Improving Student Learning During Lectures

GRAHAM GIBBS, *Principal Lecturer, Educational Methods Unit, Oxford Polytechnic,*
SUE HABESHAW, *Senior Lecturer, Department of Humanities, Bristol Polytechnic,*
TREVOR HABESHAW, *Pro-Assistant Director, Educational Development, Bristol Polytechnic*

SUMMARY *Despite moves away from teacher-centred methods towards more independent student-centred learning, resource pressures will continue to require the use of large lecture classes. Instead of examining the behaviour of the lecturer in order to improve the limited efficiency of lectures, attention is focussed on what students can do during lectures to improve their learning. Five techniques are described to improve student learning during lectures: (i) improving student note-taking and attention by separating listening from recording, and requiring the note-taking to be undertaken from memory; (ii) improving student learning through active review during the lecture; (iii) involving students in structured discussions even in very large classes by using 'pyramidding'; (iv) checking on student learning by using 'instant questionnaires' and (v) checking on student learning by asking them to summarise the 'three most important things' about the lecture. These techniques are drawn from two of a series of books entitled 'Interesting Ways To Teach'.*

Introduction

There is an accelerating trend in teaching methods in higher education away from teacher-centred pedagogy towards learner-centred approaches: for example away from a heavy reliance on lectures towards independent learning through resource based learning, project and group work. This trend has been threatened by resource constraints, and in particular by worsening student/staff ratios. Many student-centred methods have relied on small group work or individual tuition and this has been increasingly difficult to support. There has been, in some areas, a move back to the use of large lecture classes—not out of a strong belief in their effectiveness but out of a hope that they might at least be resource-efficient. This move has been particularly noticeable in first year and introductory courses with large student enrolments. That

this is generally a retrograde step has sometimes been obscured by the introduction of technologies of one kind or another, as with the use of videotaped lectures.

The retention of teacher-intensive learner-centred methods in more advanced specialist courses with smaller enrolments has often been subsidised by the way introductory courses are taught. There are sound educational arguments for taking the opposite approach and commiting more resources to the less sophisticated learners in order to develop their independence, whilst trusting more experienced learners to cope independently. However, rather than pursue these arguments here we shall instead accept current realities and examine what can be done to mitigate some of the constraints on learning brought about by the use of lectures.

The main problems with lectures as teaching methods have been thoroughly rehearsed elsewhere (*cf.* Bligh, 1974; Gibbs, 1982). The particular problems we will address ourselves to here are:

(i) the poor, and rapidly declining, quality of student attention during extended lectures, and students' consequent rapidly declining performance in terms of memory and quality of note taking;
(ii) the passive, reproductive mental set which lectures induce in students;
(iii) the relative ineffectiveness of lectures, when compared with almost any teaching or learning method, in terms of developing student understanding or their ability to apply knowledge;
(iv) poor feedback concerning student understanding of lecture content.

Much effort has been expended to improve the effectiveness of lectures by improving the performance of the lecturer: through training programmes, microteaching, use of audio-visual aids, student feedback on lecturing and so on. Our own efforts have focused more on what the students are doing during lectures. In particular we have attempted to develop methods for encouraging a more active, reflective approach to learning from lectures on the part of students. One aspect of our work has involved the use of exercises designed to help students to improve their learning skills (*cf.* Gibbs, 1982; Habeshaw *et al.*, 1987). The aspect of our work with which we are concerned here, however, involves methods which teachers can use during lectures which succeed in involving students actively, even in very large classes.

The methods described below are taken from one of the *Interesting Ways to Teach* series: *53 Interesting Things To Do In Your Lectures* (Gibbs *et al.*, 1984).

Improving Student Attention and Note-taking

[Abridged from item 7: 'Memory' (*ibid.*, pp. 29–32).]

One problem with note-taking in lectures is identified by the cynical description of lectures as methods of transferring information from the notes of the lecturer to the notes of the students without passing through the heads of either. It is perfectly possible to take verbatim notes without thinking about them, or even being aware of what they might be about, as any shorthand typist will tell you. While note-taking in this way may increase the likelihood of producing an accurate set of notes for subsequent reference, it does not do much for learning. And subsequent reference may not be of much use if there was too little thinking going on to make sense of what was being recorded. The basic dilemma is that to a certain extent the aims to understand what is being said, and to record what is being said, are incompatible goals. The better you achieve one goal the worse you are likely to achieve the other.

