Interactive lecturing: strategies for increasing participation in large group presentations

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SUMMARY *Interactive lecturing involves an increased interchange between teachers, students and the lecture content. The use of interactive lectures can promote active learning, heighten attention and motivation, give feedback to the teacher and the student, and increase satisfaction for both. This article describes a number of interactive techniques that can be used in large group presentations as well as general strategies that can promote interactivity during lectures.*

Have you ever given or attended an interactive lecture? What was it that made it interactive? What were your impressions of this method of teaching?

Whereas much has been written about effective lecturing and presentation skills in medical education (Cox & Ewan, 1988; Laidlaw, 1988; Newble & Cannon, 1994), little has been written about the benefits and strategies of interactive lecturing for medical teachers. The goals of this article are to describe the advantages and indications for interactive lectures, to discuss common fears and concerns about using this method of teaching, to outline a number of interactive techniques that can be incorporated into medical teaching at all levels, and to highlight general guidelines for successful interaction and audience participation.

What is interactive lecturing?

Interactive lecturing can be interpreted in a number of different ways. For some, interactive lecturing involves a two-way interaction between the presenter and the participants. For others, it refers to increased discussion among the participants. Interaction can also refer to a student's[1] involvement with the *material* or the *content* of a lecture; it does not necessarily mean that the audience has to do all of the talking. In all cases, however, interactive lecturing implies active involvement and participation by the audience so that students are no longer passive in the learning process.

Interactive lecturing also implies a different way of approaching the teacher's role. In giving this type of presentation, the 'instructor' frequently becomes a 'facilitator' or 'coach', and more often than not, has to modify the lecture content to allow for discussion and to try new techniques.

For the purpose of this discussion, the term 'lecture' will refer to any large group presentation, at any level of the educational system. It is important to note, however, that the number of students in the audience does not dictate whether the lecture can be interactive. Some very small groups can be non-interactive, and certain interactive techniques can be incorporated into a class of over 200 students. Moreover, although large classes are most commonly considered the context for interactive lectures, these techniques can also be used effectively with smaller groups.

Why give an interactive lecture?

Lectures as a method of teaching and transmitting information have come under increasing criticism (Bligh, 1972; Kimmel, 1992; Kroenke, 1984). One of the major reasons for this critique is the observation that lectures are less effective than other methods when instructional goals involve the application of information or facts, the development of thinking skills, or the modification of attitudes (Frederick, 1987; McKeachie, 1994; Newble and Cannon, 1994). In addition, students are frequently seen as passive recipients of information, and as a result, not engaged in the learning process.

However, while many teachers accept the notion that other teaching methods might be better than lectures for encouraging students to be more actively involved in learning, and for promoting the application of knowledge, few have the time, resources or opportunity to use the small group methods that promote such involvement and application (Schwartz, 1989). Also, when done effectively, the lecture *can* transmit new information in an efficient way, explain or clarify difficult notions, organize concepts and thinking, challenge beliefs, model problem solving, and foster enthusiasm and a motivation for learning (Gage & Berliner, 1991; Foley & Smilansky, 1980; Frederick, 1986; Saroyan & Snell, 1997).

The value of interactive lecturing rests on the premise that active participation and involvement is a prerequisite for learning beyond the recall of facts, and that students must be attentive and motivated in order for learning to occur. In summary, interactive lecturing promotes the following characteristics of effective learning.

Active involvement

Educational research has shown that students who are actively involved in the learning activity will learn more than students who are passive recipients of knowledge (Butler, 1992; Feden, 1994; Kraft, 1985; Murray, 1991). As we have said earlier, interactive lecturing can promote active involvement with the material or the content, with the teacher, or with classmates/peers. Indeed, even students who do not

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talk in class are often stimulated by questions or problem-solving exercises as they think about what they would answer in a particular situation.

Increased attention and motivation

Other studies in education have demonstrated that increased attention and motivation enhance memory (Gage & Berliner, 1991; Mannison *et al.*, 1994; Meyers & Jones, 1993). In fact, some authors have said that increased arousal and motivation are *the* essential ingredients for learning, and often are more important to retention than intelligence. Attention span studies have shown that students' interest and attention in the traditional lecture diminishes significantly after 20 minutes (Frederick, 1986; Foley & Smilansky, 1980; Stuart & Rutherford, 1978). Energy shifts—or changes of pace—are essential if student attention is to remain focused. By changing pace and incorporating a variety of techniques that arouse attention, interactive lectures can stimulate interest and help to maintain attention. By encouraging applications to 'real life' situations or focusing on controversial issues, interactive lectures also motivate students to read and learn more.

