3 How to run a discussion group

—Roger KJ Simmermacher, John R Kues

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4 How to run a practical

—Piet G de Boer, Linda Casebeer

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4 How to run a practical

1 Introduction

The practical element of a course has been one of the defining characteristics of AO education from the earliest courses in the 1960s. Teaching practical skills, using cadaveric material and then plastic bone was then, 40 years ago, almost unique in the teaching of surgery. Practical exercises (practicals) remain the most widely appreciated part of an AO course when assessed by the course participants.

The use of surgical technical skill training from bench-model courses using synthetic and animal tissue or a combination of animal or cadaveric material to simulate various types of surgery has been identified as a key component in a systems approach to reducing errors in the operating theater [1]. Workshops allow hands-on demonstrations of procedures and practice, particularly suited to the teaching of surgical skills that can be learned effectively by demonstrations from experts followed by practice.

Although the most important relationship in teaching surgical skills is that between the table instructor and the course participants, the practical director has a critical role in ensuring that practicals run successfully from an educational point of view.

The relationship between table instructors and course participants is crucial.

2 Before the course

2.1 Timing

The most common criticism of practicals is that insufficient time is given for the practical exercises. Therefore, the first task of the practical director is to establish with the course chairman that sufficient time is given within the program for the individual practical exercises.

The timing of the video is, of course, available by looking at the label on the video box, but the time required for each individual exercise can usually only be assessed by experience. If the practical director has no personal experience of the practical, discussions with colleagues and/or the chairman are vital to ensure adequate timing is given. Remember to allow time for interactivity between the table instructors and the course participants prior to starting the practical itself. Evaluations of many instructional experiences indicate that what was taught was not, in fact, learned, indicating the need for "overteaching" or repeated practice of new learnings so they can be reproduced fluently in the practice setting [2]. Also remember to allow sufficient timing for evaluation and feedback at the end of the session.

One of the most powerful effects in the instructional process is practice with feedback, and it is estimated that up to 50% of course time should be spent in practice with feedback [3, 4].

2.2 Relation to the course

Practical exercises should fit naturally into the course program. The stages of mastering new skills can be summarized as:

- Acquiring knowledge of what should be done and how.
- Executing the responses in a series of steps.
- Transferring control from the eyes to other senses.
- Automatization of the skill.
- Generalization to a wider range of applications [5].

Ideally, therefore, they should be positioned after the lectures relating to the topic of the practical and adjacent to any time given for group discussion work concerning the subject matter.

The appropriate sequence is to explain **(Fig 4-1)**, demonstrate, involve, coach, and test (EDICT) [2].

...explain...demonstrate...involve...coach...test

With complex exercises involving expensive course material it is not uncommon for there to be insufficient material for all the course participants to carry out the practical at the same time. Under these circumstances participants have to be divided into two groups and for the practical to take place on two separate occasions. If this is inevitable, then great care must be taken to negotiate the timetable of the practical to avoid the problem of doing a practical before the lectures relating to that topic.

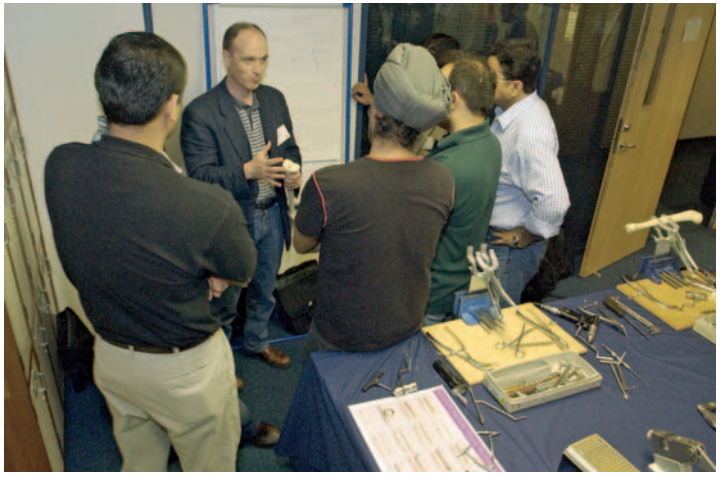

Fig 4-1 The table instructor is explaining the part of the practical after having seen the video sequence and before course participants start with the hands-on exercise.