One way around this dilemma is to separate the two goals and achieve them in sequence rather than attempt to achieve them in parallel: by only allowing note-taking to take place from memory after a section of the lecture is complete. To illustrate how this might work we will describe an agricultural engineer we have observed teaching. He forbade note-taking while he was talking in order to gain the students' attention and used OHP transparencies and posters to illustrate what he was explaining (the way a seed drill worked). After about 15 minutes of such explanation he stopped, displayed the diagrams he had built up and explained, and said, "Now I'd like you to take notes on what I've explained so far. Draw diagrams, list points, do whatever you want to record the key points and any details you think you'll need later on. You can have as long as you need. You'll have a chance to check whether you have forgotten anything or got anything wrong before I go on to the next thing". After the 5–10 minutes the students' needed, he then used a method for allowing students to check and improve their notes which involved students swopping their notes.

In practice this results in:

(i) far higher attention during explanations as students know they will have to remember and write notes in a few minutes. Attention is devoted to listening and thinking rather than being split between thinking and note-taking;

(ii) more questioning from students who, instead of copying down what they don't understand, need to make sense of the explanations if they are to remember them and take notes from memory;

(iii) smoother and faster explanations which do not have to keep being held up to allow the last point to be copied down verbatim by the slowest note-taker in the class;

(iv) notes which are brief and which only pick out the main points in a form which makes sense to the student rather than extensive copied notes which do not discriminate between key points and trivia, and which are structured in the lecturer's way;

(v) a learning check. Looking at students' notes taken in the conventional way can tell you whether students have perceived the important points, but can't tell you whether they have learnt them;

(vi) learning during the lecture. Students are not always conscientious or effective in learning from their notes after the lecture;

(vii) improving the students' listening and comprehension skills.

Asking for notes to be taken from memory is likely to shock and alarm students the first time and they may initially be very bad at it (which in itself says something about the level of learning which takes place in conventional lectures). The introduction of this method requires proper explanation and an adequate opportunity for students to check that they have remembered and noted down the important points. Time consuming note-taking, such as the drawing of complex diagrams and tables, can be avoided by the use of handouts.

Improving Student Learning Through Active Review

[Abridged from item 11: 'Review' (*ibid.*, pp. 41–44).]

Students often have to go straight from your lecture into someone else's, or into a practical session, or a tutorial, or at least embark on some other different and demanding activity immediately after your lecture has finished. They seldom have the opportunity to immediately review your lecture by working on their notes or by undertaking a task requiring use of the content of your lecture. Even if they do have

the opportunity they may not have the inclination to do so in the context of the social pressure to have a coffee and a chat.

Yet review is one of the most powerful and easily demonstrated devices for improving learning from lectures. And the sooner after the end of the lecture the review takes place the greater is its effect—the best time being immediately afterwards. Despite the crucial role of review in learning, and the reality that it seldom takes place after lectures, it is still common to lecture right up to the last minute, even introducing new information and ideas in the last minute.

Review can be built into the lecture plan as an activity taking place in the last few minutes of the lecture. We are referring here to a review undertaken by the students and not a summary undertaken by the lecturer. Such summaries would normally precede the students' review. Such reviews can take various forms. We offer two examples:

1. (46 minutes into a 50-minute lecture)
   "OK, now I'd like you to go back through your notes quietly on your own. Read through them. Remind yourself of the ideas we have considered. Make sure you understand what you have written down. Add things if it helps to make them clearer. Mark in a coloured pen anything which doesn't make sense, or where you know you have missed information or suspect you've got it wrong. You have three minutes." (During this time you could cruise around quietly picking up individual queries.) "Now your three minutes are up. I'd now like you to draw a line across the bottom of your notes and under that line write down what further work you need to do on the topic of this lecture before you would feel you have got on top of it. You may have specific quieries you want to raise in the tutorial: note these down. You may need to check with someone else's notes that you haven't missed something out. You may feel you need to work through some examples before you feel confident: note this down. You may want to read something specific from one of the references I gave you: make a note of exactly what you want to read about, and where you will find what you want to read about. You have one minute.
   OK, that's the end of the session."

2. (50 minutes into a 60-minute lecture)
   "OK, so we have dealt with four types of sedimentation in this lecture. Here they are on the OHP. I'd like you to turn to your neighbour so as to form pairs. One of you take types 1 and 3 and the other take types 2 and 4. In turn explain these four types to each other. Be brief, and just summarise the main features. You have 2 minutes for each explanation. I'll let you know when 2 minutes are up and it's time to switch around and go on to the next type of sedimentation. Now here's the tricky bit: you must give your explanation from memory! You must not refer to your notes or ask the other person. Off you go". During the eight minutes you call out, 'OK, two minutes are up. Swop around and start the explanation of the next type of sedimentation. Do this now even if you haven't finished the last one. Off you go'. (You may need to cruise around checking that students are following instructions, and giving some help to those who are stuck.)
   "OK, you have tried to give these explanations from memory. Now check

through your notes to see what you got right, what was missed out and so on. You have two minutes".

