Using Learning Resources to Enhance Teaching and Learning

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This paper was first written in 2003 as part of a project led by the London Deanery to provide a web-based learning resource to support the educational development for clinical teachers. It was revised by Judy McKimm in 2008 with the introduction of the Deanery's new web-based learning package for clinical teachers. Each of the papers provides a summary and background reading on a core topic in clinical education.

Aim
The aims of this paper are to:

- Raise awareness of the range and relevance of learning and instructional materials and media that can be used effectively in clinical teaching
- Highlight examples of good practice in the use of materials, and indicate common errors that should be avoided
- Provide ideas and examples for the use of teaching materials in the clinical setting to enhance student learning
- Provide a foundation for developing your professional skills as a teacher in the clinical setting

Content:
The principles of designing teaching materials to support teaching and learning in a variety of contexts including:

- The use of overhead projectors
- Using PowerPoint
- Using video in teaching and learning
- Resources for small group teaching
- Introducing problem based learning
- Developing study guides
- Supporting clinical learning with logbooks
- Clinical skills laboratories

Reflective Learning

As you read though this paper and associated reading, ask yourself two questions:

1) What are the strengths and weaknesses associated with this resource?

2) Where could I usefully incorporate these ideas into my teaching?

The Use of Overhead Projectors

Most lecture theatres and seminar rooms have an overhead projector (OHP) and you will certainly have seen them in use. There are however some "Do's" and "Don'ts" when preparing overhead transparencies (OHTs).

- Do use permanent (waterproof) pens if you intend to re-use the OHT (water soluble inks smudge very easily and detract from your presentation).

- Do leave space to add to the transparency as the lecture develops; do this on an overlay or with water-soluble inks.

- Do use large fonts; it will depend on the size of the lecture theatre but don't use anything smaller than 24 point.

- Do use colour for emphasis – for instance for a heading or key words, but..

- Don't use colours that are difficult to read when projected – red, yellow and orange are particularly unsuitable.

- Don't fill the area available with text. Restrict yourself to key words.

- Don't photocopy text or diagrams from a book straight on to an OHT. The font size will be too small. Enlarge the original first.

- Don't put complex diagrams on OHTs that the audience has to copy – supplement the OHT by giving out printed copies.

For some further tips see Hayes and Campbell (1998).

There are also some basic points to remember when you come to use the OHP in a lecture. These are presentational matters, but can make all the difference to how the audience responds to your talk. These ideas are explored in more detail by Race (1999) some also relate to using PowerPoint (see below).

- Make sure you know how to turn the OHP on/off. Most projectors   have a switch that activates a spare bulb in event of failure. Find it.

- Before you start, check that the OHP is correctly aligned and positioned for the screen and that the image is in focus.

- Face the audience – use a pointer or pen on the OHP to draw attention to a particular point (rather than turn away and point to the projected image)

- Try to keep the text relating to the point under discussion at the top of the screen – it is the part most visible to the audience

- Be careful not to remove the OHT before members of the audience have had time to make notes

- Cover part of the OHT if you want to deliver a key point with maximum impact, but….

- Don't make a habit out of revealing text line-by-line (it can be very irritating)

Using PowerPoint

There have been two well-established methods of illustrating the traditional lecture or talk – the 35mm slide projector and the overhead projector (OHP). Each has had its role – for instance 35mm slides allow you to show photographs to illustrate the symptoms characteristic of a particular condition. The OHP enables you to prepare visual material in advance and to build on this as the lecture proceeds.

 However computer-based technology has brought a new and powerful tool for clinical teaching – Microsoft PowerPoint. PowerPoint is part of the Microsoft Office suite of programs. Essentially it enables users to create a series of slides on a computer which may then be projected in the lecture theatre using a data projector. It has advantages over both the slide projector and overhead projector. These include:

- PowerPoint comes with pre-formed templates to help you prepare professional looking and visually stimulating slides.
- Judicial use of colour can help you stimulate interest and emphasise key points. Be aware, however, that what appears

attractive on your computer screen can be unreadable when projected.

- Text or diagrams are prepared in advance. A PowerPoint feature called 'animation' allows you to build up an image little by little with ease.
- Photographic images can be incorporated into the presentation as another slide – especially simple if the images are captured on a digital camera. However any image can be scanned into PowerPoint.
- Video clips – for instance to illustrate gait – are also readily included in the presentation.
- You can include hyperlinks to webpages
- Slides you want to appear twice can be duplicated at the click of a mouse button and it is simple to re-order the slides.
- PowerPoint contains a variety of methods of changing from one slide to the next – called 'transitions'. These add to your presentation provided they are used sparingly.

Like all technologies PowerPoint needs a little practice to develop your skills in using it. However the basics are not difficult especially if you are familiar with other programs in Microsoft Office such as Word. Try answering the questions below, which should help you avoid some of the more common errors for the beginner.

Mini quiz

1. Which font is better for PowerPoint slides – Times New Roman or Arial?

2. What minimum font sizes are suitable for a) Titles on slides and   b) Text on slides?

3. How many lines of text should appear on a slide?

4. Should the background be pale (with black or dark coloured text) or dark (with white or pale coloured text)?

5. How do you avoid disaster – for instance when the data projector blows its bulb or the data projector won't read your files/memory stick?