2.3 Videos

The effective use of media in instruction requires an organized approach. The ASSURE model identifies various elements of this approach, including:

- Analyzing learners.
- Stating objectives.
- Selecting methods, media, and materials.
- Utilizing media and materials.
- Requiring learning outcomes.
- Evaluating the outcomes [6].

The media chosen for instruction must be able to transmit the necessary information, supply the instructional stimuli, which the content requires, and help the course

participant to engage in the learning activity. For teaching practical skills, videos are the obvious choice to meet these requirements [5, 6]. However, practical aspects, such as costs and flexibility in updating the material, may influence the usefulness of any particular media [6]. Videos are usually available for each practical exercise. Videos literally take hundreds of hours to prepare and are very costly to make. Updating of videos occurs infrequently. It is important for practical directors to compare the materials' objectives against the course objectives and criteria [5].

Obtaining appropriate materials usually involves three choices:

- Finding available materials.
- Modifying existing materials.
- Designing new materials.

Fig 4-2 The practical director is reinforcing a critical step, previously shown in the video, by demonstrating it live over CCTV. Without preparing himself and knowing the contents of the video, he would not be able to do so.

If appropriate materials exist, time and money are saved. When materials do not match objectives, adapting materials is an option, although this is more difficult in video production than other media [6].

Most practical directors will find that the video, that has been made available for their use, does not perfectly match their teaching and learning requirements. Decisions need to be made well before the course, if this is the case. Various solutions are available:

- If there is a considerable amount of time available, it might be possible for the video studio in Davos to rework the practical video. This is expensive and time-consuming. It should therefore only be done in exceptional circumstances. In practical terms this rarely happens outside the Davos courses themselves.

- The practical director could elect to leave part of the video out, or on occasion, run part of one video and part of another one.

- The practical director might elect to do some or all of the practicals live over closed-circuit television (CCTV). This is a very high-risk strategy! Experience has shown that live demonstrations always take longer than the video themselves. Unless you have an exceptionally good cameraman and you are very experienced, the quality of the images sent over the CCTV is unlikely to match that of the teaching video available to you. For that reason, getting rid of the video is rarely advisable. Individual points which are not clear on the video can, however, be shown by a live demonstration on the CCTV **(Fig 4-2)**.

2.4 Learning objectives

Most practicals now carry a list of learning objectives with them. An educational objective is a precise statement of intent of what the learner should be able to do at the end of the practical session [5]. It is critical that the practical director establishes those learning points he wishes to transmit during the practical. In choosing objectives, relevance and viability should be considered [5]. The maximum number of learning points for each individual practical is variable, but three to four would appear to be the optimum level.

The practical director should carefully note his learning objectives and these should form part of his presentation to his faculty at the precourse and to the course participants during the practical itself.

It is very useful for faculty to have a short printed handout of the learning objectives of each practical given to them at the precourse.

2.5 Practicals

All practicals require a certain amount of instruments and implants and an appropriate bone/soft-tissue model. Many hundreds of models now exist, and the number of teaching videos is also rapidly approaching the 100 mark. Videos have been reworked over the years to reflect changes in technique and changes in instrumentation, and it is not infrequent that a practical director would find that the video that he has been supplied, the bone model available and the instrumentation that is to be used, do not precisely match up. These problems have become considerably worse in the last 2–3 years with the introduction of LCP (locking compression plate) technologies and the rapid development of different teaching models to demonstrate this new technology. Providing the practical director finds this out sufficiently in advance, the problem can usually be resolved. Never assume that instrumentation, implants, bone model, and video will match up. Always check it with the course chairman and, if necessary, contact the industrial partner in advance.

2.6 Chunking

The videos provided vary in length from 5–25 minutes. Traditionally, AO practicals involved running the video from start to finish and then allowing the course participants to proceed with the exercise. It is clearly impossible for the course participants to fully appreciate the entire length of a complex practical and, therefore, practical directors must, before the course, decide how they are going to divide the practical up into manageable (learnable) "chunks". The traditional approach of presenting lengthy sets of content proves less than optimal as a teaching tool. The "chunked" method, on the other hand, is an excellent format for formal small and large-group instruction [7]. The most frequent error in instructional design is to make the chunks of instruction too large [4]. Once the nature of the chunks has been established, practical directors should then decide which other key steps are involved and what the learning objectives of each section of the practical should be.

Careful planning and timing of the individual chunks is essential for digestible learning portions.