"Now you ought to have a pretty clear idea what you know and understand and what you don't, and whether your notes are any use, so you also ought to have a clear impression of what follow-up work there is still to do on this topic before you can explain all four types from memory—because that is the sort of thing you will have to do in the exam. That is the end of the session."

Your students may be quite unused to the notion that they should actually be expected to know anything or explain anything at the end of a lecture. The first time you ask them to they may baulk and be confused. The first example here is much less demanding and threatening than the second. The second can be very powerful in:

(i) influencing the way students pay attention and take notes during the lecture;
(ii) highlighting inadequacies in notes which the kind of review in the first example might not reveal;
(iii) highlighting the need for specific follow-up work for the students.

The activity of having to explain is a much more effective review than that of simply reading through notes. Reading is such an essentially passive review as to leave students with a vague feeling of familiarity with the subject and a false sense of security about what has been learnt.

It is possible to lead up gradually to the method illustrated in the second example by allowing students a couple of minutes in which to prepare their explanations, using their notes. This has the advantage of pinpointing the adequacy of their notes without putting such emphasis on memory or risking severe embarrassment when explanation proves to be beyond them. Such challenging methods may need clear flagging, and may initially warrant prior notice, e.g. "At the end of this lecture you will be asked to explain two of the four sedimentation types we will look at to your neighbour. So be prepared and pay attention!"

A short period of 'quiet time' for student reflection may be used by students for reviewing material, but unlike the examples offered here, quiet time is under the control of students to use as they wish.

Involving Students in Structured Discussions in Large Classes

[Abridged from item 40: 'Pyramidding' (*ibid.*, pp. 127–132).]

Pyramid or 'snowball' groups involve students first working alone, then in pairs, then in fours and so on. Normally after working in fours they return to some form of whole group activity involving the pooling of the conclusions or solutions of the groups. The method was developed at the Open University for tutorial groups of mature students (Northedge, 1978). But it has some special advantages if individual or small group work is to be used during lectures:

(i) Setting individual students a task to do during a lecture may not work well if there is no clear demand on the student to produce an outcome. On the other hand, demanding that individuals report the outcome of their work in public in a large lecture class can be very unnerving: they are likely to focus their attention on avoiding being picked on to report, or if asked, on getting through the experience as painlessly as possible, rather than seriously attending to the task in an open and exploratory way. Suggesting that students take the outcome of their individual work to their neighbour

involves just enough social obligation for them to get on with the task, without too much threat of humiliation if they don't get very far with it.

(ii) Using buzz groups may sometimes work only slowly because students may come to the 'buzz' without any ideas formed or anything much to say. They may cope with this embarrassing situation by starting to work on their own: by re-reading their notes for example. Once working on their own they may then never get going in discussion. If students are instead given even a very short period to work on their own to prepare some ideas beforehand, then they are much more likely to start a useful discussion straight away.

(iii) Syndicate groups of four to six may have difficulty in getting going from cold, especially if the lecture room furniture is unsuitable and they have previously been somewhat passively listening to a lecture. It is relatively easy to speak and get involved in a pair and once started it can then be much easier to get going in a larger group. One minute spent alone and three spent in a pair can save ten minutes at the start of a syndicate. Students need the time and opportunity to try out new ideas in safe surroundings before they are likely to risk sharing them in a larger group.

(iv) Going straight into syndicate groups also risks starting half-way through a problem or prematurely closing down options, rather than starting from the beginning and considering alternatives before choosing one to pursue. Different instructions to students working on their own, and then in pairs, can ensure that the basic steps of problem solving have been worked through by the time a larger group grapples with the problem.

(v) Individuals, and even pairs, may be quite reluctant to report the outcome of their work in public. But when students are asked to report on behalf of a group of four or eight, which has been formed through pyramidding, they seem much more willing to do so. They speak more confidently and coherently than under other circumstances. This seems to be because they have already 'practised' some of the ideas before in smaller groups, will certainly have spoken already, and are likely to feel that they are not solely responsible for the ideas: "These are not my own ideas, you understand, but those of my group!"

