interest and persuasion. By varying activities, one can renew attention and develop student learning. Learning from lectures can be improved by teaching students the structure of lectures and methods of listening and note-taking. Student ratings of lectures are useful but over-used and limited ways of evaluating lectures. Equally important is peer review and more important than either student ratings or peer feedback is reflection on the practice of lecturing by individuals and course teams.*

Purposes and context

This guide has been written to help teachers, particularly those in the healthcare professions, to refresh their approaches to lecturing and, in so doing, help them to make their lectures more refreshing for students. The guide is based on research on lecturing and the authors' experience of observing lectures and providing short courses on lecturing. It outlines various styles of lecturing, methods of structuring lectures, learning from lectures, and the skills of lecturing. It provides some suggestions for helping students to learn from lectures and for evaluating lectures.

At the outset it is stressed that the task of refreshing one's lectures is not simple. It involves reactivating and extending existing knowledge of content and techniques, the refinement of one's skills of lecturing and, perhaps, the development of new skills. Merely reading this guide may not be sufficient to improve one's lectures—just as reading a text on clinical diagnosis may not be sufficient to make one a better clinician.

Why lecture?

Given the advent of the e-revolution, why is lecturing in any form still necessary? The reasons are not hard to find. In the early years of undergraduate medical education many students attend more lectures than they see patients. By the end of their clinical years they may have attended over a thousand lectures. Lectures are a substantial part of the learning experiences of students and so merit our attention. They are the most common method of teaching and they are likely to remain so well into this century. Lecturing, then, is an important constituent of a teacher's repertoire of teaching methods. Lectures are, potentially, an economical and efficient method of conveying information to large groups of students. They *can* provide an entrée into a difficult topic, different perspectives on a subject, up-to-date résumés of research and relevant personal, clinical or laboratory experience. A lecture *can* be used to provoke thought, to deepen understanding and to enhance scientific and clinical thinking. Lectures *can* provide hints and guidelines on how to learn a topic or procedure as well as what to learn and thereby help students to develop into independent, thinking professionals. They can, in short, bring a subject alive and make it more meaningful. Alternatively, they can kill it.

Limitations of lectures

Lectures, like all methods of teaching, have limitations. They can be boring and, worse, useless. If they are merely recitations of standard texts then they are not fulfilling adequately their functions of developing understanding and motivating students to learn. If the lecture is used only to provide detailed coverage of facts and findings then the students would gain more from reading a good textbook. If lectures are the only method of teaching used then the students are not being well prepared for their future roles. A rich diversity of teaching methods is necessary for a domain as complex as the health of human beings and their communities. Lectures do not *usually* provide evidence of students' understanding and knowledge—that is explored in seminars, practical work and assessment tasks. Finally,

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lectures can induce passivity and compliance. But they are not necessarily passive modes of learning or authoritarian modes of teaching. As in bedside teaching and small-group teaching, passivity and authoritarianism are not dependent on the teaching method so much as on how that teaching method is used by the lecturer or clinician.

Despite these limitations of lectures, they are here to stay. If they are here to stay, we may as well make them more effective. Hence this guide.

Are lectures as effective as other methods of teaching?

Reviews of the research on lecturing over the past 70 years have concluded that lectures are at least as effective as other methods of teaching at presenting information and providing explanations (Spence, 1928; McLeish, 1976; Dunkin, 1983, 1986; Brown, 1987; Brown & Atkins, 1988, 1997; Bligh, 2000). Practical skills are obviously taught more effectively in laboratories and clinics. Lectures are not a substitute for practical work—particularly for dentists, who must be fully clinically competent on graduation. But an analysis of learning activities in these settings may well show that much of the underlying methodology and theory may be taught as effectively in brief lecture demonstrations. Clinical problem solving may be taught more effectively in small groups. Attitude change, it is claimed, is more likely to occur in small groups (Bligh, 2000). Small-group teaching methods are usually not as efficient a method of imparting information as lectures are; their particular strengths lie in the interplay of ideas and views that develop a student's capacities to think. Comparisons between lectures and newer methods of teaching should be treated cautiously. Whereas new methods such as computer-assisted learning, interactive video and simulations are usually prepared carefully and evaluated systematically, lecture methods are rarely subject to such rigorous planning and scrutiny. All of the above findings assume that lecturing and other methods of teaching are stable phenomena. In practice, there is a rich variety of approaches within each method and within each method there is potential for both competent and incompetent teaching.

Are there different styles of lecturing?

Styles are habitual sets of responses to situations perceived as similar. Every lecturer has at least one style of lecturing and those who are more discriminating have different styles based on their perceptions of different classes and audiences.

Styles may be placed upon a continuum from the 'reading aloud' style in which a lecturer reads every word from a prepared text to the 'associating aloud' style in which a lecturer says whatever is in his/her head regardless of its relevance. Neither extreme is commendable. In between these styles is the 'thinking aloud' style in which lecturers disclose their thinking about a topic, or model the process of solving a clinical problem so that students learn how an expert works.

Anecdotal evidence on styles was provided by postgraduates who were asked to identify the different styles of lecturing that they had experienced. The most common

styles were *The Overfill* who crammed, *Radio Three* who used long, eloquent sentences that were difficult to note, *The Random Walk* who wandered aimlessly through the literature, *The Systems Person* who provided a systematic, if somewhat dull presentation, *The Systems Person plus* who used every aid available to put across the information. Preference was for the *Systems Man* for good notes. Some *Random Walkers* were thought amusing (Brown, 1979).

In a more rigorous study, five styles of lecturing were identified through cluster analysis of the responses of lecturers to an inventory (Brown & Bakhtar, 1987) and then validated by direct observation:

- **Oral Presenters:** These lecturers rarely use any means of communicating other than talk. They do not use blackboards or overhead transparencies to outline main points or provide full notes, nor do they use diagrams to show relationships, structures or processes. They are less likely to write down full lecture notes or scripts, more likely to note headings and subheadings and less likely to rely on one text for preparing lectures.
- **Visual Information Givers:** These lecturers are confident visual information providers who use the chalkboard, overhead projector or slides to provide full notes to their students, they use diagrams to show relationships and processes, and they usually give students time to copy down complex diagrams. Of all the groups, they are most likely to write down full notes when preparing their lectures and least likely to use only headings and brief notes.
- **Exemplary Performers:** These lecturers are confident, well structured and able presenters who use a wide variety of oral and visual techniques of presentation. When preparing lectures this is the group that is most likely to write down headings, subheadings and brief notes rather than whole lectures. They do not report any difficulty in selecting and structuring materials for their lectures. They think about, write down and tell the students the objectives of each lecture, and they inform the students in advance of the lecture topics. They often structure the lecture around questions. They rarely use aids to provide full notes but almost all exemplaries use aids to emphasize key points. The exemplaries provide more handouts but this difference is not significant.
- **Eclectic Lecturers:** These lecturers use a variety of techniques, including humour, but lack confidence in their lecturing powers and tend to be disorganized. When preparing lectures, this group admits to having difficulty in selecting and structuring materials. They tend to write down headings, subheadings and brief notes rather than full lecture notes and they are likely to use more than one text as a source for their lectures. Of all the groups, they are the group most likely to digress from the content of their notes.
- **Amorphous Talkers:** These lecturers are confident, even over-confident, but ill-prepared and vague. They are the group least likely to think about objectives for their lectures or to inform the students of the objectives of the lecture. Of all the groups, they are the least likely to tell the students which topics they will be examined on or to tell the students in advance the topics of their lectures. They neglect the essential strategies of lecturing.