Answers

1. In general it is better to use a sans serif font such as Arial to prevent blurring of the text when it is projected.

2. a)Titles should be in a minimum of 32 point. b) Text should be in a minimum of 28 point. You may require bigger fonts in a large lecture theatre. If possible check the slides at the venue in advance to ensure legibility from the back. You may be able to use smaller font if you are presenting to a small group in a seminar room rather than a lecture theatre.

3. Try to avoid more than six or seven lines. Use key words and do not fill the entire slide with text. Don't reduce the font size to fit in more lines – use an extra slide instead.

4. If your lecture is in a dark room use a dark blue or green background with pale text (e.g. pale grey or straw yellow). In a partially dimmed room using a dark coloured font on a pale (and possibly textured) background – but not white - may be helpful if you expect your audience to be taking notes.

5. Never put your complete trust in technology. Use PowerPoint to provide a back up set of your slides.

PowerPoint also includes a number of print options. Particularly useful are those that print either three or six slides to a single A4 page with or without notes. These make ideal handouts if you wish to give your audience the key points of your presentation to take home with them and have space to write notes as you talk.

PowerPoint is not difficult to use and it does bring benefits for clinical teaching. The links and books suggested below should help you if you wish to acquire the skills to enable you to prepare your own PowerPoint presentations.

Using Video in Teaching and Learning

Videotape recorders can be used in a number of different ways to enhance teaching in both large groups (lectures) and small groups. The advent of digital versatile discs (DVD) makes video images easier to use in the classroom, since individual clips can be immediately accessed without searching through a length of tape. Video images can also be made available via a website for students to view in their private study time. Below are some suggestions for how you could incorporate video into your teaching.

To illustrate clinical conditions.
It is important that students become familiar with the principle signs and symptoms of common clinical conditions. However these can be made much more memorable if they are illustrated (with consent) by video clips of patients. Movement disorders (e.g. Parkinsonian tremor) are more easily seen that described. Video tape is always available, can be used in lectures on non-clinical sites without inconvenience to patients and (once compiled) will save you time.

To show complex sequences of events.
Animated diagrammatic representations of complex events can be slowed and deconstructed. For instance in the cardiac cycle the relationship between the electrocardiogram, atrial and ventricular contraction and pressure changes, valve opening/closing and heart sounds is made relatively easy for students to assimilate if illustrated by animation. Such material is commercially available at a reasonable cost.

To show clinical skills.
Teaching in the clinical skills laboratory is discussed elsewhere in this paper, however the correct procedure for basic clinical skills (e.g. venesection, suturing) can be shown on video before the students attempt these procedures for themselves.

To stimulate student discussion.
A carefully structured video can be a good starting point for initiating student discussion of important issues in medical practice. For instance a cross-cultural consultation between a GP and a patient can trigger discussion about cultural sensitivity in the conduct of interviews and examinations of patients with particular religious beliefs.

As an aid to consideration of affective skills.
The three main areas of content in the undergraduate medical curriculum are knowledge, skills and attitudes. Of these, attitudes are generally held to be the most problematic – they are difficult to innumerate and explain to students. However, video recordings enable the student to put technical skills into the context of appropriate professional behaviour with respect to attitude. A good example might be a recording of a doctor explaining to a patient what will happen during an unpleasant procedure such as bronchoscopy. Students may be asked to identify aspects of the doctor's behaviour that were helpful for relieving the patient's anxiety.

**To provide students with feedback on their performance.**
In this application a recording is made of a student undertaking some activity. Afterwards this is reviewed by the student and teacher so that the strengths and weaknesses can be identified with view to improving the student's skills. One good example is the use of simulated patients in learning communication skills. After a five or ten minute interview, the student, teacher and simulated patient (normally an actors trained in feedback skills) can replay the recording and discuss particular aspects. Although perhaps a little daunted initially, most students come to value such feedback.

A number of studies have investigated the use of video recording in communication skills. There are a number of advantages in using video recording (rather than just verbal feedback from an observer) which have been well summarised by Kurtz at al (1998).

Resources for Small Group Teaching

Furniture, space and teaching style
Small group teaching requires different skills and resources from those suitable for the lecture theatre. A good starting point is to consider what sort of small group teaching you are undertaking, and how this relates to the layout of the room. Many seminar rooms are set out with the students in rows, facing the teacher who stands in front of a whiteboard or OHP.
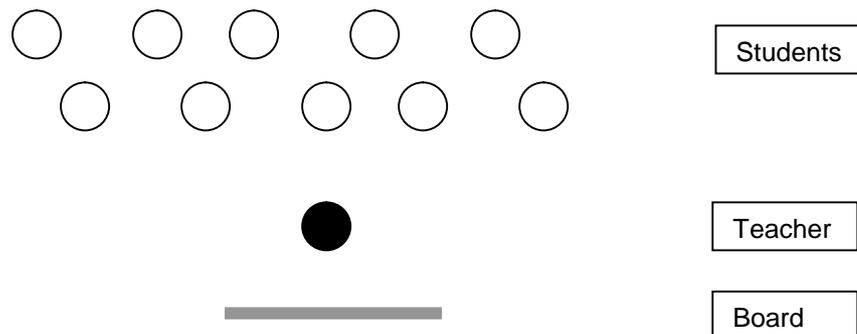