Once this has been done, a timetable for the running of the practical can be constructed. This timetable would include the start time and the time that the practical director feels would be necessary for each particular chunk of the practical to take place. Included into the timetable would be the learning objectives of the practical as a whole and the key points for each particular section or chunk of the practical. This document can form the basis of a handout at the precourse as well as an aide memoire for the director himself while the practical is running.

Future AO teaching DVDs will be prechunked with information available as to the length of each particular chunk.

2.7 Venue and setup

The setup for most practicals include TVs within the practical room to allow the course participants to see the video. Most practicals have a CCTV system so that the practical director can appear on these TV screens. The quality of the camera work varies enormously from venue to venue. Some long-established courses have professional cameramen and sound technicians managing the CCTV. Most courses have a hand-held, or tripod-mounted camcorder with limited zooming facilities. The practical director must check, in advance, what is available for his particular practical and talk with the cameraman/technician to tell him exactly what is required during the practical. It is useful to be able to project onto the TV screens the aims and objectives of the practicals as well as the key points for each chunk of it. This can be done through a camcorder focused on a flip chart **(Fig 4-3)**. Other alternatives include the use of a computer and projector.

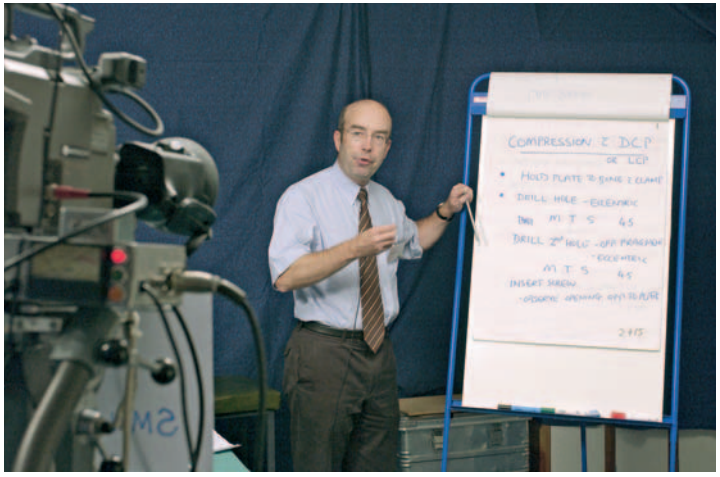

Fig 4-3 Camcorder focused on flip chart and practical director. It is important that the practical director checks the equipment and discusses the requirements with the technician in advance.

2.8 Preparing your presentation

As with formal lectures, an important part of the instructional design process is to start by defining your conclusions. This is the most important part of your message and the one that is most likely to be remembered by the course participants **[4, 5]**. Clearly your conclusions should be based on the learning points that you wish to bring out throughout the presentation. Then work backwards through the presentation, thinking about the learning objectives for each particular section of the practical and finally prepare the introduction.

3 At the precourse

The amount of work that you have to do at the precourse will depend largely on the faculty that you have been allocated to help you with the practical. In rare incidences, all the faculty members will already be familiar with the practical and with the learning objectives from it. Most of the time, however, your faculty will vary from those who are extremely experienced to those who are just starting their AO teaching career as a table instructor.

3.1 Learning objectives

The key to success of the practical is to ensure that the table instructors providing the one-on-one teaching and learning experience are familiar and content with the learning objectives that you have decided are important for a given practical. In most incidences no problems will arise—but on occasion some faculty members (usually senior) may have other ideas about what the nature of the learning objectives are for a particular practical. Their concerns must be discussed openly at the precourse and a common line agreed upon. A key to effective instructional design, which leads to desired outcomes, is consensus on the desired outcomes as stated in the learning objectives that are communicated to learners [4].

Key is to:

- **Decide on learning objectives.**
- **Agree on learning objectives with faculty at precourse.**
- **Communicate learning objectives to course participants.**

3.2 Timetable

The precourse is the opportunity for you, as the practical director, to produce the timetable for the practical. This will give the table instructors an understanding of the time constraints under which they are operating and how the practical is to be split up.