In medicine, *Visual Information Givers* were common and *Amorphous Lecturers* were more common than one would expect by chance.

Are there different methods of structuring lectures?

Some common organizing principles used by lecturers are time sequence (cases or stories), cause to effect, problem to solutions, pro versus con to resolution, familiar to unfamiliar, concept to application, building blocks, helixes or networks (McKeachie, 1994).

Five different methods of structuring lectures have been identified through observation and reports by lecturers (Brown & Bakhtar, 1987; Bligh, 2000). These, briefly, are:

- (1) *The Classical*—in which a lecture is divided into broad areas and then subdivided. This is the easiest method of structuring a lecture and, potentially, the most boring. An extension of this method is the *iterative classical* in which a set procedure is applied to each topic. For example signs, symptoms, diagnoses, management and prognosis may be applied to a set of related diseases.
- (2) *The Problem Centred*—in which a problem is outlined and various solutions are offered. Handled well, this method can play on the curiosity or clinical interests of the students.
- (3) *The Sequential*—in which a problem or question is presented and followed by a chain of reasoning which leads to a solution or conclusion. It is easy to lose the students' attention when using this method so the use of periodic summaries is recommended.
- (4) *The Comparative*—in which two or more perspectives, methods or models are compared. It is better done visually rather than orally. A common weakness is to assume that the audience knows intimately the perspective or methods under review. If in doubt, first outline each of the perspectives.
- (5) *The Thesis*—in which an assertion is made and then proved or disproved through a mixture of argument and perhaps speculation. Potentially an interesting approach for students but, like the sequential approach, it can sometimes be difficult to follow.

Some examples of the structure of lectures are shown in Figures 1–4. Some lectures are based on a mixture of the above approaches but usually one structure predominates. Preparing a summary sheet of your lecture can help you to identify its structure and ways of improving it. Often a simple change in order or structure can make a lecture much more meaningful and interesting to an audience so it is useful to experiment with different structures, even on the same material. Whatever the structure, explain it to the students on an overhead transparency, slide or in a handout at the beginning of the lecture.

Views on lecturing

Twenty years ago, lecturers and students appeared to like lectures (Beard & Hartley, 1984). However, the overload of teaching and assessment in the past decade may have produced changes in attitudes towards lecturing. Over 90% of the lecturers sampled ($n = 268$) in the survey by

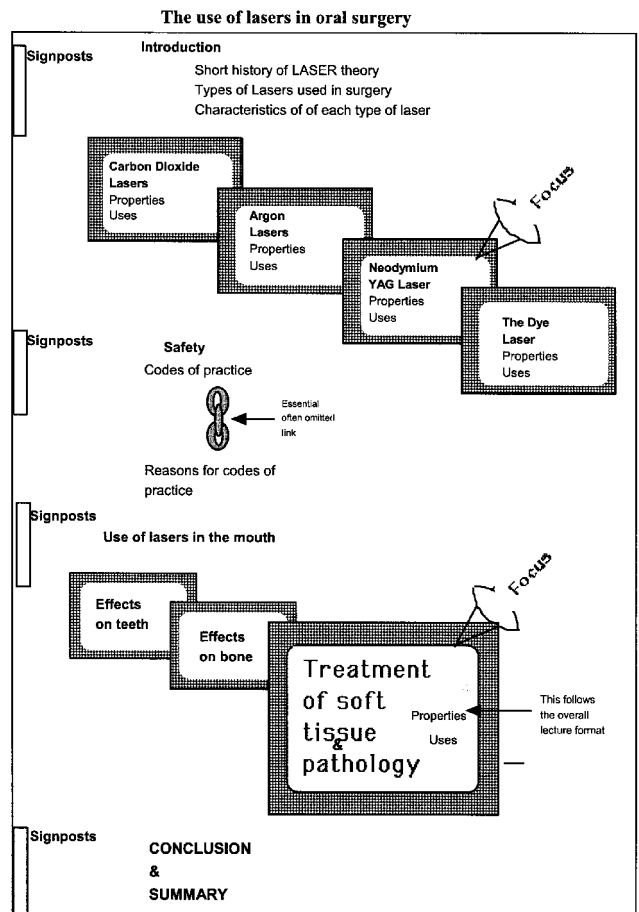


Figure 1. Example of classical method.

Brown & Bakhtar (1987) stated that they liked lecturing, they considered lecturing to be a useful and economical method of teaching and they approved of training in lecturing techniques.

What students disliked was not lectures, but poor quality lecturing. Students' dislikes were:

- inaudibility;
- incoherence;
- talking too fast;
- poor use of audiovisual aids;
- too much information.

These dislikes were reflected in weaknesses reported by lecturers:

- saying too much too quickly;
- not giving sufficient time to copy diagrams;
- assuming too much knowledge;
- forgetting to provide summaries;
- not indicating asides;
- difficulty in timing a lecture.

Lecturers disliked:

- unresponsive audiences;
- large groups;
- effort and time involved in preparation;
- feelings of failure after a bad lecture;
- lecturing on topics disliked.

Childrens' minor illnesses

Introduction
 What they are. Brief epidemiology.
 Trends in UK and Europe
 Only minor if we keep them that way
 Structure of lecture (iterative)

Measles
Symptoms
 Fever—unknown causes? Coryza?
 Spots after 7 days
 Miserable, bleary eyes, cough, itching

Signs
 Kopliks spots. Rash—scarlatini form initially. Maculo papules (3 mm). Usually starts behind ears spreads to face, chest, body, limbs. Coalesces. Fades to brown after 3 days. Lasts about a week. May have conjunctivitis, photophobia (Show slides of signs)

Definition
 Highly infectious—viral. Incubation 12–14 days
 Rare pre 6 months, unusual post 10 years. Occurs in local epidemics. **Notifiable**

Prognosis
 Usually good. Can be serious amongst Nigerians and other Africans. Ill for 2–3 days then recovery. Non-infectious 5–7 days post rash onset. Complications—Bronchopneumonia, pneumonitis, Otitis media, **Encephalitis**

Management
 Prophylactic penicillin (allergic?). Soothing eye drops.
 Paracetamol. Isolate at home

Prevention
 Vaccination

Repeat iteration for Mumps and Rubella with slides

Recent trends in prevention
 Controversy, recent Finnish research

Summary
Introduction to case studies and 'test' cases (seminar session)

Figure 2. An example based on the iterative/classical approach.

Introduction

Process information

Definition of (Provisional)

Prognosis

Management

Emergency

Management and Discharge

Discharge

Worked

Symptoms: Breathlessness and chest

Signs: Asymmetry of ventilatory
 Unilateral absence of breath
 Hyperresonant percussion note one
 ? Displacement of trachea and apex
 ? Cyanosis

Definition: Simple or tension
 (Diagnosis) (decide from signs) due to
 fistula as a result of rib

Prognosis: Tension pneumothorax—death likely
 asphyxiation therefore
 Simple pneumothorax—no immediate
 to life BUT how sure is

Management Air in pleural space must be
 Valve and tracheotomy
 Referral for rib fracture

Tests: X-ray chest after

Monitoring: Nursing staff briefing

Figure 4. Example of a sequential method of lecturing.
Notes: This sets out how to cope with a road traffic victim presenting with breathlessness and chest pain after being crushed against the steering wheel of a car.
Source: Based on Brown & Tomlinson (1979).