This layout prevents the students from interacting with each other without some difficulty and hence discourages group discussion. The student expectation will be that they are there to gain information imparted by the teacher, and the tendency will be for the teaching to become a mini-lecture in nature. However it should not be impossible to re-arrange the furniture if this is not your intention.
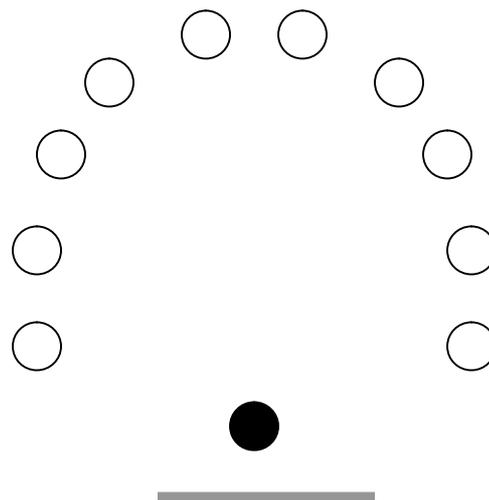
This arrangement, a U shape, is suitable for "closed" discussions (Mackway-Jones and Walker, 1999). The teacher is still a focus for attention and has access to the OHP or board. However the students are now able to see each other, and hence engage in discussion which does not have to be passed "through the chair". The teacher

may also establish good contact with an individual by stepping into the centre of the U. It is also possible to encourage student active participation, for instance by handing over the pen to a student with the words "Perhaps you would like to show us that on the board." Students very quickly adopt the expectation of active participation.

A further re-arrangement changes this format from a closed discussion to an "open" discussion.
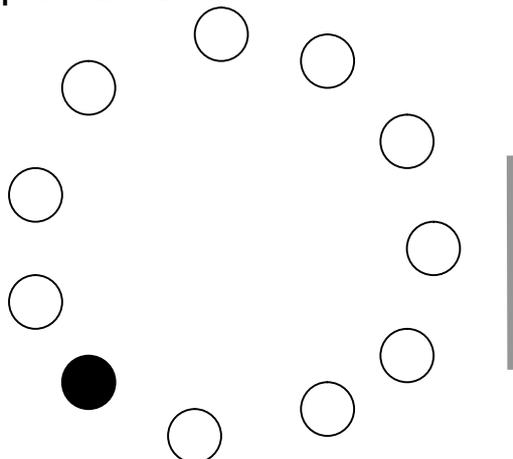
In this circular arrangement the tutor has relinquished the position of power, and is now a member of the group. The whiteboard may not even be associated with the teachers seating position, but with another member of the group appointed as "scribe". This arrangement encourages an open discussion where all learn from participation rather than by teacher-to-student directed learning (the so-called transmitter-receiver model). This arrangement is essential for some activities, such as problem- based learning (see elsewhere in this paper).

Flipcharts and Whiteboards
Flipcharts are a teaching resource well suited to small group teaching (but which are far too small for use in the lecture theatre. In some ways they can be used as a substitute whiteboard (or chalkboard). For instance the group could be asked to brainstorm ("What are the possible causes of chest pain?"), and the tutor records them on the flipchart for later expansion. However they can be used in other ways to advantage.

The group might be divided into two or three smaller groups and asked to consider either the same question or problem, or two or three related ones. Each group is equipped with a page from the flipchart and a pen. After a suitable period for discussion has been allowed the groups are asked to summarise their deliberations and, using the flipchart as a guide, present their findings to the whole group. The various pages might then be attached to the wall with 'Blu-tack' for future reference. (The tutor may wish to retain these as a record, or to type them up for distribution.)

A newer relation of the whiteboard is the interactive white board. This is attached to a computer and data projector. What is written on the board (with an electronic stylus) may be stored as a computer file, printed and copied to members of the group.

Introducing Problem Based Learning

Problem based learning – or PBL – is still sometimes thought of as a new approach to medical education. In fact it was implemented at McMaster University in Hamilton, Canada in the late 1960s. It can also be argued that PBL is the formalisation of a process that has underpinned clinical teaching for many years. PBL is now to be found in undergraduate medical curricula throughout the world, and its introduction in the UK was encouraged by the General Medical Councils 1993 recommendations on undergraduate medical education ("Tomorrow's Doctors").

What is Problem Based Learning?

As Davis and Harden (1999) have indicated there is still some confusion about what PBL really is. It is best thought of as an educational approach where students are encouraged to take an active role in their learning by discussing a problem (or scenario) centred on a clinical situation, community problem or current scientific debate. In the clinical context this might be a description of events when a patient attends a GP surgery or A & E department. The history, presenting complaint, signs and symptoms, ethical issues, investigations needed (and their outcomes) can all be woven into the case as required. The problem has to be written so that the students can identify the areas that they need to explore in order to be able to resolve satisfactorily gaps in their knowledge and understanding that become apparent during group discussion.

A key point in understanding the nature of problem based learning is to differentiate it from problem solving. In problem solving exercises the basic assumption is that the students have the knowledge and skills required to arrive at a solution (albeit that the application to a specific problem may further stretch them). In PBL the problem is the starting point that enables students to identify for themselves new areas for their learning.