A 'different' kind of learning

In addition to increasing student involvement, attention and motivation, interactive lecturing promotes a 'higher level' of thinking (Lowman, 1984; Michaelsen *et al.*, 1982; Ramsden, 1992). This includes the analysis and synthesis of material, application to other situations and evaluation of the material presented. Interactive lecturing can facilitate problem-solving and decision-making, communication skills and 'thinking on your feet'. This is particularly important in medical education where the application and use of information is as important as the retention and recall of facts.

Feedback—to the teacher and the student

The importance of feedback to learning has been frequently noted (Jason & Westberg, 1991; Lowman, 1984). Interactive techniques allow teachers to receive feedback at a number of levels: on student needs (at the beginning, middle or end of a lecture), on how the information has been assimilated, and on future learning directions. Students, on the other hand, can get feedback on their own knowledge or performance. For example, computerized audience response systems allow for the rapid collation and broadcast of students' responses to questions (Jason & Westberg, 1995). Quizzes at various intervals during the lecture also allow for immediate feedback.

Increased student—and teacher—satisfaction

In a recent study of surgical teaching, Papp & Miller (1996) found that faculty who involve students in their lectures by questioning were perceived more favourably by students than those who did not. These authors also report that students who attend lectures by faculty who ask many questions believe that the lecture is more stimulating. Butler (1992) found that student satisfaction with the lecture format increased when the students were actively involved in the teaching session.

At the same time, experienced teachers will tell you that once you have tried an interactive lecture, it is difficult to go back to a more traditional style where the audience is more passive and less involved. In many ways, interactive lectures keep the teachers interested and awake as well!

In summary, interactive lecturing encourages active participation on the part of the teacher and the student. This method of teaching arouses student attention and allows for instant feedback on whether the lecture material has been understood. It also promotes a higher level of thinking, problem solving and application of material taught. Indeed, interactive lecturing is a way to capitalize on the strengths of small group learning in a large group format (Butler, 1992).

What prevents us from giving interactive lectures?

Fear

Whereas most teachers accept the theoretical benefits of interactive lectures, many will not engage in such lectures for a number of reasons. Most frequently, teachers report a fear of *losing control* when giving such a lecture. They fear that if the class is allowed to participate actively and ask questions, the presenter will no longer be 'in control', of either the students or the material, and that chaos may reign. Fear of not *covering all of the material*, or of sacrificing important content, is another commonly encountered lament. It is true that the 'number of facts' need to be reduced in order for a lecture to become interactive; we also know that if we present too much information, students will retain less (McKeachie, 1994; Newble & Cannon, 1994; Russell *et al.*, 1984).

Additional fears include anxiety about not knowing the answer to a question posed by the students, concern that a 'dominant' group will take over and apprehension that no one will respond to a question asked.

The 'context' of learning

Time constraints are frequently mentioned as a reason for not giving an interactive lecture; but again, this concern is more commonly related to the fear of not 'covering' all of the material. Audience expectations, the subject matter and the physical setting may also hinder an attempt to be interactive. Many teachers believe that the basic sciences cannot be taught interactively, and that it is easier to teach the clinical sciences using this format. Others believe that undergraduate students, because of their more limited knowledge, cannot participate in an interactive lecture, which may appear more appropriate for postgraduate students and practicing physicians. And yet, teaching experiences and the relevant literature do not support this position.

What are commonly used interactive techniques?

The following section provides an overview of the most commonly used interactive techniques in medical education. Although the indications and limitations of these diverse methods may differ, the common ingredient to all is the goal of increasing student participation, attention and motivation in the lecture process. These methods include the following.

1. Breaking the class into smaller groups

Small group teaching has distinct advantages over lecturing in terms of promoting comprehension, application and problem solving (Butler, 1992; McKeachie, 1994). Yet, for many of its proponents, small group teaching is not a cost-effective method of teaching. Incorporating small groups into lectures can, therefore, be beneficial for promoting the discussion of ideas and concepts, for examining issues and presenting alternatives, for encouraging the application of new concepts, and for fostering problem solving and communication skills. Group discussions also give the teacher an additional way of assessing student attitudes and beliefs.

