

## ABC of learning and teaching in medicine

### Creating teaching materials

Richard Farrow

The nature and qualities of the teaching materials that you use can have a substantial effect on the educational experience of your students. Teaching materials can often distract learners rather than help them to learn. Common avoidable problems include overcrowded or illegible slides, irrelevant or badly prepared handouts, and incompatible multimedia equipment. It is important therefore to know how to create effective teaching materials.

#### Ground rules

Five basic principles apply to preparing teaching materials, irrespective of the type of material you choose: links, intelligibility, general style, highlighting, and targeting (LIGHT). You may sometimes decide to ignore one or more of these principles, but if you do, think carefully about what you are trying to achieve.

#### Links

Your teaching materials should have obvious and direct links to your talk, discussion, or presentation. Handouts are the main offenders in this category, and it is not unusual for handouts to have little in common with the talk. It is quite acceptable for the teaching materials to give some additional information, but this should not be excessive.

#### Intelligibility

The teaching material should be easy to understand and learn from. How this is achieved will depend on the medium used and the venue of the talk or presentation. Use simple language and avoid overlong sentences or statements. Diagrams can help to clarify a complex message. If you are using slides or overhead transparencies, the size of the print needs to be large enough to be read from the back of the auditorium. The font selected should be sans serif (for example, Arial).

#### General style

You should aim to use a consistent style throughout your teaching materials, particularly if you are giving a series of talks. Although it is tempting to use a variety of novel styles, consistency will allow learners to concentrate on the meaning and relevance of what you are trying to communicate.

#### Highlighting

Highlighted information helps to emphasise important issues or pivotal points in a developing argument. Methods of highlighting include changing the colour of text or underlining words or phrases. This also applies to videotapes and audiotapes, where changing your tone of voice can be used to emphasise key points.

#### Targeting

It is important that both the type of educational event (for example, presentation, seminar, discussion) and the teaching materials that supplement it are targeted at what your students need to learn. Targeting therefore requires an awareness of what knowledge and skills your students already have. This can be difficult to judge, but it is worth spending time finding out



#### Preparing overhead transparencies

##### Do

- Try to use typed rather than handwritten script
- Use a type size that is big enough to be read by the whole audience—for example, at least 20 points
- Make sure that the colour of your text works—for example, dark print on a pale background
- Limit each transparency to one idea or concept

##### Don't

- Use small print
- Use overhead transparencies packed with tables and figures
- Use light colours

**Uniformity in the teaching materials will help learners to focus on content rather than style**

It is easy to **overdo** highlighting by **emphasising** virtually every point that you make. This reduces the **usefulness** of the technique and **hides** the really pivotal shifts in a **morass** of *highlighted text*.

**Target your talk at learners' needs—don't just pull out the slides or overheads from a previous talk**

about your expected audience. It becomes easier if you are doing a series of talks with the same group as you can get feedback from the learners to help you plan more effectively.

## Types of teaching materials

### Black, green, or white boards

These are ideal for brainstorming sessions and small group work. If you are doing the writing, try not to talk at the same time as it is difficult for your learners to hear you if you have your back to them. Remember the LIGHT principles, and try to put concepts, not an essay, on the board. Make sure that everyone has finished copying information before you rub the board clean. Using different colours can add emphasis and highlight your important messages.

### Lecture notes

Ensure that any handouts are produced to a high quality. Photocopies of handwritten notes (and frequently photocopied elderly pages) look scrappy and tend not to be valued. Give handouts to the learners at the beginning of the talk as copying down information is not a good use of their limited "face to face" time. Use headings and diagrams to make the handouts intelligible.

### Overhead projector

The technical equipment for displaying overhead transparencies is widely available and reliable. It is a good backup resource, and for critical presentations it is comforting to know that, if all else fails, you have transparencies in your bag. Presentations using an overhead projector have the advantage that they allow you to face your audience while pointing out features on the transparency.