For problem based learning to be effective it is important that participants work together in a structured way. Initially a problem, designed by the faculty staff, is reviewed by a group of students. Ideally there should not be more than ten members in the group, and they should select for themselves a student chair and scribe for the session. (The scribe will record the ideas generated by the group on a whiteboard or flipchart). It is the task of the staff facilitator to

ensure that the group works through the problem in a methodical way. A series of steps can be identified – that below is based on the Maastricht seven jumps model.

1. The group starts by identifying any terms with which they are unfamiliar. Some members of the group may have some prior knowledge that will help the group.
2. The students openly discuss the scenario and define the problem.
3. The group brainstorms possible explanations or hypotheses which fit with the events/problems they identified.
4. Some provisional explanations/conclusions are reached that would reasonably explain the essence of the case.
5. The students formulate their learning objectives – those aspects which the group have determined need further study.
6. Working independently (or in pairs) the students use the resources available to them to achieve the learning objectives.
7. The group meets again a few days later to pool the information they have gained from private study and discuss the case in the light of this new knowledge.

Ideally the students and facilitator should then evaluate the case and its suitability for problem based learning. Schmidt (1983) provides a fuller description of the process.

The Role of the Facilitator.

The use of the word 'facilitator' here, rather than 'tutor' is intentional. The traditional tutor initiates activities of the group, controls the content, questions students and imparts information. This type of learning activity may be described as teacher centred. The PBL group is much more student centred, and as we have seen above the students take an active role in defining their learning. If the *facilitator* is tempted into the more traditional role of *teacher* the process is short-circuited and the advantages are lost.

This does not mean that the facilitator is entirely passive. There are practical aspects to making PBL successful – for instance the seating should be arranged in a circle so that all members can establish eye contact with each other (and the facilitator), as described above for the "open" discussion model. The facilitator has prime responsibility for ensuring that the group functions well. Pause for a few minutes to consider what practical skills a facilitator can bring to helping the group be successful at PBL. Compare your ideas with those below.

- Ensuring the group works through each step in turn
- Maintaining a non-threatening atmosphere that permits students to feel able to comment freely
- Making certain that all views are respected
- Encouraging all members of the group to contribute to the discussion

- Keeping the group working together and not splitting into sub-groups
- Asking non-directive questions to stimulate further thinking – for instance requesting clarification or expansion
- Opening new directions of thought for the students to follow
- Restating ideas in a way that helps the group develop them further
- Gentle confrontation if this helps individuals with their thinking
- Providing additional material at the appropriate time (depending on the structure of the case)
- Helping the students to define their learning objectives
- Acting as timekeeper (unless this task is assigned to a student)

From this list it will become clear that skilled facilitators have good communication skills. They must be willing to encourage the students to become active participants in their learning and resist the temptation to take a leading role themselves. Because most teachers are accustomed to a more didactic role introduction of problem based learning almost certainly involves staff development training sessions. Further discussion of the roles and responsibilities of facilitators will be found in Maudsley (1999).

Writing Problems

PBL encourages student independent learning, but the extent to which it is effective is determined (to some extent) by the cases presented to the students. A well-written case will stimulate a lively group discussion, generate valid learning objectives and motivate the students to research the answers. Dolmans et al (1997) have suggested seven principles to be observed in designing cases. These are:

1. The contents of a case should adapt well to students' prior knowledge.
2. A case should contain several cues that stimulate students to elaborate.
3. Preferably present a case in a context that is relevant to the future profession.
4. Present relevant basic sciences concepts in the context of a clinical problem to encourage integration of knowledge.
5. A case should stimulate self-directed learning by encouraging students to generate learning issues and conduct literature searches.
6. A case should enhance students' interest in the subject matter, by sustaining discussion about possible solutions and facilitating students to explore alternatives.
7. A case should match one or more of the faculty objectives.

PBL in the Clinical Setting

The cases for problem based learning tend to be thought of as paper-based – and indeed the majority certainly are. These are suitable for use in non-clinical settings, and extending PBL into the clinical setting has given rise to a number of studies investigating the use of patients in PBL. Aspegren et al (1998) describe how they modify the PBL process in the Department of Surgery in Malmo, Sweden. Before the seven steps were undertaken, a patient joins the group to provide an opportunity for students to interviews and examinations. Further data, such as laboratory investigations may also be made available. The usual stages of PBL are then followed in the absence of the patient. The student evaluation was generally very positive with 26/28 preferring patients to paper cases.

At Manchester, UK, a strategy has been developed to strengthen the link between paper cases and clinical experience in the third and fourth years of the course. (O'Neill at al, 2000). The PBL process is modified to encourage students to bring clinical experience to the first tutorial and to seek experience related to the problem between PBL sessions.

The participation of patients in PBL in the general practice setting has also been reported. (Dammers et al, 2001). A suitable 'problem area' is selected (e.g. chest pain, diabetes) and a patient who "illustrates" the problem area identified from amongst the patients registered with the practice. With the prior consent, the students centre their learning on this real patient rather than on a paper scenario. The benefits of this approach are discussed by the authors.