3.3 Video

Traditionally, the practical videos have been played at the precourse in their entirety. This has, in the past, led to very long, tedious, and unpopular precourses, and it is unreasonable to expect faculty members to watch upwards of 3 hours of video, while maintaining even the slightest degree of interest. It is therefore best to only use videos for controversial or difficult points. Most course chairmen now circulate the videos to be used in the practicals to all the relevant faculty members before the course. This is usually in a CD-ROM format. Note that although CD-ROMs can be used on your laptop to prepare for courses, they do not give sufficient clarity of image to be used on the courses themselves. A DVD-video format will be available in 2005 to get around this problem. In theory, therefore, all the relevant faculty members will have had an opportunity to review the videos before the course begins. Do not, however, make that assumption. The vast majority of faculty members do not preview the videos until shortly before the practical, and it is unwise to assume a familiarity of the material while discussing it at the precourse.

3.4 Deviation

Nearly all of the faculty will be considerably more senior than the course participants. They are usually fairly experienced surgeons and—like most orthopedic surgeons—have developed their own particular ways of performing an operation. The teaching videos used in a practical represent best practice; but most if not all, of the faculty will have in the course of their career, developed various tricks and tips when dealing with a particular clinical problem. There is an overwhelming desire on the part of the table instructors to confer this additional knowledge to the course participants. How often have you heard "I know that they do it this way in the video, but if I were you, I would just do it this way". To the individual practitioner such advice may seem, at best, highly useful and at worst, harmless; but the reality is that if the faculty covertly or overtly disagree with the teaching video then the confidence of the course participants is severely dented. It is therefore wise at the precourse to ask all the faculty members present if there are any aspects of the practical with which they disagree and have an open discussion as to what the common approach is going to be. Faculty must understand that it is better for them to take a united stand, advocating one particular line of therapy even if individual members of the faculty believe that there maybe better ways of doing things.

Faculty must understand that it is better for them to take a united stand, advocating one particular line of therapy even if individual members of the faculty believe that there maybe better ways of doing things.

3.5 Running the precourse session

The precourse or shortly afterwards is the last time that the practical instructor has to ensure that the appropriate teaching material is available. The effective use of media and materials, as defined by the ASSURE, requires previewing the materials and making sure all media and materials are available and fit the required teaching scenario [6]. It is also his opportunity to check out the AV system, the CCTV, and to discuss with the cameraman/technician exactly how he wishes to proceed and how he wishes the video to be divided up and shown.

Most AO courses extend between 3 and 5 days. For 4- and 5-day courses it is probably wise to not discuss all the practicals at the precourse, but to discuss the first ones at the precourse and the subsequent ones at the faculty meetings that are held regularly throughout the course.

4 During the course

4.1 Setup

Always arrive 10–15 minutes before the session is due to start and ensure that your teaching material is correct. This is also an opportunity for you to have last-minute discussions with the cameraman and technician with regard to how you wish him to cooperate during the course. If you are doing the first practical of a course then go into the practical room to check out the visibility of the screens and the audibility of the sound system.

4.2 Introductions

Introductions should be brief and to the point. They should include the learning objectives of the practicals.

Fig 4-4 It is important, that course participants fully concentrate on the video chunk. The hands-on work must therefore stop immediately as soon as the television screen comes on.

Trying to put a degree of clinical relevance into it is also a very good attention grabber. The introduction serves as an advance organizer and an aid to effective instruction; an advance organizer may include an overview of the information, a statement of principles contained in the information, and a statement of objectives. Studies have demonstrated the contribution of an advance organizer to the increased effectiveness of instructional courses [6, 8]. The introduction is also an opportunity for the practical director to inform the course participants how he wishes the practical to run. If you are conducting the first practical then information also needs to be given with regard to safety, goggles, sharps, etc. It is also essential for the practical director of the first practical to inform the course participants that following cessation of the video he will expect them to link up with their table instructor for a brief discussion before commencing work on the practical. Finally, mention must of course be made that when the television screens come on, all work should cease promptly **(Fig 4-4)**.

4.3 Handing over to the table instructors

The course participants, having heard the introduction and watched the first part of the video, will be incredibly keen to start working immediately. It is therefore vital that when the video stops, the practical director comes back onto the CCTV screen to direct the course participants to their table instructors and to lay out the nature of the discussion that he wishes them to have. A useful way of ensuring that course participants do not start the practical too early is to ensure that the air supply for the power tools is not switched on immediately after the video stops. This requires careful negotiations with the technical staff who naturally prefer to have the air switched on for the whole of the session.