- intellectual challenge in structuring a lecture;
- personal satisfaction of giving a good lecture;
- student responsiveness during a lecture and subsequently;
- motivation to master a topic because one has to give a lecture on it.

There were some interesting differences across the Science/ Arts boundaries. Structure and clarity were valued more highly by science lecturers; interests, insights and perspectives were valued more highly by arts lecturers. Science lecturers were more likely to believe that training can improve clarity, expressiveness and the use of audiovisual aids (Brown & Daines, 1981b). The study of training in clarity and interest by Brown (1983) suggests that science lecturers were probably correct.

Students value clarity of presentation, structure and interest. There are likely to be different meanings attached

Orientation

Statement of problem

Solution 1 **Solution 2** **Solution 3**

K E Y S **K E Y S** **K E Y S**

SUMMARY

Figure 3. The problem-centred method.

Notes: The 'keys' contain a statement of the solution, examples, evidence in favour of the solutions, its strengths and weaknesses. The sequence is often from the worst to the best solution.

Both lecturers and student valued highly structure, clarity and interest (Brown & Daines, 1981a; Dunkin, 1986; Marsh, 1987; McKeachie, 1997) and lecturers enjoyed these aspects of lecturing (Brown & Bakhtar, 1987):

to these terms in different subjects. Clear oral presentation may not be perceived as satisfactory to a student who is used to noting and thinking visually. What may be interesting to a budding epidemiologist may not seem at all interesting to a potential orthopaedic surgeon. Students regard 'good' lectures as a means of obtaining 'good' notes. But what counts as 'good' notes differs across subjects. Science students value logically structured notes more highly than do arts students and arts students value gains in insights and new perspectives more than science and medical students do. Science students see lectures as an entrée into reading. For arts students lectures, ideally, follow reading, and help them to interpret what they have read (Brown & Daines, 1981a, 1981b).

As well as quantitative surveys of views on lecturing, there is also some interesting qualitative evidence. In studies of gifted lecturers by Sheffield (1974), Dunkin (1994) and Andrews *et al.* (1996) the most important aspects of lecturing appear to be the stimulation of students to become active learners in their own right followed by the importance of caring for students, love of subject, preparing properly and conveying principles rather than details. These views of lecturers are echoed in the good and bad stories of lecturers told by students in open-ended interviews to Bliss (1990). 'Good' stories contained descriptions of involvement, enthusiasm, generating understanding and human interest. 'Bad' stories described the opposite.

Learning from lectures: an explanatory model

Students learn from lectures by listening, observing, summarizing and note-taking. Sometimes understanding is gained in a lecture and sometimes it emerges when the students pore over their notes after a lecture. Figure 5 offers a simple robust model for examining the processes of learning from lectures. It is derived from studies of human information processing (Baddeley, 1996). Its key features are *intention, transmission, receipt of information and output.*

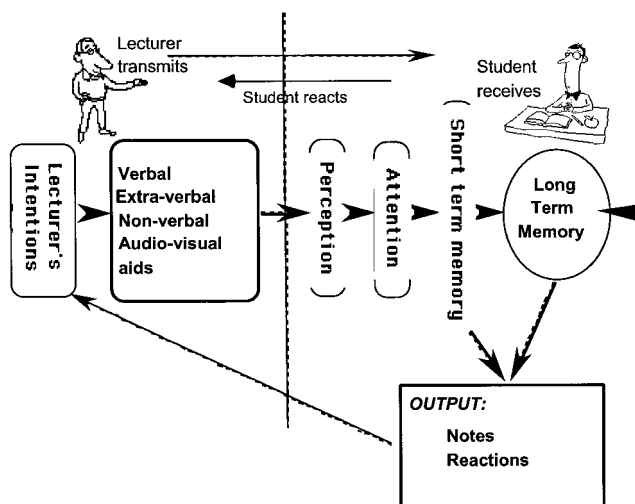


Figure 5. Learning from lectures: an explanatory model
Notes: Lecturer's transmissions may be affected by students' reactions.
 Students' intentions activate long-term memory.

These features provide the four strategies of making the lecture a more effective method of learning: improve lecture preparation and transmission and improve student reception and output.

Intentions

The lecturer's intentions may be based on the broad purposes of coverage, understanding and motivation. These intentions may be articulated or they may simply be manifest in the lecturer's actions. The students' intentions may be based on the broad purposes of note taking, acquiring information, deepening understanding and developing interest. (They may also have other intentions in attending lectures.) Given the likelihood of confusion of intentions it may well be worth spending time exploring with one's students what the purposes and intentions of one's lectures are. First-year students are particularly confused about what they should do in lectures and what lectures are for. It seems odd that we submit students to so many lectures yet do not discuss with them what lectures are for or how students can gain from them.

Transmission

A lecturer sends messages verbally, extra-verbally, non-verbally and through his or her use of audiovisual aids. The verbal messages may consist of statements of objectives, definitions, descriptions of signs and symptoms, examples, exceptions, explanations or comments. The 'extra-verbal' component is the lecturer's vocal qualities, hesitations, stumbles, speech errors and use of pauses. Hesitations and stumbles are often due to lack of preparation or nervousness. The 'non-verbal' component consists primarily of eye contact, gestures and body movements. These may be used deliberately to establish rapport, to monitor student reactions, to convey meaning or to emphasize a point. Audiovisual messages are presented on chalkboards, transparencies, slides (including *PowerPoint* presentations) and audiovisual extracts.

A lecturer transmits not only information. His or her extra-verbal and non-verbal cues and the quality of the audiovisual aids used may convey meanings and attitudes that highlight, qualify or distort the essential messages.

Receipt

All of these types of messages may or may not be perceived by the students who may sift, perhaps store and summarize, and note what they perceive as the important messages. What they perceive is determined in part by what they already know, what they are interested in and their levels of attention and arousal. Attention fluctuates throughout a one-hour lecture (see Figure 6). After 20 minutes there is a marked decline in attention followed by a peak of attention just before the lecture ends (Biggs, 1999; Bligh, 2000). This decline in attention is less likely to occur if the lecture includes some short activities for students such as brief small-group discussions or simple clinical reasoning or problem solving. Any change of activity is, in fact, likely to renew attention. Hence some

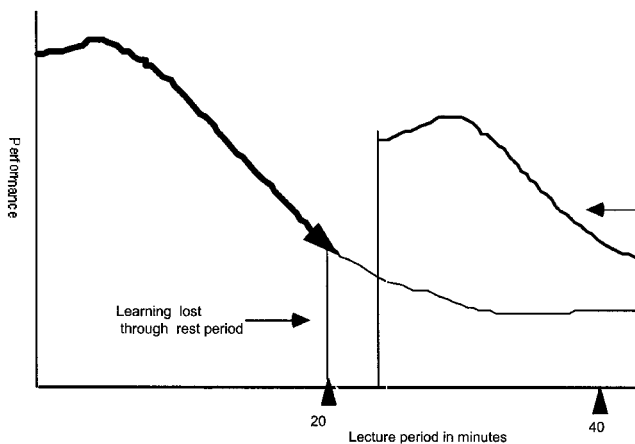


Figure 6. Effects of changing activity on student performance in a lecture.

Notes: Performance declines during a lecture but it can be improved by varying student activity.

Source: Based on Bligh (2000), who developed this explanation from a review of empirical research on attention and learning.

lecturers slip in occasional amusing slides, tell anecdotes or just give their students a two-minute break.