Developing Study Guides

It is conventional to think of study guides as printed notes, but this website may be regarded as an electronic study guide. Laidlaw and Hesketh (2001) have defined the function of study guides in the following terms:

> *"Not only does the guide give students an indication of what they should be learning, it also informs them how they should best learn and how they can recognise that they have mastered the topic being studied."*

Before producing a study guide it is important to decide what purpose you expect it to fulfil – for this determines the content. At a basic level a guide may just be a statement of what it is the readers are expected to learn and the opportunities available to help them; at the very least this would mean a set of learning outcomes (or objectives) and a timetable of learning opportunities (lectures, seminars, skills laboratory sessions). The contact details of the guide's author should also be included.

However a study guide can be much more than this. It can include material on study skills and preparation for assessment. It can contain exercises to encourage the reader to think through key concepts, and perhaps self-assessment questions. The guide might also direct the reader to further suitable references (paper or electronic) to foster student participation in their own learning. It is also worth giving some thought to presentation. A well-presented document can be a potent motivation for student learning. Here are a few points to think about:

- What size paper will be most useful?
- What font style and sizes – bearing in mind headings and sub-headings?
- Will there be illustrations? (graphs, charts, photos, X rays). Can these be reproduced with sufficient clarity?
- Should colour be used – if so where and why?
- How will pages of the guide be bound together?

If you intend to make the study guide a regular part of your teaching don't forget to evaluate it. Ask the users for specific comments about the parts they found most useful and the sections needing improvement. A study guide that evolves in this way gradually increases its value to the learner.

Finally study guides can be an important part of post-graduate training. Mitchell et al (1998) have published details about the production of a pocket-sized paediatric training guide for use by senior house officers throughout Scotland.

Supporting Clinical Learning with Logbooks

The clinical logbook is an aid to learning in both undergraduate and postgraduate medical education. At its simplest the logbook is a record of individual achievement in a particular field of study. This may be a series of observations made or tasks undertaken. Students normally retain this record as a means of keeping track of their progress, but there may be a requirement for a suitably qualified supervisor to "sign off" the record. Logbooks are usually paper-based, but Alderson and Oswald (1999) have reported that the use of hand held computers is a feasible alternative.

It is important to distinguish between experience and competence. The logbook enables students to record their experiences which then provide a formative assessment of their progress against the checklist in the log (although as indicated below this may not be entirely reliable). For instance they may note that they have observed a particular procedure such as a lumbar puncture or have taken a history from a patient with diabetes. However students are not reliable at self-assessment of competence, and unless carefully supervised the logbook does not demonstrate acquisition of skills.

Clinical logbooks are subject to other limitations. Raghoebar-Kreiger et al (2001) reported on the interobserver agreement in logbook records. Students and two experienced doctors were given identical instructions to record diseases they encountered over a four week period, and analysis showed that the students under-reported compared with the experienced doctors. There is therefore a concern that the log may not be a complete record of student experiences. Furthermore, evidence from Dolmans et al (1999) suggests that logbooks are not as promising as first thought in stimulating student directed learning. They reported that students did not feel logbooks provided sufficient insight into their essential learning activities nor did they cause them to adjust these to improve their experience. That there are wide variations in the experience of students within particular clinical settings is well known (and indeed logbooks may help reveal this, see Davis and Dent, 1994).

Clinical logbooks will continue to have a useful role in medical education, but to reach their true potential further refinement is needed in managing their use.

References and further reading

Overhead Projectors - References
Hayes T and Campbell J (1998). Educational Technology. In:
Teaching and training techniques for hospital doctors. .Bayley T and
Drury M (editors)   Radcliffe Medical Press. ISBN 1-85775-173-6.

Race P (1999). 2000 Tips for Lecturers. Kogan Page. ISBN 0-7494-
3046-X
Using PowerPoint - References and Useful Links
"How to get started using PowerPoint 4.0."
http://library.humboldt.edu/~chadwick/pptintro.htm.
 *A well illustrated step-by-step guide on how to use PowerPoint for
the first time. Includes tips and guidelines to help avoid common
errors.*

"Using PowerPoint".
http://www.microsoft.com/office/powerpoint/using/default.asp
*On-line Microsoft support site that offers self paced tutorials on using
PowerPoint and also "How to…." advice on specific tasks.*

"Using PowerPoint in Courses"
http://cit.duke.edu/resources-guides/methods-powerpoint-
presentations.html
*This is the site of Duke University Centre for Instructional
Technology. This is just one of a number of guides on the site, and
includes tips on using PowerPoint as well as "how to" instructions.*

If you prefer to have a book at hand there are many to choose from.
These include:

PowerPoint 2000 for Dummies (1999).
Doug Lowe and Grace Jasmine
Published by Hungry Minds, ISBN 88-7303-5698
This popular series includes this handy book on PowerPoint.

Sams Teach Yourself Microsoft PowerPoint 2000 in 10 minutes
(1999).
Faithe Wempsen
Published by Sams Publishing, ISBN 0-6723-1440-1
*You would need to be a fast reader to do it in ten minutes, but this is
a well-illustrated and easy to use guide.*

Microsoft PowerPoint 2000 At a Glance (1999).
Published by Perspection Inc, ISBN 1-57231-994-5
*Perspection is part of the Microsoft publishing arm, so this guide is
straight from the PowerPoint originators.*

Using video in teaching and learning - References.