(vi) Students working alone may feel that their own solutions to problems, or ideas, are the only solutions and ideas, or at least that they have arrived at these ideas in the same way as everybody else. Similarly, groups often develop their own consensus and unified approach to the problem surprisingly quickly. Pyramidding progressively confronts students with ideas and assumptions different from their own and does not allow groups the comfortable complacency of immediate consensus.

(vii) Some tasks may be complex and difficult to tackle all in one go. Individuals may get stuck through lack of knowledge or ideas. Groups may be very poor at organising themselves so as to make use of their collective knowledge and ideas, and may progress rather slowly. Pyramidding can make complex tasks more manageable, especially when each stage is accompanied by a progressively more complex and demanding task which builds on the achievement of the previous stage. To illustrate:

On Your Own: 2 Min

> "OK, I have spent the last 20 minutes explaining about valuation methods. I want us to try applying this to a practical situation, the valuation of an office block. We are going to pyramid the problem I've displayed up here. So first, on your own, write down the important bits of information which you will need to use to do this valuation. Separate the useful stuff from the noise. You have two minutes."

In Pairs: 5 Min

"Now, in pairs, quickly check your lists of information to see if you agree. When you've done that, get going on doing the valuation. I'll give you 5 minutes. I don't expect you to have completed it in that time; just see how far you can get."

In Fours: 10 Min

"Right, you've had 5 minutes. Please form fours by combining two pairs. Explain to each other what you've done so far. Have you gone about it the same way using the same method? I'm going to give you another 10 minutes to try and complete this valuation, but before you get going I'd like you to go through the methods I've explained today and agree between yourselves which method is most appropriate in this case. When 10 minutes are up I'll ask a couple of groups to go about this valuation."

Plenary

"OK, 10 minutes are up. Now this group over here, can you just tell the others how you have tackled this one? . . . How does that compare with that group? . . . And have any other groups gone about this differently?" etc.

The tasks need to be built up in this way because pyramidding can be boring if the same task is used at each successive stage and students simply find themselves explaining the same thing over and over to different audiences.

Pyramidding can be undertaken in a group of any size. We have used it in groups of larger than 400, and with sub-groups reaching 16 before reporting back.

Having a rapporteur appointed within each group of four improves the quality of reporting back and saves time. The expectation that your own group might have to report back is quite important in maintaining a little tension and motivation. If you can ask every group at least one quick question when it comes to reporting back then this will keep them on their toes next time. A certain amount of time pressure can help induce a little urgency and pace to group work, though too rapid progress can trivialise tasks and produce superficial work and reporting back.

Checking on Student Learning in Lectures

[Abridged from item 48: 'The instant questionnaire', and item 49: 'The three most important things . . . for students' (*ibid.*, pp. 149–154).]

An important characteristic of questionnaires is that they gauge opinion rather than measure things more directly. A test, for example, can measure the extent to which students actually know certain things or can do certain things, whereas a questionnaire can indicate their opinion as to whether they know or can do these things. Provided you trust their judgement (and if you are using questionnaires as feedback rather than as assessment there is no reason why you should not) then questionnaires offer a very quick way of getting feedback compared with tests which can be time-consuming to design and check through.

The example here is based around a fictional lecture on bat measurement. One might pose the following questionnaire items to gain feedback on the lecture:

1. I could list four ways of measuring a bat.
2. I could choose the best method for a given bat.
3. I don't understand why you use Slow methods.
4. I can explain three sources of error.

5. I need practice at measuring bats.
6. ... etc....

Students would respond to each of these statements by indicating their level of understanding according to a three-point scale:

1 = Yes
2 = Don't know/not sure
3 = No

While it might be very useful to have such information about students' level of understanding of key points in your lecture you might think this a somewhat time-consuming and expensive method of gaining it. You'd have to plan your lecture in detail sufficiently in advance for you to draw up the questionnaire, type it and have it printed. Then you'd have to hand it out during the lecture. If you were to go to all that trouble you'd probably ask lots of questions to make it worth it and then you'd be stuck with the effort of collating masses of data.

However, the instant questionnaire avoids these problems. The instant questionnaire is written on an OHP transparency containing just a small number of statements such as the five listed above. This transparency can be written during the lecture itself, during a student activity such as in the examples above, for example, so you can match your statements very closely to your current concerns about how that particular lecture has gone. You don't need to plan this in advance at all and don't need to type or print anything.