Messages that are received by the students are filtered and stored temporarily in the short-term memory. They are forgotten after about 30 seconds if they cannot be kept in mind (transferred to the long-term memory) or noted. The long-term memory most readily receives messages that are closely related to the network of concepts and facts which are already stored in it and have been activated. Links can then be made between the new and existing knowledge. Sometimes this processing of the new information in the light of the old may profoundly affect the pre-existing networks of information and they will be 'returned' to long-term store in a different or modified form. A lecture can, therefore, radically change one's perception of a topic or issue. Facts and concepts that are incomprehensible are most likely to be forgotten but the long-term memory will store new messages which are only loosely associated with existing facts and ideas. Consequently a student may not retrieve or understand the connections between old and new topics. The episodic (narrative) component of long-term memory stores 'stories' that are easier to retrieve than information stored in the conceptual (semantic) memory. Hence examples based on patients or problems are more likely to be recalled than straight theory or detailed findings. Facts and concepts that are incomprehensible are not likely to be stored. Competing verbal and audiovisual messages are also difficult to cope with and usually the audiovisual messages win.

Output

A student's response or 'output' is not only a set of notes that may be understood and, if necessary, restructured and learnt; it also consists of reactions to the lecture and the lecturer. The immediate reactions are usually non-verbal signals and these may be received, interpreted and perhaps acted upon by the lecturer. Such signals provide the basis

for the responsiveness of the lecturer to the audience. Herein lies an important difference between recorded and live lectures.

More important than the immediately observable responses to a lecture are the long-term changes in attitudes and understanding which may occur in a student. These changes are not easily disentangled from other learning experiences but it is likely that a student's attitude towards a subject and towards lecture methods is influenced markedly by the quality of lecturing he or she experiences as well as by the student's own personality characteristics.

Practical implications

The implications of this simplified model of learning are that if you want students to learn from lectures and to take good notes, you must structure your presentations so they are meaningful and interesting and you must ensure that you gain and sustain the students' attention. The ideas and facts that are presented must be capable of being assimilated readily into the students' existing store of knowledge and understanding.

The skills of lecturing

The model described above provides a basis for the clusters of overlapping skills of lecturing. These are shown in Figure 7. Improvement in any of these skills will increase the effectiveness of lecturing but, as in all practical tasks, it is useful to identify the skill that, if improved, is likely to have the greatest consequential effects. Improvements in preparing lectures and in explaining are likely to have the maximum impact. Therefore we focus primarily upon these skills. A more detailed description of the skills and

Skill	Comments
Preparation	Takes account of knowledge of learners. Specifies purposes or outcomes and provides structure and sequence. Undue specificity and very loose structures not recommended
Openings	Gains attention, establishes rapport and provides framework of lecture
Explaining	The key skill. Creates understanding in the learners. Clarity, generating interest and persuasion are its key components. Embraces many of the skills of lecturing such as preparation, openings, use of audio-visual aids/IT, summarizing
Presenting information	An important but lower level skill than explaining. It is concerned with coverage of the essential facts or theories. Danger of providing too much detail and inducing boredom
Narrating	Telling a story of a patient, case or experience that captures the imagination of the students and deepens their understanding. A powerful but neglected skill
Comparing and contrasting	Easy to do badly. Requires a clear outline of what is to be compared and contrasted and careful framing of the comparisons. 2x2 matrices are useful for paired comparisons
Design and use of audiovisual aids	Important in medicine and dentistry but sometimes produces mental dazzle or sleep rather than intellectual enlightenment
Responsiveness to audience	A neglected skill. Includes monitoring audience, reading reactions of audience and responding accordingly
Varying student activity	Necessary to keep them awake! Can improve learning and heighten interest. Ensure, if possible, that the changes in activity are relevant
Summarizing	Should be used during a lecture as well as at the end of a lecture. Should emphasize the key points, show the links within the lecture topic and between the topic and cognate topics

Figure 7. The skills of lecturing.

sub-skills of lecturing may be found in Brown (1978) and Brown & Atkins (1988).

Preparing lectures;

There are no studies extant of how lecturers actually prepare their lectures. However, studies of teaching in schools show that there is a strong association between subject knowledge and teaching competence (Bennett & Carre, 1993). The work of Calderhead (1996) demonstrates that successful teachers plan, not by simply deducing methods from objectives, but by taking account of student understanding, other student characteristics and the resources available. The maxim 'Know your subject, know your students' is confirmed by these studies.

In the absence of research on preparing lectures, one has to rely upon wisdom derived from experience. The essential ingredients of lecture preparation are purposes, content, organization and the preparation of audiovisual aids.

Purposes of lectures

It is now customary to express the purposes of a lecture in the form of objectives (intended learning outcomes) and to state them to students at the beginning of a lecture. There is a danger of specifying too detailed a set of objectives which then become a straitjacket rather than a guide. Equally dangerous is to have no clear purpose so one presents a mish-mash of findings. There is much to be said for stating the purposes of a lecture in the form of questions that challenge and evoke curiosity. For example, at the beginning of a lecture in oral biochemistry, the lecturer could pose the question 'How does fluoride strengthen teeth?'. Research on pre-questions (advanced organizers) show that questions help students learn from texts (Ausubel, 1978). It is likely that such questions will help the students to focus on the essentials of the lecture.

Content of lectures

The task of selecting content that fits the purposes of a lecture is not easy. That is why some lecturers simply use précis of the material found in a single text. *Don't do it*. Evidence reviewed by Bligh (2000) shows that students recall and understand better presentations that are based on essential principles and a little detail than those containing much detail. It is more important to explain, to provide understanding, than to report detailed findings. Too much content militates against learning.

Organization of lectures

Structures of lectures have already been outlined in a previous section. Here we just make these points:

- Try to take account of the students' existing knowledge and cognitive structure as well as the structure of the subject.
- State and show the organization of the lecture. Giving the structure is helpful to many students, particularly the

less able and the more anxious (Snow & Peterson, 1980).

- Do not overload.
- Provide periodic summaries during the lecture.
- Use the conclusion to summarize and raise questions.
- Better still, invite the students to review, summarize and compare their summaries.

Some suggestions for preparing lectures

One method that has been found useful by new lecturers is given in Figure 8. In practice people often zigzag and backtrack rather than prepare lectures in a linear fashion.

Analyses of transcripts of lectures indicate that, typically, a lecturer speaks at about one hundred words per minute, so even if one writes every word one is going to speak then one should only have about 15 pages per one-hour lecture. If you must read aloud, rather than talk, then it is advisable to write the lecture as you would speak it, rather than speak the lecture as you would normally write.

Explaining

Explaining is the key skill in lecturing and one of the two most important skills in teaching (the other is questioning). Common types of explanations in lectures are *Interpretive*, *Descriptive* and *Reason-giving*. These correspond roughly to 'What?', 'How?' and 'Why?'. Together with explanations based on 'When?' and 'Where?' they may be used to quickly assemble a framework for a lecture, an explanation or a talk. For example, if one had to prepare a lecture on local anaesthetics, one might structure it around the questions 'What are local anaesthetics?', 'How do they work?', 'Why do we use them?', 'When do we use them?', 'Where do we use them?'