Dent JA and Harden RM (editors) (2001). A practical guide for medical teachers. Harcourt Publishers. ISBN 0-443-06273-0.

Kurtz S, Silverman J and Draper J (1998). Teaching and learning communication skills in medicine. Radcliffe medical press. ISBN 1-85775-273-2

Resources for small group teaching - References.
Mackway-Jones K and Walker M (1999). Pocket guide to teaching for medical instructors. BMJ Books. ISBN 0-7279-1380-8.

Race P (1999). 2000 Tips for Lecturers. Kogan Page. ISBN 0-7494-3046-X

Newble D and Cannon R (2001) A handbook for medical teachers. Kluwer academic. ISBN 0-7923-7029-9.

Problem based learning - References and Useful Links
General.
Boud D, and Feletti, G. (1999) The challenge of problem based learning. Kogan Page, London.

Davis M and Harden R. (1999) AMEE Medical Education Guide No. 15: Problem-based learning: a practical guide. Medical teacher 21(2) 130-140.

Education Committee of the GMC (1993). Tomorrow's Doctors: recommendations in undergraduate medical education. London. GMC

Maudsley G. (1999) Roles and responsibilities of the problem based learning tutor in the undergraduate medical curriculum. BMJ 318 657-661.

Moore GT, Block SD, Briggs Style C, Mitchell R (1994). The influence of the new pathway curriculum on Harvard medical students. Acad. Med 69, 983-989.

Schmidt HG, (1983) Problem based learning: rationale and description. Medical Education 17 11-16.

Writing Problems
Dolmans DHJM, Snellen-Balendong H, Wolfhagen IHAP and Van der Vleuten PM. (1997) Seven principles of effective case design for a problem-based curriculum. Medical Teacher 19(3) 185-189.

PBL in the Clinical Setting
Aspegren K, Blomqvist P and Borgstrom A. (1998). Live patients and problem-based learning. Medical Teacher 20(5) 417-420.

Dammers J, Spencer J and Thomas M (2001). Using real patients in problem based learning. Medical Education 35 27-34.

Links
http://med.queensu.ca/medicine/pbl/PBLHndbkDownLoad.htm
This site contains the Queens University, Kingston, Ontario, Canada PBL handbook and includes an example of a first year problem.

http://edaff.siumed.edu/DEPT/Index.htm
PBL site maintained by Dr Howard Burrows of Southern Illinois University School of Medicine. Includes a comprehensive bibliography.

Study Guides - References
Laidlaw JM and Hesketh EA (2001). Study Guides. In: A practical guide for medical teachers. J A Dent and R M Harden (editors). Harcourt Publishers.ISBN 0-443-06273-0.

Mitchell HE, Harden RM and Laidlaw JM (1998). Towards effective on-the-job learning: the development of a paediatric training guide. Medical Teacher 20 (2) 91- 98

Clinical logbooks - References and Links
Alderson T St J and Oswald NT (1999). Clinical experience of students in primary care: use of an electronic log in monitoring experience and in guiding education in the Cambridge Community Based Course. Medical Education 33 429-433.

Davis MH and Dent JA (1994). Comparison of student learning in the outpatient clinic and ward round. Medical Education 28 208-212.

Dolmans D, Schmidt A, van der Beek J, Beintema M and Gerver WJ (1999). Does a student log provide means to better structure clinical education? Medical Education 33 89-94.

Raghoebar-Krieger HMJ, Sleijfer D, Bender W, Stewart RE and Popping R. (2001) The reliability of logbook data of medical students: an estimation of interobserver agreement, sensitivity and specificity. Medical Education 35 624- 631.

www.rcog.org.uk/resources/worddocs/introductions.doc
Introduction to the logbook on the Royal College of Obstetricians and Gynaecologists website. Includes an example of the log from a completed paper.

CLINICAL SKILLS LABORATORIES

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Introduction

The increasing need for accreditation of medical and healthcare staff in procedures that form part of everyday practice have lead to skills laboratories taking a central role in introducing and assessing skills. Skills labs should also be viewed as an opportunity to integrate the work of health professionals to improve team building. The provision of space within a hospital setting gives a golden opportunity for medical students to be taught at the same time as nursing students or nurse practitioners. Also more specialised nurses can be taught within the skills lab setting along guidelines for practice that are laid down for postgraduate medics.

The Role of Skill Labs in Medical Education

The skills lab forms a positive and safe environment to introduce the basic skills of practice. This should take the form of:

- **Practical Tasks**

- **Communication**

- **Simulation**

Most practical tasks can first be learnt in principle and then practiced on a model for example, this allows the student to travel further along their learning curve before they encounter real patients. It also give them confidence in themselves that they know what to do, who to ask and what they need for a specific procedure. Hence the provision of facilities for the student to both practice and be assessed in their ability to communicate is essential. Combining both clinical skills and communication skills assessment within the skills lab setting allows integration of knowledge and discussion with the student, tutors and peers as to refinement of their technique.

Medical simulation is a rapidly expanding market, which has a significant amount to contribute to medical education and skill laboratories are the place where they sit most naturally from the

most rudimentary plastic models to highly advanced computer generated virtual reality environments.

Skills Lab Users

Clinical skills labs are appropriate for the training of any individual involved in the delivery of healthcare irrespective of level or grade.