4.4 Timing

The practical director must keep a close eye on the timing throughout the practical. If a table instructor brings to his attention the fact that many of the course participants are making the same mistake, then it is worth pointing that out to the course participants before the next set of videos are shown. Be very careful, however, at showing course participants work on the CCTV. Course participants do not take kindly to public humiliation. Having their genuine mistakes put on public display provides a very negative form of feedback to them.

Most practical directors do stroll around the room during the practical, to get a sense of how things are working.

- **On occasion timing goes badly array. If it is clear that a practical is going to overrun then two options are available:**
  - **The practical can be allowed to continue for the appropriate required length. You can really only do this if you are talking about 10 minutes or so, because the 10 minutes extra, that your practical takes up, will inevitably eat into 10 minutes of free time available to the course participants. All courses are extremely intense experiences for faculty and participants alike. Both faculty and participants require some down time during the day to reflect on what they have seen and learned and to allow them some time to recharge their intellectual batteries. Also remember that coffee breaks often provide the best informal learning conditions on any course.**
  - **Cut out the last sections of the practicals. It is far better to do three-quarters of a practical correctly than to rush through the whole practical in an effort to meet a time deadline. There is a natural tendency on behalf of faculty and course participants alike to feel that the most important thing in a practical session is to complete the exercise. Although this is important, rushing through rarely produces good learning outcomes.**

4.5 Discipline

Discipline can be very hard to maintain during courses. There is considerable variation worldwide as to what is and what is not acceptable behavior amongst the course participants. In many parts of the world and in many courses, course participants do not stop work when the television screens come on. Ignoring this never works and even though it may take a minute or so to restore order, this is time that is very well worth taking.

4.6 Summarize

At the end of the practical, summarize the learning objectives for the course [4]. Try to concentrate on the positive aspects of the work that has been shown and don't dwell on any problems that arose. Ensure that the course participants leave the room with a clear understanding of what was required of them and what they have done and give clear directions as to their next assignments.

5 After the course

5.1 Chairman's report

Techniques change, videos alter, and equipment becomes more or less complex. Therefore, some practicals that used to be rushed through in one hour, can now be comfortably handled in 3/4 hour. Other practicals have grown in their complexity and time requirements. New videos, which have been meticulously worked out, may on their first time of showing turn out to contain serious potential errors and areas of ambiguity. New bone models, which worked perfectly in testing, may fracture with monotonous regularity in a course situation.

Feedback is therefore essential to give your successor some idea of the successes and failures of your practical and the potential pitfalls to avoid. This serves as a means of formative evaluation, allowing for important revisions when the course is next offered [5]. If any issues therefore do arise, you are advised to communicate with the course chairman, so that appropriate modification can be made in subsequent courses.

5.2 Participant assessment

At present, the AO carries out no formal long-term assessment of the effect that skills' training has in the surgical practice of the course participants. Experience at the courses has shown us that most participants can have the psychomotor skills improved considerably as a result of the experience of going through an AO practical. We do not know, however, whether this experience is translated into their everyday practice after the course.

5.3 Conclusions

Practicals remain one of the bedrocks of AO education. The success or failure of the learning experience will be largely determined by interaction between the table instructors and the course participants. It is the job of the practical director to structure the learning experience in such a way that this relationship can be optimized. Meticulous plan of the practical before the course, together with the creation of agreed learning objectives and a timetable, are the keys to success. The days of run the video and now do the practical are over.

6 Anecdote

Even the most experienced educators, in the end, meet their match. Full of confidence I was asked to sort out a problem during a practical in Davos. What had happened was that six of the course participants had decided to fix the ankle fracture in an extremely idiosyncratic way, bearing no relationship at all to what the video had suggested. The table instructor had said that he had been unable to resolve the issue and I approached the table, brimming full of confidence. Standing with an open stance—and in the friendliest possible way—I enquired in the correct fashion "My, that looks very interesting, can you tell me why you do it this way?" There was a brief pause, and the course participants replied together "Because that is the way we do things in our hospital". Not put off, I then asked "Can you tell me why you do it this way in your hospital?" Quick as a flash came the answer, "Because our professor tells us to do it this way". I still was not beaten, so asked "But can you tell me why your professor asks you to do it in this particular way". There was a brief pause, and the answer came back "Because that is the way we do it in our hospital". After two more circuits round this somewhat curious conversation, I gave up. Modern AO teaching techniques cannot cope with hierarchical medical systems that have been in use for many centuries.

Piet G de Boer

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