Two interesting examples of this technique have been presented by Schwartz (1989), teaching biochemistry to a large number of students, and by Stein *et al.* (1990), who incorporated small group teaching methods in a large group setting in clinical pharmacology. The general strategy is to break the class into small groups, using a judicious rearrangement of seating if necessary (Gibbs *et al.*, 1988; Newble & Cannon, 1994). Small groups of between two and four people may be formed among neighbours without any movement while larger groups can be formed quite quickly. The selection of the most appropriate grouping will largely depend on what you wish to achieve. Small groups may be asked to discuss a limited topic for a few minutes (in what is often called 'buzz groups' because of the noise in the room) or they may consider broader issues for a longer period of time. The small groups can also join to form larger groups to further discuss the same topic or to consider a different approach to the same task (Gibbs *et al.*, 1988; Jackson & Prosser, 1989; Michaelsen *et al.*, 1982).

Although breaking the class into small groups is a powerful and very effective technique, it is not frequently attempted. Once tried, however, more traditional lectures seem far too silent!

2. Questioning the audience

Questioning the audience is probably one of the most frequently used interactive techniques. It is also the easiest to implement. Questions can stimulate interest, arouse attention, serve as an 'ice breaker', and provide valuable feedback to the teacher and student alike (Knox, 1986). Questioning can take many forms.

- *Straightforward questions*: the value of effective questioning has been highlighted by many authors (Foley & Smilansky, 1980; Schwenk & Whitman, 1987). Some examples of straightforward questions include the following: 'What are the common causes of right lower quadrant pain?' 'Which therapy would you choose for the treatment of hypertension, and why?' In asking questions of the audience, it is important to remember to pose them in a non-threatening way, to *wait* for a response, and to make sure that more than one student has an opportunity to respond!

  Another way of using questions is to allow students to ask questions of the teacher. The majority of lecturers save time at the end of their presentation for questions from the audience, and yet, many of these presenters are often disappointed by the lack of—or quality of—the questions. It is far more useful to intersperse the lecture with time for questions, from both the teacher and students.
- *Brainstorming*: brainstorming refers to that process whereby students generate a list of issues—in response to a specific question or topic—and judgement of the responses is initially suspended (Newble & Cannon, 1994; Schwenk & Whitman, 1987). Only after the list is completed are comments or critiques invited.

  Brainstorming can be used at different points in the lecture. At the beginning, it can be used to invite everyone in the group to participate and to put them at ease. For example, the lecturer might start a presentation by asking the class to list all the possible complications of diabetes. While this is happening, the teacher—or a student—can scribe these responses on a flipchart, blackboard or transparency, for critical review after an initial phase of accepting all ideas and statements. In reviewing the list, the lecturer may decide to organize his/her presentation around comments made or highlight the key issues that will be addressed. Brainstorming at the beginning of a session has the added benefit of providing an evaluation of the students' knowledge of a particular area prior to teaching.

  Brainstorming in the middle of a lecture can be helpful to change the pace, to regain the group's attention, or to apply certain 'facts' presented so far. For example, the teacher might ask the following: 'What are the common side effects of antidepressant medication?' Brainstorming at the end of a lecture allows the students to summarize the information discussed, to develop a framework for the material covered, and to provide feedback on what was understood or learned.
- *Rhetorical questions*: rhetorical questions have been defined as those questions that are asked merely for effect with no answer expected (Webster's Dictionary, 1977).

  Rhetorical questions stimulate thought without requiring an answer. They are frequently introduced at the beginning of a lecture or particular segment of the lecture, to stimulate interest in the subsequent presentation. For example, one might start a lecture on *Surviving Change* by asking the audience whether any of them have experienced a change in the last year—and whether any of them have survived.
- *Surveying the class*: this technique is particularly useful for identifying audience needs and interests, for allowing teachers to assess the students' baseline level of knowledge around a particular topic, and for arousing motivation. For example, asking the students how many of them have ever had a fracture at the beginning of a class on orthopaedic trauma gets their attention very quickly!
- *Quizzes and short answers*: Quizzes or short answers can be used at the beginning or end of a class to provide a 'check-up' on learning, to summarize or synthesize the information presented, and to point out gaps in understanding for both the teacher and the student. Testing students at the end of a lecture can help to increase their retention of the information covered (Bligh, 1972; Gibbs *et al.*, 1987).