Undergraduate medical students:
- Surface anatomy
- Applied Physiology
- Basic Clinical Procedures
- Communication skills
- Examinations

Postgraduate Medical trainees:
- Basic Accreditation courses e.g. basic surgical skills, Advanced Life support, Advanced trauma and Life Support
- Specialist courses
- Examination driven course
- Staff development Courses

Nurses:
- Basic ward procedures
- Integration with medical students
- Specialist nurse practitioners

Others:
- Physiotherapists
- Occupational Therapists
- Paramedics
- ODTs
- Podiatrists
- Lifting training

And of course, for all these healthcare professionals working together in team situations.

Skills Lab Teachers

Tutors from all disciplines should be encouraged to enrich their students learning and their own teaching skills by utilising skills labs.

Usually skills lab teachers are:
- Medically trained – Academics and non-academics
- Nursing Background – Usually have had a senior post prior to taking post
- Associated medical speciality

Many labs have combinations of the above types of people that work in conjunction with other parties or buy in help for very specialised teaching.

For information and a forum to link to parties involved in clinical skills lab teaching the Clinical Skills Network exists to aid communication: *www.clinical-skills-net.org.uk*

How to set up a Skills Lab

Define the need?
Motivation and support for the setting up of a skills lab will only exists if there is population need for a lab and there will be a perceived benefit.

Target student population

The aim of a good lab is that it should be integrated into currently available systems and allow for multidisciplinary sessions.

Write proposal of service to be delivered
A proposal of teaching to be delivered should be prepared with a view to laying out specific plans for target student populations, with realistic goals and endpoints.

Fund raising + Site identification

Funds for labs are usually from regional/Central funds for the purpose of setting up with recurring costs charged to associated hospitals or funds generated form running postgraduate courses.
The site of lab is important; it should be a showpiece, yet easily accessible to allow students to use the lab on a drop in basis to supplement their formalised teaching. The lab space needs to be large enough and versatile enough to provide site for the different

modes of teaching and also allow different sessions to run concurrently

Equipping the Lab
After decisions have been made regarding the usage of the lab the lab can be equipped with instruments that are identical to those used on the wards where the students are going to work.

Bench top models and simulators can be purchased from a variety of source companies who readily give samples and free demonstrations.

Philip Harris medical	www.phmedical.co.uk
Pharmabiotics	www.pharmabiotics.com
Immersion Medical Virtual reality	www.immersion.com
Kimal	www.kimal.co.uk
Adam Rouilly	www.adam-rouilly.co.uk
Laerdel resuscitation equipment	www.laerdel.com

Staffing the Lab
Enthusiastic people with a background in medicine or nursing are ideal. They should themselves continue to learn new skills within the post and attend advanced courses for their own career development.

Continual audit and evaluation of teaching provided
Evaluation not only of students but also of all the aspects of the delivery of teaching within the lab setting is of up most importance to maintain standards. Audit of usage of the lab is again important especially when applying for increase in funding.

Educational Research

In any good unit research projects should run alongside regular teaching which all staff should view as a part of their job description.

Clinical Skill Lab Curricula

A curriculum for the skills lab is important as it is the basis for the teaching delivered. This is particularly so for undergraduate students, where the skills lab teaching should dovetail and complement other teaching that occurs in the school and hospital. Also students need guidance both for using the lab, learning in the lab, revision for exams and reminders when in practice. If possible curricula should be agreed by all parties who have interests in the education of the students. The guidelines should be available to the students and complemented with handbooks and web-based materials that can be updated.

CASE STUDY
The Imperial College Faculty of Medicine provides such a service, attached is a sample for undergraduate medical teaching. This is supplemented by internally created websites that give information to the student regarding skills lab issues in the form of text audio and video. The Imperial website is password protected and only available to staff, students and other authorised users.

Skills Lab Syllabus

<u>Week 1 Objectives</u>

1. Explanation of Electrocardiogram (ECG), performing an ECG and reporting an ECG. Examples of common abnormalities are:

   - Sinus tachycardia
   - Supraventricular tachycardia
   - Ventricular tachycardia
   - Atrial Fibrillation
   - Ventricular fibrillation
   - Anterior myocardial infarction
   - Inferior myocardial infarction
   - Lateral myocardial infarction
   - Left Bundle branch block
   - Right bundle branch block

2. Taking and Charting a Blood pressure

3. Interpretation of ward charts, Temperature charts, pulse and blood pressure charts, fluid balance charts, blood glucose charts, respiratory function (peak flow) charts. You should consider common abnormalities that would occur and how you would recognise them and manage them. Examples are:

   - A post-operative pyrexia

   - A low or high blood sugar

   - A rising pulse and falling blood pressure

   - A falling urine output

4. Ward equipment – On the wards and in the skills labs there should be a box containing medical equipment which you will encounter during your training and will have to know about as a doctor. A list of these instruments with explanations of what they do can be found in the clinical skills website in the section called "Instrument Box"

The learning objectives for the instrument box are:

- Recognise instruments using correct terminology
- Describe their indications
- Describe how they are used and demonstrate if required
- Describe their care on the ward
- Describe any complications that may be related to those pieces of equipment

5. Describe a chest radiograph, abdominal radiograph and a contrast study e.g. barium enema

Week 2 Objectives

1. Scrubbing up

You must learn the technique of washing your hands correctly prior to carrying out a medical procedure. This includes an understanding of which antiseptic solutions are available. You should learn how to don a surgical gown and put on surgical gloves while maintaining sterility. It may be that in you hospital the theatre sister can teach you this in the operating theatre

2. Setting up a sterile field

Understanding the principles of how a sterile field is set-up in a generic fashion is important for the safe and successful completion of a wide variety of medical procedures.