Correct preparation following the LIGHT principles is vital. Ensure that the transparencies will fit the projector—most will display A4 size, but some are smaller, so check in advance. The absolute minimum height for text on transparencies is 5 mm, although using larger text and fewer words usually produces a more effective educational tool. A good rule of thumb is to use a type size of at least 20 points. Several simple transparencies are usually better than one complicated one.

It is fairly straightforward to design your transparency on a computer then print it using a colour printer. Avoid using yellow, orange, and red, as these colours are difficult to see. Instead, use dark text on a light background. You can write and draw directly on to the transparencies with felt tipped pens. Use permanent markers to avoid smudging, and place a sheet of ruled paper underneath so that the writing is evenly spaced. You can also use a photocopier to copy print on to a transparency, but remember that you may need to enlarge it to make the text readable.

If you are likely to use a transparency again it is worth storing it carefully in dust free covers. One commonly used method is to store transparencies in clear plastic sleeves that can be filed in a ring binder. When showing transparencies, do not overuse the technique of covering the transparency and revealing a little at a time—many learners find this irritating.

### 35 mm slides

The need for 35 mm slides has decreased substantially with the advent of computer programs such as Microsoft's PowerPoint. However, multimedia projectors and computers are expensive and not available in all locations, whereas most educational institutions have a slide projector. Making your own slides can be difficult, so get help from the local illustration department or a commercial company. Ensure that the text is large enough to see when projected and that the slides are marked so that they

### Types and uses of teaching materials

*Boards, flip charts*—Small groups, problem based learning tutorials, workshops

*Lecture notes*—Small and large groups; help to improve interactivity

*Overhead projector*—Small and large groups, workshops, and interactive sessions

*35 mm slides and PowerPoint*—Generally large groups and lecture formats

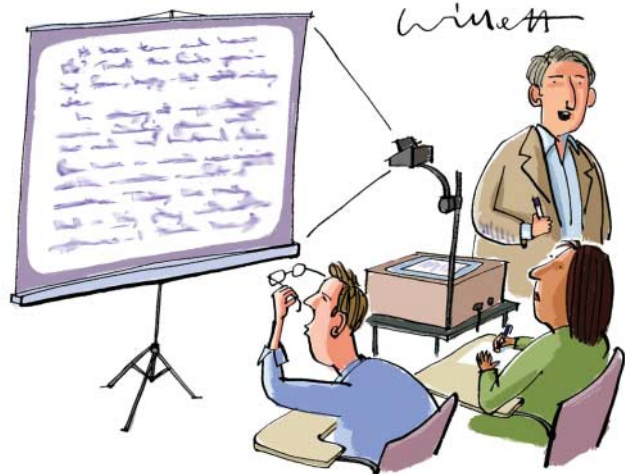
*Videos*—Good for clinical teaching in larger groups (use film of patients); also for teaching communication skills and practical skills (students can keep films for self appraisal)

*Life and plastic models*—Anatomy teaching in small groups or for self directed learning

*Computer assisted learning packages*—Small groups with a tutor; large groups in computer laboratories; self directed learning

*Skills centres and simulators*—Small groups learning clinical skills

**Leave spaces in the handout for your learners to record the results of interactive parts of your talk—this ensures that the handout the learners take away has more value than the one they were given. Also, leave spaces for exercises to be completed later, thus linking self directed learning with face to face learning**



**Paper copies of transparencies and slides can make useful handouts—your learners can then add clarifying statements or diagrams to their own copy of the presentation**

**Number your slides so that if a projectionist is loading them or the carousel is dropped they can be quickly reordered**

are loaded in the projector correctly. Dual projection is rarely done well and rarely necessary unless you are using visual images (for example, x ray films, clinical photographs) with accompanying text. If you use dual projection make sure that each of the slides is labelled for the correct projector.

### Computer generated slides

The ability to make computer generated slides (for example, PowerPoint) has transformed the way that many people create teaching materials and has greatly reduced the use of 35 mm slides. Try not to get seduced by the technology, however, and remember that it is just another educational tool. Having tried all of the colours and slide layouts available, many experienced lecturers now prefer simple formats that are easy to read and in which the medium does not get in the way of the message.