3. Using audience responses

Interactive computer systems are one of the newer ways by which to promote interaction in a large group (Jason &

Westberg, 1995). By using this method, audience attention is quickly aroused and the learner can receive immediate feedback on his/her knowledge in an anonymous fashion. Students can also compare their responses to their classmates in an easy and effective manner (Ytterberg *et al.*, 1994).

The disadvantage of this method, on the other hand, is that it can become too 'gimmicky' and some people only see it as a gadget. It also takes more preparation on the part of the teacher because the questions have to be carefully selected and programmed prior to the presentation. Another disadvantage to this method is the fact that the questions are usually closed in nature and spontaneous responses cannot be easily incorporated into the pre-set format.

An alternative approach to the interactive computer system, that is much less costly, is the use of flash cards. For example, the teacher can project a 'multiple choice' or 'true–false' question on the overhead projector, and for each response, the students raise a different coloured card.

4. Use of clinical cases

Clinical cases can be used in different ways to bring relevance to the discussion (Douglas *et al.*, 1988; Stein *et al.*, 1990). Indeed, this is probably the second most common method (after questioning) used by medical teachers. The use of cases heightens interest and promotes problem solving in an effective manner. It also encourages clinical reasoning and makes the learning of medicine 'real', important for junior students with limited clinical experience and for seasoned practitioners who can easily see application to their own clinical practices.

During the lecture, students can be asked to analyze or discuss a case that is presented on paper, on video or live. Case presentations can be structured in different ways, and the objectives for its use should be clearly delineated beforehand. For example, a *brief case description* can be used to illustrate a particular point or support certain principles being addressed, at any time during the lecture. It can also be used to get students to hypothesize about what is going on and to problem solve.

Alternatively, students can be asked to *work through a case* in class, where the lecturer starts by giving some information, asks students for their hypotheses and areas for further inquiry, provides additional information, and slowly works through the case with the students. Examples of this include the following:

- *Cliff hanger cases*: students are asked to read a case that outlines a complex situation and that includes a problem calling for decision. The case narrative stops at the decision point but students are asked what they would do and why. In class, students have to defend the factual basis and reasoning that led to their decision (Segall *et al.*, 1975; Wilkerson & Miller, 1984).
- *Incident type cases*: students are presented with a short description of a problem situation. If they ask the right questions, they are supplied with more information. As a group, the students take the role of the decision maker trying to sort out the problem. Sometimes they are divided into teams and asked to defend their positions. Often they work alone. The class, however, must come to a decision that is mutually agreeable (Segall *et al.*, 1975; Wilkerson & Miller, 1984).
- *Inviting patients* to class heightens student interest and motivation. This is particularly helpful when the learners can interact with the patient.

5. Use of written materials

Written materials are helpful to assist in the organization of key concepts, to promote the retention of information, and to remove pressure on the teacher to 'cover everything'. For example, handouts of slides (Amato & Quirt, 1990) allow students to participate more in thinking about the concepts under discussion rather than writing down every word of the lecture.

The literature on handouts (Beard & Hartley, 1984; Butler, 1992) suggests that students achieve higher test scores from lectures accompanied by handouts, that students appreciate them, and that the design of the handout can influence note-taking practices. For example, in one study, students preferred to write in the space between headings, and the more space left, the more notes were taken (Newble & Cannon, 1994). Similarly, Butler (1992) found that incomplete handouts promoted greater attention and retention of the material taught. In an interactive lecture, handouts can also structure the discussion and/or supplement the lecture content.

The timing of when to distribute the handout often depends on its purpose. It is useful prior to the lecture if the student is to come prepared with a fund of knowledge; it is more effective at the outset of the lecture if the handout is incomplete; and it is most valuable at the end of the lecture if the handout contains supplemental information for further reading. Critical to its success, however, is the use of the handout *in* class.

6. Organizing debates, reaction panels and guests

Debates can be conducted in a number of ways. For example, the class can be divided in two (e.g. along the two sides of the lecture hall) and the students on either side can be asked to support two different sides of the issue (Frederick, 1986, 1987; Wilkerson & Miller, 1984). Assignment of 'sides' might take place ahead of time or students can be asked to seat themselves according to their point of view. The class can then proceed by the instructor asking for several statements from persons seated on each side. Although neither side may contain the whole truth, it can be energizing to defend a particular perspective. Students choosing a middle ground should be invited to defend their reasoning. Summary arguments could be made by several students from each 'side'.

Alternatively, a number of students can be chosen from the class to debate an issue in front of the class (Herbert, 1990). Peer-led debates and discussions have the advantage of enlisting class support and interest.