3. Urinary Catheterisation

Having understood the principles of setting up a sterile field you can proceed to learn the skill of urinary catheterisation in both the male and female patient using the models in the skills lab. You must investigate and understand the different types of catheters available and how to size them, as well as the different types of collection bags. You should also be aware of some of the commoner indications for inserting a urinary catheter.

- To monitor urine output
- To relieve a urinary obstruction
- Patients with incontinence
- Immobile/unconscious patients
- Irrigation of the bladder
- Instilling drugs or contrast agents

Rectal Examination
The principles behind digital rectal examination should be learned using the models in the skills lab. A discussion of the types of lesions that could be encountered during a rectal examination should be discussed

Week 3 Objectives

1. Principles of wound closure

This part of the syllabus concentrates on basic surgical skill. Your aim should be to assess a wound, anaesthetise it, clean it and bring the skin edges together. In OSCEs you may be asked to do this in 5 minutes.

Key learning points are different types of wound (e.g. clean or contaminated); important points in the history (e.g. possible foreign body); other investigations that may be needed prior to closing the skin (X ray to exclude glass fragments

2. Local Anaesthetic injection

The principles of the action and delivery of local anaesthetics to superficial skin wounds should be discussed together with safe dosages of the commonly used drugs such as Lidocaine (lignocaine/xylocaine) and bupivacaine. The indications and potential dangers of using adrenaline with local anaesthetics must be clearly understood.

The method of injecting the anaesthetic into a wound should be practiced on simulated skin pads.

3. Suturing

You will be expected to be able to close a skin wound with interrupted sutures. In order to do this you must understand the role of and how to use the following items:

- Needle holding forceps
- Toothed & non-toothed forceps
- Suture scissors
- Dissecting scissors
- Scalpel – Understand principles of different blade sizes, how to load and unload the scalpel, how to handle the scalpel and incise skin.
- Also you must understand the principles behind suture materials and needles, their different sizes and how to choose appropriate materials for specific tasks
- You should be able to insert a simple interrupted suture and perform an instrument tie, which results in a secure knot.
- Have knowledge about duration that sutures should stay in skin.

4. Knot tying
You should be able to tie reef knots with your hands, initially with thick cord and then with suture material. Both suturing and knot tying should be practised wearing gloves

5. Principles of lesion excision
You should now be able to put together the skills of setting up a sterile pack, scrubbing up and donning gloves, and anaesthetising the skin to excise a mole from a skin pad and close the resulting ellipse with sutures.

Week 4 Objectives

1.   Venous access

You must learn a safe and effective way of gaining venous access, as this can be a life saving manoeuvre. You will be expected understand the principles of use of an intravenous cannula, how to size them and which ones to use where. Cannulation can be practised on the rubber IV arms in the skills labs.

2.   Setting up an infusion

You must know how to set up an intravenous fluid infusion and be aware of the different types of giving sets available. The types of fluid that can be given are covered in the "instrument box" section on the clinical skills website.

3. Taking blood

You must be able to take blood from a patient safely. The objectives are to take blood using a syringe, a vacutainer system and a butterfly system. You must also learn which colour blood bottles are for which tests.

4. Central Lines

You need to be aware of central lines and their indications. You must especially be aware of the principles behind the measurement of the central venous pressure and why it is important in the fluid management of a patient. You are not expected to be able to perform central line insertion.

5. Other delivery systems and investigations

- How to give an intramuscular injection, in thigh, deltoid and buttock illustrated with examples of when each procedure is indicated
- How to give a safe subcutaneous injection with examples
- How to give a safe intradermal injection with examples
- How to safely perform a blood glucose stix measurement
- How to perform a dipstick investigation and pregnancy test of urine

Week 5 Objectives

1. Life Support
Involving the principles behind basic and advanced life support in the community and hospital settings

2. Airway management

Different types of airways and their usage
- Masks
- Oropharyngeal airways
- Nasopharyngeal airways
- Endotracheal tube
- Tracheostomy

3. Arterial Blood gas measurement

Principles behind arterial puncture, demonstration on IV arms, also an understanding of common blood gas abnormalities and their significance.

4. Pulse oximeter

Its usage and interpretation

Week 6 Objectives

The final week is an opportunity to reflect on the skills you have learned and marry this with your experiences when taking histories and examining patients. You should then approach the performance of the skills as if it were real life; you could even paint yourselves scenarios in groups.

You should try to run a mock OSCE of approximately 6-8 stations with your firm leaders. This will help consolidate knowledge, identify weaknesses and practice for the OSCE at the end of the year. If this process is repeated with each firm the OSCE will be easier to cope with. It is also envisaged that by the end of the year you would also have completed on patients a significant number of procedures that you practised in the skills lab. The end of firm OSCEs could form part of your end of firm assessment