Students respond by taking a sheet of their own paper and writing down the numbers of the statements and next to them writing 1, 2, or 3 using the rating scale above, e.g.:

1. 2
2. 1
3. 2
4. 1
5. 3

The students hand their sheets in at the end of the lecture as they leave, and you collate the data. If you like, you can also add the open-ended questions: "What do you not understand fully?" and "What aspects of this lecture would you like to spend more time on?" to pick up any other information which your chosen statements failed to cover.

Once students are used to giving you feedback like this you needn't remind them of the three-point rating scale, or even use an OHP transparency to display the statements. You can simply say, "OK, time for instant feedback!" and read out your statements.

The usual rules apply to formulating good statements:

(i) avoid ambiguous statements;

(ii) avoid double statements such as, "I could list the advantages *and* disadvantages of Slow methods";

(iii) mix positive and negative statements and those which are likely to elicit 'yes' and 'no' to avoid biasing responses;

(iv) avoid exaggerated statements which encourage the student to make a misleading response: "I can remember absolutely nothing whatsoever about Slow methods";

(v) use statements about behaviour such as "I could *list*..." "I could explain..."

which produce responses easier to interpret than statements about thoughts such as "I understand . . ." "I know . . ."

The use of the instant questionnaire has been proposed here only for gaining feedback on student learning of the content of the lecture. We do not consider evaluation of the process of lectures in this paper.

Asking students to identify the three most important points of a lecture can be an excellent way to get them to create their own summary and review a lecture's content before they rush off to their next lecture. It can also be a revealing way to obtain feedback on the effectiveness of your presentation.

You could say, "Right, that's the end of this week's lecture, but before you go I'd like to check whether I've got my main points across. I'd like you all to write down the three most important things about this lecture: those three things that, if you forget everything else, would capture the essence of the lecture for you. You have two minutes."

While students are doing this you write down what you think are the three most important things on an OHP transparency. When the two minutes are up you display your transparency and briefly explain your three points and why they are the most important. You then ask for a show of hands: "Who, honestly, has written down all three of these points? Who has written down two? Who one? Who none? What other points did people consider important?"

If this seems too threatening to students you can:

(i) emphasis that what is on trial is your own competence as a lecturer rather than their competence as learners;

(ii) ask for their points before revealing your own;

(iii) collect up students' written statements to read in private;

(iv) emphasise the scope that exists for alternative perspectives, different conclusions, etc.

This exercise can be very salutary.

The Methods in Practice

These methods require no special training or technology to employ. They are self-contained in that they do not require curriculum redesign or other disturbances to a course. Neither do they require the teacher to take on board excess theoretical baggage to make sense of them or use them sensibly. As a consequence these methods (and others like them) have been readily adopted by large numbers of teachers in higher education.

The only problems teachers appear to encounter are:

(i) the conservativism of students who are used to a wholly passive role;

(ii) feelings of panic which can develop when the students activities involved in the methods generate a lot of noise and a sense of loss of control.

Students may need to be broken in gently and the purpose of activities properly explained. Regaining teacher control and student attention after such student activities can be difficult simply because the activities are so engaging. However, anxieties about loss of control dissipate after control has been successfully regained a few times.

These methods are unlikely to suit all teachers or all situations. Indeed, we have collected such large numbers of ideas for teaching methods together precisely because we would not expect an individual teacher to find all of them suitable and valuable.

However, with 53 alternatives, the chances are that everyone will find a few to their taste!

Full sets of instructions for 'do-it-yourself' training workshops on these methods, which require no trainer to run, are available without charge from the authors.

Correspondence: Graham Gibbs, Educational Methods Unit, Oxford Polytechnic, Headington, Oxford OX3 0BP, U.K.

REFERENCES

BLIGH, D. (1974) *What's the Use of Lectures?* (Exeter, Bligh & Bligh).

GIBBS, G. (1982) *Teaching Students to Learn* (Milton Keynes, Open University Press).

GIBBS, G. (1982) *Twenty Terrible Reasons for Lecturing*, Occasional Paper No. 8) (Birmingham, Standing Conference on Educational Development Services in Polytechnics).

GIBBS, G., HABESHAW, S. & HABESHAW, T. (1984) *53 Interesting Things To Do In Your Lectures* (Bristol, Technical and Educational Services).

HABESHAW, T., GIBBS, G. & HABESHAW, S. (1987) *53 Interesting Ways of Helping Your Students Study* (Bristol, Technical and Educational Services).

NORTHEDGE, A. (1978) Learning through Discussion in the Open University, *Teaching at a Distance*, 2, pp. 10–19.