To explain is to attempt to give understanding to another and understanding is the creation of new connections in the minds of the learner. These connections may

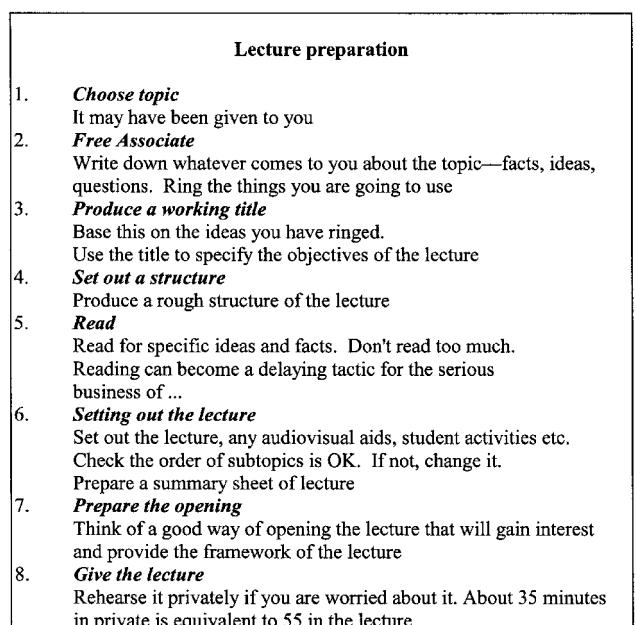


Figure 8. Preparing a lecture.

be between facts, ideas or values. The process of explaining consists of three parts:

- specification of a problem or task to be explained;
- a series of statements that are understood by the explainees;
- an understanding of the problem and, if possible, its solution(s).

The explainer has to take account of the problem, the likely knowledge and experience of the explainees and the context. Thus the explanation and implications of mitral stenosis one might give to a group of student dental nurses may be very different from the explanation one might give to SHOs on a ward.

These apparently simple descriptions of explaining and understanding provide a basic framework for exploring research on explaining in various professional contexts (Brown & Atkins, 1997). In lectures, the evidence indicates that the essential features of explanations are clarity, generating interest and persuasion.

Improving clarity

Clear explanations are, as indicated, dependent upon knowing precisely what one wishes to explain to whom, transmitting the explanation and checking, when possible, whether the explanation has been understood. Evidence from the research indicates that there are four ways of improving clarity: *minimize vagueness, sharpen the focus, use structuring moves and provide a clear structure.*

Explanations that contain fewer false starts, redundant phrases, complex clauses, tangles of words, hesitations and pauses yield higher student achievement scores. As Gage *et al.* (1968) wryly observed:

“Some people explain aptly, getting to the heart of the matter with just the right terminology, examples, and organization of ideas. Other explainers, on the contrary, get us and themselves all mixed up, use terms beyond our level of comprehension, draw inept analogies, and even employ concepts and principles that cannot be understood without an understanding of the very thing being explained.”

Effective explanations use names and labels rather than pronouns, precise pointing at diagrams and naming of parts, simple definitions, simple sentences, emphases of key points, apt examples, guiding images, metaphors, analogies, repetition and paraphrasing of key points and clear transitions from one subtopic to the next (Land, 1985; Brophy & Good, 1986).

Four important structuring moves in explaining have been shown to be related to high ratings of clarity (Brown, 1983). These are shown in Figure 9. Observations of lectures indicate that most lecturers use signposts but some signposts are too lengthy and some are too brief. Frames are used but tend to become confused in the middle of a lecture. Foci are not always used and links are often forgotten.

The structure of an explanation is probably more important than any other of its features. It can be improved by summarizing the key points of each section of an explanation and examining their order and links. Figures 10 and 11 provide examples of brief explanations. Figure 10 was

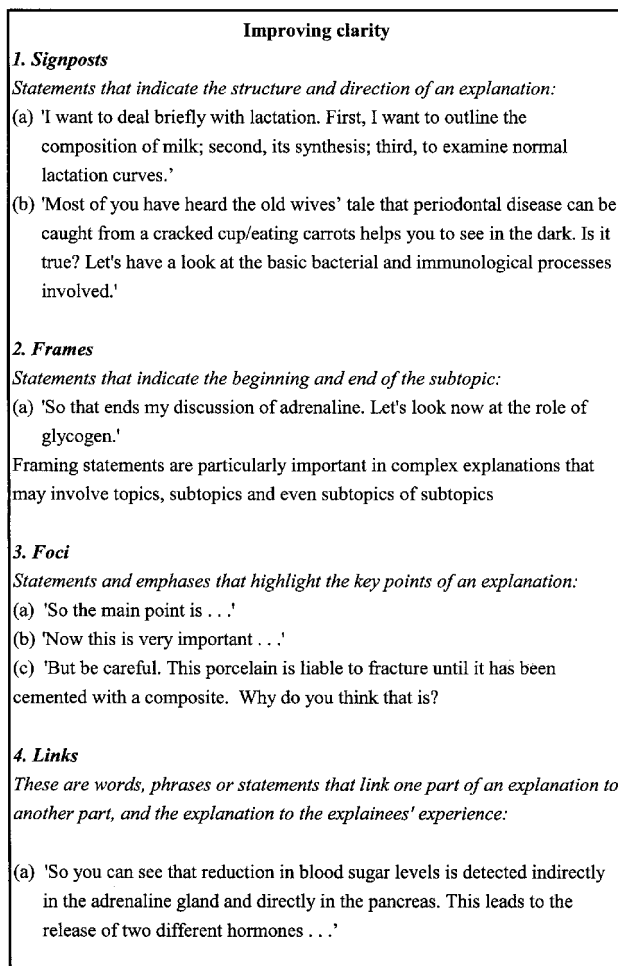


Figure 9. Four useful structuring moves for improving clarity.

an inexperienced lecturer's first attempt. After viewing a videotape of his efforts he asked himself two questions:

- (1) What precisely do I wish to explain?
- (2) What other questions are hidden in the question?

It should be clear that the question 'Why are nude mice important to biologists?' contains within it some hidden questions such as 'What are nude mice?', 'What features of nude mice make them important?', 'Why?'. The lecturer then restructured his explanation. It is shown in Figure 11. It is not perfect but most people think it is better than his first attempt for an audience who knew nothing about nude mice.

Lecturers' advice to colleagues who are new to lecturing (Brown & Bakhtar, 1987) also included suggestions to improve clarity. In descending rank order these were:

- speak clearly, use pauses, don't go too fast;
- plan, prepare and structure to give a clear simple (not simplistic) view of a topic;
- make it understandable and clarify key points;
- observe student reactions;
- do not try to cover everything;
- check you understand your own material.

Whilst these suggestions may seem common sense, observations of lectures suggest that they are not common practice.

Transcript One

Er—the—the title of my talk today is why nude mice are important to biologists.

Well, the thymus as most of you probably know is—er—a large—er—organ that's located in the—em—upper part of the chest, it's referred to as a lymphoid organ because most of th... the cells—cells processed by the organ—most of the constituent cells in this—in the thymus are lymphocytes—a specific cell type. It's importance lies in the fact that lymphoid cells processed by this—by this organ—erm—are cells which control the mechanism of graft rejection; this is important in transplantation.

Erm—they also have a specific role in immune responses—erm—and the role here is one of control—it's the thymocytes, the lymphoid cells rising from this organ which determine the pattern of an immune response.

Now, one way of studying the importance of such an organ is to remove it and see what happens in its absence so the surgical ablation or thymectomy as it's known in this particular instance has become quite a widespread procedure normally combined with irradiation—er—irradiation of sufficient intensity to destroy—erm—other lymphocytes present in the body since lymphocytes are particularly sensitive to irradiation—erm—the procedure doesn't unduly effect other cell types but—erm—in particular instances where irradiation has to be given of—erm—a lethal quantity of irradiation has to be given then the—erm—problem is that the—erm—animal has then to be reconstituted with marrow cells and kept on a variety of antibiotics to prevent infection since lymphocytes have such a-a-an important role—function in—erm—in immune responses an animal deprived of these lymphocytes then has to be kept artificially to ensure its survival, by the administration of antibiotics and so on.