7. Using simulations and role plays

Simulations and role plays allow students to try out a real life situation in a 'safe setting' and to receive feedback on their experiences (Handfield-Jones *et al.*, 1993; Steinert, 1993a). By presenting students with a situation that they are likely to face in the future, simulations can heighten

attention and clinical relevance, and involve students at a number of levels in the lecture format. Role plays can also be used creatively in large classes. For example, students can be asked to role play a doctor–patient encounter and receive feedback from their peers. Alternatively, the teacher can role play a particular patient problem (e.g. a 24-year-old woman complaining of painful intercourse) and ask the students to take a history. Simulations can be used effectively as well. In a presentation on Parkinson's Disease, the teacher can demonstrate a number of abnormal gaits, and students can be asked to identify the differences among them.

8. Using films and videotapes

Film clips or videotaped vignettes can be used as a trigger to promote discussion or to stimulate student thinking. Most often, the objective is to elicit an emotional as well as a cognitive response in the viewer and to 'trigger' meaningful discussion (Segall *et al.*, 1975). For example, a short videotaped segment can be used to illustrate a challenging patient interview and the students may be asked to react to what they saw.

Films or videotapes used for this purpose should usually be brief in duration and present only part of a situation in order to promote further inquiry or discussion. Videotapes are also useful for examining student attitudes and skills (Steinert, 1993b).

9. Audiovisual aids

Certain audiovisual aids facilitate interaction more than others. Overhead projectors, for example, allow the presenter to maintain eye contact with the audience, to record audience responses, and to change the order of the presentation, which is not easily achieved when using 35 mm slides. Flipcharts and whiteboards allow for the creation of diagrams or content during the lecture and easily permit the scribing of students' answers to questions, problem solving exercises or debates. Multimedia presentations and computer-assisted learning also promote interactivity.

10. Using effective presentation skills

Although the focus of this discussion is not on effective presentation skills per se, the presence or absence of such skills can determine the effectiveness of an interactive lecture. Clearly, if one does not have eye contact with the students or scan the audience, the lecture cannot be interactive! Similarly, the physical setting (e.g. a long, steep lecture hall vs one where members of the audience can see each other) can hinder or facilitate interaction.

What general strategies will help us to become more interactive?

The previous section outlined a number of specific interactive techniques that teachers may consider using. The following general principles may help them to become more interactive.

(1) *Be willing to take risks and overcome your fears*. As we have stated earlier, giving an interactive lecture can be very risky, but taking the risk is worthwhile if it will enhance student learning. Identify your fears, be willing to take a risk and maintain your sense of humour. Most of all, be prepared for the unexpected!

(2) *Prepare—and practice.* Many successful teachers will tell you that it takes longer to prepare an interactive lecture than a traditional one because of the need to pare down the material and to choose your methodology carefully. Preparation—and practice—is, therefore, the key.

(3) *Be clear in your objectives and cut down on your material.* Whereas it is always important to have clear objectives, this becomes even more important in an interactive lecture. Remember that less is more; consider your three most important 'points' and build your lecture around them. Do not try to cover every topic in complete detail; when worried about 'leaving out' too much material, or not 'covering' everything, provide readings and handouts to supplement the material. Always ensure that your methods match your objectives.

(4) *Prepare students for their role in interactive lectures.* As teachers, we cannot assume that students will know how to participate in a lecture or what behaviour is appropriate. Accustomed to being passive, students must learn to become active participants in the process of learning, and we must prepare them to do this over time. Setting rules at the beginning of your lecture and outlining how your session will be conducted is one way of preparing your students for taking an active role in the process of learning.

(5) *Remain flexible—and do not overdo it.* Many teachers, once introduced to the concept of interactive lecturing, want to immediately apply their newly acquired skills. Remember to focus on one new technique at a time, and to remain flexible. Finally, be prepared to abandon your prepared agenda!

Conclusion

As Frederick (1986) has said, the lecture method is here to stay. By using interactive techniques and strategies, students will become more involved in the learning process, retain more information and be more satisfied. So will the teacher!

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Note

[1] The word 'student' will be used to represent students at all levels of medical education, including undergraduate students, postgraduate students or residents, and practicing physicians. Moreover, although most of the examples used in this discussion refer to undergraduate and postgraduate education, the strategies suggested apply to continuing medical education and faculty development activities as well.

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