However, the computer package has many useful tools—diagrams and “clip art” can help to conceptualise difficult problems. Video clips can be inserted into a presentation, but be certain that they are there to illustrate a point and not simply to show off your own technological skills. Use advanced formats for PowerPoint presentations only if you are well practised and comfortable with the medium.

Ensure that the computer you are planning to use is compatible with the multimedia projector. Similarly, if you have stored your presentation on a CD or floppy disk (or any one of the other portable storage formats), make sure that this is supported at the venue. The latest version of the presentation software can give you access to many features that may not work on the computer provided at the teaching venue, so a wise precaution is to save your presentation as an older version of the software.



### Ground rules for slide preparation (35 mm or PowerPoint)

- Use a clear font that is easily readable
- Use a type size of 20 points or greater
- Use a light text on a dark background for slides (in contrast with OHP transparencies)
- Use short sentences and small tables
- Restrict the overall number of words on each slide to about 40 or fewer
- Avoid patterned backgrounds—they are extremely distracting
- Limit the number of colours on your slides to a maximum of three
- Use highlighting to emphasise items in lists
- Use animation and sound effects sparingly

### Further reading

- Cannon R, Newble D. *A handbook for teachers in universities and colleges*. 4th ed. London: Kogan Page, 1999.
- Newble DI, Cannon R. *A handbook for medical teachers*. 4th ed. Dordrecht, Netherlands: Kluwer Academic, 2001.
- Kemp JE, Dayton DK. *Planning and producing instructional media*. 5th ed. New York: Harper and Row, 1985.
- Hartley J. *Designing instructional text*. 3rd ed. London: Kogan Page, 1994.

Richard Farrow is director of problem based learning at the Peninsula Medical School at the Universities of Exeter and Plymouth.

The ABC of learning and teaching in medicine is edited by Peter Cantillon, senior lecturer in medical informatics and medical education, National University of Ireland, Galway, Republic of Ireland; Linda Hutchinson, director of education and workforce development and consultant paediatrician, University Hospital Lewisham; and Diana F Wood, deputy dean for education and consultant endocrinologist, Barts and the London, Queen Mary's School of Medicine and Dentistry, Queen Mary, University of London. The series will be published as a book in late spring.

BMJ 2003;326:921-3

### One hundred years ago

#### Newspaper medicine

Charles Lamb said that no one ever took up a newspaper without expectation, or laid it down without disappointment. This doubtless holds good as a general rule; but when the newspaper deals with medical matters a medical man may confidently expect to be amused, and will hardly ever be disappointed. A collection of extracts of this kind might be specially recommended to practitioners suffering from malaria, as it would “desoppliate” the most congested spleen. We have only a few at hand, but with very little trouble a vast number might be gathered. At the beginning of the late Archbishop of Canterbury's fatal illness the newspapers made the guarded announcement that “at present the symptoms are purely physical.” The opinion was attributed not long ago to a distinguished physician that there was absolutely no hope of a patient's recovery, as “meningitis had developed in the form of inflammation, which was covering the brain.” The death of Sir E. Burne-Jones was said by a leading

London newspaper to have been due to “cardiac disease of the heart.” A Chicago paper gave the following lucid account of the operation performed on President Roosevelt not long ago: “A little surgical appliance like the end of a syringe drawn to a fine point was inserted in the swelling which stood out on the President's shin midway between the knee and ankle. A miniature pump was attached, the cavity under the peritoneum was emptied ‘by aspiration,’ as the doctors say—which is another term for pumping—and it was all over.” The enlightening comment was added that “not even a President can have edged tools inserted in his tissues beyond the wrappings of the bones itself, which are called peritoneum, without feeling it.” Another American newspaper made the interesting statement that A. B. “is having his heart moved to his left side from the right side, where it had worked its way.”

(BMJ 1903;i:211)