Such a mouse, anyway is known as a immunologically deprived animal and it's an extremely valuable—erm—it's an extremely valuable—erm—animal to the biologists because it provides a sort of tool whereby the role of other cell types can be assessed. You've destroyed the lymphocytes in—in this particular animal you can then re-inject other—erm—specific cell types and see how they function in—when various stimuli are given to them. Organs, for instance, can be assessed in the absence of other interfering factor So where does the nude mouse come into this all this?

Well, in 1966—erm—Flanagan first described a creature "The nude mouse is a homozygous recessive condition" and I think one ought to explain here using the blackboard,—erm—the nude condition—erm—is governed by a single gene and since each gene is-is-is represented by two in each cell of the body you have three possible combinations. You have a d-a plus, combination (writes on board) this is known as the wild type.

Figure 10. Example of a first attempt at an explanation.

Generating interest

The key to generating interest is expressiveness supported by the use of examples, a narrative mode of explaining and the stimulation of curiosity. All of the features can raise levels of arousal and attention and thereby increase the probability of learning from lectures. The evidence reviewed by Brown & Atkins (1997) suggests that interest is more likely to influence students' attitude towards the subject than to produce marked changes in achievement. Figure 12 summarizes the recommended approaches derived from research and experience.

Expressiveness includes enthusiasm, friendliness, humour, a conversational style, dynamism and even charisma. It is based largely on eye contact, gesture, body movement, facial expression, vocal inflection and choice of vocabulary.

Apt examples and analogies can generate interest and understanding. They can provide the links between the structure of the topic and the cognitive structure in the student's head. Often it is useful to provide positive instances—what the thing is—and negative instances—what the thing is not, followed by 'rogue' instances. The

Transcript Two

The title of my talk is why nude mice are important to biologists

The term the 'nude mouse' is used to describe a strain of mouse which arose by mutation from normal laboratory mice—um. It's a condition which is characterized by two main features. These are, first of all, absence of hair hence the term the 'nude mouse' and the second feature is the absence of a thymus and it's the second property, the absence of a thymus, which is the subject of my talk.

Now, the basic point is going to be summarized on this first table. So, there are two conditions possible, either the thymus is present or it's absent. Thymus present, a naturally occurring condition, leads to an ability to respond. (Perhaps I should stand on this side.) The absence of a thymus which either can be experimentally induced or it can occur naturally in the nude mouse leads to inability to respond immunologically. The question then rephrased is why is the absence of a thymus a useful condition and the answer—um—simply that animals can be injected with foreign cells—um—and the role and the role and the function of these cells can then be studied without the interference of immune responses.

Second table then once again summarizes this main, this—um—this statement of mine. No thymus results in no immune response, hence injected cells can survive and can be studied. A very useful experimental situation.

Going back to the first table—um, the last point which I want to make is that the natural condition, i.e. the nude mouse, is preferable to the experimental condition because complex surgery is involved. This needs to be followed by prolonged drug treatment and such a combination—um—is highly lethal to the animal resulting in mortality of—um—experimental groups.

So to summarize the, the nude mouse is an important—um—is important to biologists because—um—first of all it's easy to obtain relative to the experimentally induced condition and since it doesn't have a thymus it's a useful animal because it doesn't respond immunologically and it's this last condition which is in much demand in biological research.

Figure 11. Example of a second attempt at an explanation.

negative examples delineate the boundaries of a definition and the 'rogue' cases can stimulate intellectual curiosity. The order in which examples are presented is of importance. Brown & Armstrong (1983) found that when ideas which were new to a group were being explained, an inductive pattern of several examples leading to a definition or generalization was most effective. When the ideas were relatively familiar to the group, the use of the deductive pattern of statement of principle followed by examples was more effective. Introducing new knowledge requires activation of examples already known so that new connections may be made. When ideas are already known the deductive pattern restructures existing knowledge.

Generating interest	
1.	Show your own interest/commitment to the topic by being expressive
2.	Think of and use examples, analogies, metaphors and models which are apt for the audience and the topic
3.	If the material is unfamiliar begin with examples
4.	Use a mixture of modes of explaining—but particularly the narrative mode
5.	Play on the intellectual curiosity of the audience through the use of puzzles, problems and questions

Figure 12. Making explanations more interesting.

The fourth approach is to use an appropriate mode of explaining. Three modes have been observed in lectures (Brown & Atkins, 1988): the *narrative*, the *anecdotal* and the *conceptual*. In the narrative mode the lecturer explains an event or a set of research findings in the form of a personal story. In the anecdotal mode the lecturer uses humorous stories or moral fables to illustrate the key points. In the conceptual mode, the lecturer provides a series of principles or facts in a logical order. The narrative mode is most likely to capture interest but it may not provide clear, precise knowledge. The anecdotal mode can be very entertaining but it is not always informative. The conceptual mode is likely to be clear but less interesting. A mixture of the three, beginning with the narrative mode, using anecdotes appropriately and ending with a conceptual summary, is likely to be the most effective way of generating interest and understanding.

Persuasion

Persuasion is the basis of attitude change. The order and quality of presentation do have an effect on an audience so one might as well be aware of the processes and use them to good effect. And there are contexts in which persuasive explaining may be necessary. For example, one may wish to introduce a new approach to knee-joint replacement, advocate a new approach to post-natal care, offer a new interpretation of conflicting theories of temporo-mandibular joint dysfunction or challenge existing assumptions about psychiatric care in the community.

In lecturing, persuasion depends in large measure on the use of rhetoric. Atkinson (1984) and Cockcroft & Cockcroft (1992) provide analyses of rhetorical devices. Of these, the most relevant to lecturing are the use of pairs of contrasting statements, asking rhetorical questions then pausing, the use of triple statements, pausing before important points, summarizing with punch lines and the use of powerful metaphors and analogies. Metaphors and analogies are particularly useful when explaining unfamiliar topics or ideas.

Studies of attitude change (e.g. Zimbardo *et al.*, 1977; Baron & Byrne, 1997) conducted in a wide variety of contexts suggest some basic principles of persuasive explaining and how new attitudes are formed. These are summarized in Figure 13.

Design and use of audiovisual aids

The design and use of audiovisual aids share features with explaining. Their primary purpose is to increase clarity and interest and thereby improve understanding. Broadly speaking, aids are may be used to confirm and reinforce the main points of a lecture, as an explanatory device in their own right, as an exemplar or as a stimulus for discussion and thought. The essential question to ask of any aid is: is it fulfilling its purpose?

Visual aids should be easy to see and audio aids easy to hear. The point is obvious but not always followed in practice. Aids may sustain attention and enhance interest in a topic providing they are well presented and colourful. Audiovisual aids have been shown to improve learning in higher education but some of the findings may be due to novelty effects (Clark & Salomon, 1986). The visual image is a powerful method of attracting attention, consequently

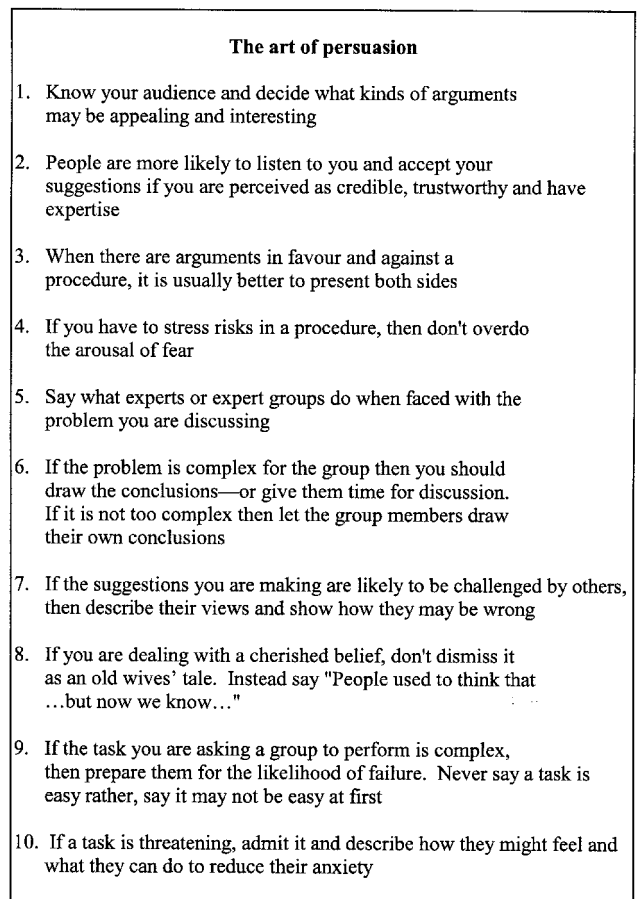


Figure 13. Persuasive explaining.

it can also *distract* attention from the lecture and its messages if not used appropriately. Using *PowerPoint* instead of a chalkboard will not in itself enhance learning. The effectiveness of a particular medium depends not so much upon the medium *per se* but how it is used (Laurillard, 1993). As Clarke (1993) says: '*Media do not influence student achievement any more than the truck that delivers our groceries causes changes in our nutrition.*'

Visual aids

Medical and dental practice relies heavily on visual clues. Ideas and procedures that are linked through visualization are more likely to be retained in the long-term memory. But procedures that are observed and practised rather than described verbally or visually are more likely to become part of one's brain-stem responses. And, as most lecturers know, thinking out a visual presentation of key concepts, procedures and processes deepens one's own understanding of a topic as well as providing deeper understanding for one's students.

Illustrations, diagrams, bullet points and summaries should be simple, brief and readable from the back of the class. Avoid reciting the list of bullet points on the transparency or slide. Instead, link the bullet points in a meaningful way. If the illustrations are important give the students time to look at them and, if necessary, copy them. If the illustrations are available in a book, give the title and page number. There is no need to speak whilst the students

are looking at illustrations; indeed if you want them to look intensively, tell them what to look for and shut up!

Audiovisual aids

Audio-recordings, video-recordings and films can be effective ways of developing understanding but their excessive use can induce sleep. One should indicate which features of the aid should be attended to. If possible, one should pose questions (advanced organizers) for the students to answer whilst watching the audiovisual materials, give them an opportunity to discuss briefly the materials, then summarize the main points and link them to the relevant parts of the lecture.

Handouts

The larger the group, the more important handouts become. There are five types and each has advantages and disadvantages. *Outlines* provide a one-page summary of the lecture and some annotated key references. *Interactive handouts* contain skeletal notes and diagrams that the students have to complete during the lecture. These can be reduced versions of the slides or transparencies used, with space for the students to write their own notes. *Key information handouts* provide complex diagrams, references, quotations, formulae, proofs, etc. *Full handouts* are virtually a transcript of the lecture. Unfortunately, many students assume if they have the handout in their files, they have the knowledge in their heads. *Tasks and problems handouts* state the tasks or problems that are to be used in the lecture so that students do not have to refer to the slide or transparency that the lecturer is using. Evidence from experimental studies (Hartley, 1994) and experienced lecturers suggest that interactive handouts are better than comprehensive handouts for aiding recall and understanding. Hartley's book reviews some of the evidence on handouts and offers suggestions on designing instructional text.

Making lectures interactive

There is nothing wrong with someone with expert knowledge explaining ideas and procedures to someone less knowledgeable. But it does not follow that because one has a lecture class for one hour that one has to talk for the whole time. By varying student activities during a lecture one can renew their attention, generate interest, provide opportunities for students to think and obtain some feedback of their understanding. But there is a cost: the lecturer has less time to talk. So there is a question that one has to ask oneself: which is more important, that I cover all the material or that the students learn more?

A well-known method of involving students is known as 'buzz groups'. The lecturer sets a problem or a discussion topic and invites the students to form groups of three or four who discuss or solve the problem set. The solution to the problem or a summary of discussion points can then be shown to the class on a transparency or chalkboard. Alternatively some buzz groups can be invited to offer their solution or discussion points. Buzz groups take very little time. They give students an activity and a break so they return to listening and note taking with renewed concentration. They can be used to link one section of a lecture to another, as a

check on understanding and as a way of encouraging students to discuss and think. Students are also more likely to answer questions in a large audience if they have checked out their answers with a few of their peers.

There are other uses of breaks in lectures that vary what students do. Some of these methods encourage students to observe and think as well as varying what they do. A few examples are shown in Figure 14. Other examples may be found in Gibbs *et al.* (1983, 1992), Newble & Cannon (1987), Cox & Ewan (1988), Smith (1998) and Race (2000).

Varying student activities in lectures is a useful strategy but like all teaching strategies it can lose its effect if it is over-used. Hence it is worth providing some lectures that include student activities and some lectures that rely on other strategies which promote understanding and motivation.

Improving learning from lectures

Since medical and dental students spend about 1000 hours in lectures, it seems not unreasonable to spend a few hours helping them to improve their learning from lectures. Many of the suggestions for varying student activities can improve learning in lectures but what they cannot do is directly improve listening, note-taking and, most importantly, the way the notes are used after a lecture.

Reviews of note-taking by Bligh (2000), Anderson & Armbruster (1991) and Hartley (1998) indicate that note-taking and reviewing notes improves recall. Reviewing notes on the same day that they are taken is more effective than reviewing notes later. Students who review their notes with a partner do better in subsequent tests of recall than those who review notes individually (O'Donnell & Dansereau, 1994). In one of the few studies to explore how students use notes after a lecture, Norton & Hartley (1986) showed that the more sources a student used in answering

Interactive lecturing
1. Set a question or problem to be discussed in 'buzz' groups
2. Show a video clip—with instructions on what to look for
3. Demonstrate a task—with instructions on what to look for
4. Set a brief multiple-choice questionnaire. Present it on a transparency
5. Ask the students to frame questions in relation to data or to make estimates (e.g. incidences of various diseases, costs of operations, risks of infection)
6. Solve a problem collectively
7. Ask the students to discuss briefly (in groups of two or three) a case, a research design or set of findings
8. Ask the students to invent examples and compare them with those of another student
9. Ask the students to consider briefly likely advantages and disadvantages, or strengths and weaknesses, of a procedure or theory. Then outline the advantages and disadvantages so they can compare their views with yours
10. Towards the end of the lecture ask them to review the key points that they have learnt or need to learn and share them with their neighbours. This active review aids recall and probably understanding
<i>All of the above are methods of getting students to observe and think in lectures as well as varying what they do</i>

Figure 14. Making lectures interactive.

an examination question, the higher the mark usually obtained. The most useful sources were the article put on 'short term loan' in the library, the students' own notes and the recommended text. In-depth interviews conducted by Van Meter *et al.* (1994) show that students adapt their note-taking strategies according to their goals, their perception of the relevance of the information being provided, their own knowledge and experience, their conceptions of learning and the quality of the presentation of the lecturer.

But can students be trained to be more effective note takers? Given the importance of note-taking in many clinical situations as well as in lectures, it is surprising that so little research has been done in this area. Peck & Hannafin (1993) have shown that training in note-taking aids recall of aural instructions and Brown (1979) developed a training programme on learning from lectures based on the advice provided by postgraduates in different subject areas. A subsequent evaluation of the programme by Brown & Daines (1981a), showed that students who had been taught the structures of lectures and given practice in listening, observing and note-taking were better note-takers than students who had not received training.

From these studies some simple but effective ways of improving learning from lectures may be inferred (see Figure 15).

Further suggestions on note-taking and usage may be found in Bligh (2000), Brown (1978), Brown & Atkins (1988) and Chalmers & Fuller (1996).

Evaluating lectures

The main purposes of evaluation range from judgement, sometimes for promotion or tenure or quality procedures, to development for improving student learning. Some development can come out of judgement and some judgement is necessary for development. The precise purposes of an evaluation should shape the choice of methods of evaluation, the quality of the evaluation instruments and the sources of evaluation (students, peers or external reviewers).

These broad principles apply to the evaluation of lectures. Usually the purposes are developmental: to

Improving learning from lectures
<ul style="list-style-type: none"> • Outline the structures of lectures and how lecturers lecture. Describe signposts, how to recognize key points and examples and to be sensitive to verbal cues such as '<i>However...</i>', '<i>Nevertheless...</i>', '<i>So...</i>' • Provide practice in listening, observing and note-taking based on relevant live or video-recorded examples. Get the students to compare their notes in these exercises • Discuss with them what counts as 'good' notes and how to use notes after a lecture • Do all of the above in the context of the course not as an add-on of study skills • Provide them with the list of lecture topics at the beginning of the course (module) and show how they are linked. Repeat the exposition of the linkages at the end of the course • Encourage them to review and compare their notes by setting mini-tasks at the beginning and end of some of the lectures

Figure 15. Improving learning from lectures.

improve lecturing and learning from lectures. For these purposes, the key approaches are student opinion, student achievement, peer feedback and reflection on practice.

Student opinion may be collected casually in conversation or obtained systematically in discussions, focus groups or through rating schedules or written reports. There are advantages and disadvantages of each of these methods.

Methods based on small groups may provide valuable insights but small groups may be dominated by vociferous students who may persuade others to their viewpoints. Rating schedules may tell you what is good or bad but not how to improve. Their value is limited by the quality of the rating schedule and other factors (see below). Detailed written reports can provide deeper views but they are time consuming for students to complete and for lecturers to analyse.

Use of ratings

Most of the studies of the student evaluation of teaching have focused upon the use, validity and reliability of student ratings (Marsh, 1987, Braskamp & Ory, 1994). Few studies have examined the more fundamental question 'Does student evaluation improve teaching?'. Some academic managers and quality reviewers will be disappointed with the findings. Murray's comprehensive review concludes 'under certain conditions, student evaluation of teaching does lead to improvement of teaching' (Murray, 1997). In earlier studies reported by McKeachie (1994) it was shown that student evaluations only improved teaching when the ratings were in the middle range and *when the lecturers wanted to improve their teaching.*

Although students' opinions of a lecture or lectures can be a useful indicator of their effectiveness, they must be treated with caution (Ramsden, 1992). There is more to teaching than performance and, in any case, ratings of lectures are determined only in part by the lecturer's performance. Design faults in the curriculum or a poor lecturing environment can affect performance. The students' ratings of a lecture may be influenced by questionnaire fatigue, by gender differences of lecturers and students, students' levels of knowledge, their personalities, aptitudes, attitudes and values (see Husband, 1996; Greenwald & Gillmore, 1997). For example, it has long been known that students who score high on scales of dogmatism express particularly strong preferences for clear-cut, easy-to-note presentations. Debate and subtle distinctions bother them (Smithers, 1970a, 1970b).

Using student achievement and student opinion to evaluate lectures

As indicated in the section on 'Improving learning from lectures', student learning from a lecture or a set of lectures can be estimated by using MCQs or mini-problems or cases during a lecture or follow-up class. One can identify common errors or misinterpretations in assignments and examination papers and one can occasionally borrow and read notes taken by students in lectures. The findings from these activities may be an imperfect guide but they are better than no guide.

If one's main purpose of evaluation is improvement of the processes of lecturing then the simple questionnaire shown

Please rate the lecture on the following items.

On the whole the lectures were:-

	Agree strongly	Agree slightly	Disagree slightly	Disagree strongly
	4	3	2	1
Clear				
Interesting				
Easy to take notes from				
Thought provoking				
Relevant to course				

Comments:

Thank you for your help

Figure 16. Example of a simple rating schedule for evaluating a lecture.

Note: Use of an even number of rating points forces a respondent to choose positively or negatively.

in Figure 16 is worth using and developing. The items are based on the research reviewed in this guide. Inspect standard deviations as well as means of scores obtained and remember that one cannot please all of one's students all of the time. The section for free comments gives opportunities for students to state what they think and feel and for lecturers to compile the overall views of the students. A simplified version of the questionnaire can be used at the end of a lecture. The questionnaire can be shown on a transparency; the students write down the number of the item, their ratings of it and their comments. The ratings may be computer marked and the comments analysed.

An alternative approach, which focuses upon learning from lectures, is the 'One Minute Paper' (Sinclair *et al.*, 1998). Towards the end of a lecture, the students are asked to review their notes and write down the answers to the following three questions:

- (1) What was the most *useful* or *meaningful* thing you learned during this session?
- (2) What *question(s)* remain uppermost in your mind as we end this session?
- (3) What was the *muddiest* point in this session? (In other words, what was least clear to you?).

The lecturer skim-reads the students' responses and at the beginning of the next lecture he/she summarizes the main comments and re-explains any material causing difficulty. Be prepared for some jokey comments.

Using peer feedback

Feedback from peers and professional staff (faculty) developers is increasingly recognized as a valuable adjunct to surveys of student opinion (Chism, 1999; Murray, 1997). Such feedback can provide insights that student opinion cannot reach. Peer feedback can be provided mutually: A observes B and B observes A. Mentors may be used or, alternatively, a team approach adopted. The method and focus of evaluation can be by agreement and the instruments used can be rating schedules, checklists or open comments. Mutual feedback is useful in the early stages of

the implementation of a peer feedback system on lecturing. If a team approach is used, guard against it becoming, or being perceived, as judgemental. The comments of some peers can be biased or uninformed.

Reflective practice

Reflections on practice are the cornerstone of continuing professional development (Kolb, 1984; Schon, 1988; Brookfield, 1995). Methods of reflective practice range from intuitive thinking about a particular lecture to complex portfolios. Although portfolios appear to be a promising approach to developing teaching (Centra, 1993), for the purposes of evaluating lectures, our advice on reflective practice is: *keep it simple*. Collect and analyse evidence from students and peers, read a little and think, modify approaches and repeat the cycle. Augment individual reflections on practice by sharing experiences in groups or course teams so that the overall quality of lectures in a department or faculty is worked upon and improved.

Reflection on practice is probably the most powerful source of evaluation for the purposes of change but reflection on practice and change require insight, effort and the will to change. Reading this guide is a tiny but important part of the tasks of evaluating and improving lectures. It is hoped that you have found it clear, interesting, thought provoking and useful.

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