

Effective teaching in medical schools

Guiding principles

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ABSTRACT

المتصدرون لتدريس الطب هم في العادة الأطباء الممارسون لمهنة الطب. كل ما يحتاجوه لشغل وظيفة تعليمية هو تحصيلهم للمؤهل العلمي والتدريب في تخصصاتهم. هذا الرأي مبني على الافتراض أن المتخصصين الممارسين لمهنة معينة قادرون على ترجمة الممارسة إلى قدرة على تعليم هذه المهنة. وعلى الرغم من أن هذه الفرضية تتغير وتتطور بشكل سريع وبالرغم من وجود برامج تطويرية في الكليات إلا أن أعضاء هيئة التدريس في كليات الطب لا يزالون يواجهون التحدي في كيفية دمج مهمة التدريس مع الممارسة الطبية اليومية بكفاءة وفعالية. لقد قمنا في هذا المقال بتقديم وعرض مبادئ أساسية في العملية التعليمية لأعضاء هيئة التدريس الممارسين للتخصصات الصحية وذلك لتطوير ممارستهم لمهنة التعليم. كما قمنا باستعراض آراء بعض الكتاب في مجال النقد في التعليم، حيث تم جمع مؤلفات تركز حول هذه القضايا. لقد تمت مناقشة ١٧ مبدأ، ودعم كل مبدأ بمثال واحد على الأقل. واستخدمت هذه المبادئ كتوجيه وإرشاد للمبتدئين والخبراء على حد سواء. ومن أجل الارتقاء بجودة ممارسة التدريس يحتاج أعضاء هيئة التدريس في التخصصات الطبية لدراسة علم أصول التدريس والبحث عن التغذية الراجعة من زملاء المهنة الذين درسوا ومارسوا مبادئ التعليم.

Clinical teachers have high qualifications in their specialty, but some of them do not have training, or proficiency in teaching, and education. Therefore, they may face the challenge of effective teaching in their daily practice. The objective of this study is to present some basic guiding principles for novices and expert academic health professionals. An overview from the perspective of the authors on critical fields in education was conducted. Seventeen principles (supported by one or more relevant examples) are discussed. To improve the quality of their teaching practice, academic health professionals need to study the pedagogy of education, and to seek feedback from colleagues who have already studied and practiced the principles of learning and teaching.

Saudi Med J 2012; Vol. 33 (3): 237-243

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Teaching is often difficult, even for experienced clinicians who find that they are not as effective in enhancing the learners as they would like to be. Clinical teachers in medicine are usually competent practitioners of their craft. They are required to have high qualifications and training in their specialty. Just like learning medicine, there is a basic science and applied science to teaching and education. Rarely do academic leaders expect their teachers to have undergone formal, or even informal instruction in the basic concepts and principles of education.¹ There is a tacit assumption that expertise in medical practice will translate into proficiency in teaching.² The purpose of this paper is to introduce some general principles that can be useful to interested clinical teachers who would like to improve their teaching practice. Teachers are advised in this overview to plan their sessions in terms of what their students are supposed to learn or do, rather than what they are going to do during the session. What students do is more important in determining the learning outcome than what the teacher does.³ The information on pedagogy may not be easily accessible to the clinical teachers, it is a whole field of science that can improve educational practice, just as clinical evidence improves clinical practice. An overview from the perspective of the authors, and recent update on relevant medical education literature were conducted.

Disclosure. This study was supported by the College of Medicine Research Centre, Deanship of Scientific Research, King Saud University, Riyadh, Kingdom of Saudi Arabia.

Teaching principles. We propose for the teachers to ask themselves, "What should we do to help our students learn?". These principles are derived from adult learning theories, best practices, research, and best evidence medical education.^{4,5} We believe that these principles can be useful to both novices and experts because their importance has been shown by learning theories, best practices, and research:

1. Familiarize yourself with the learning outcomes of a course: Generally speaking, teaching activities and courses should be arranged to form a coherent program. The institutional committees, regulatory bodies, or relevant committees have predetermined the learning outcomes for the whole medical school curriculum. Just as musicians in an orchestra cannot play their own part individually, education is a concerted effort. The teacher should be aware how, and where his content fits into the medical school curriculum. It is the responsibility of the educators to seek information on the learning outcomes of the courses they teach. The learning outcomes should prepare the students for the future phases of the curriculum, and build on what was learnt earlier to avoid unnecessary repetition. Well-written learning outcomes provide the framework that determines which course content, strategies, resources, and assessment are required.⁶ The teachers can familiarize themselves with the learning outcomes by reading the study guide and the curricular document, and participating in course and curriculum meetings.

2. Plan for learning stimuli by providing students with material for study before the learning session. The learning stimuli (triggers) represent the material prepared for the session to act as the starting point for learning. Learners' current knowledge and experience are critical, and an important resource in new learning situations.⁷ Knowles⁸ described adult learners as using their own experiences as an important resource for learning. One example of a learning stimulus is to provide students with handouts before the session containing case scenarios, questions to be answered, or blank spaces to be filled out. Students should ideally study and think about the material, and prepare questions on it before the learning session. The learners should be encouraged to clarify relevant basic concepts and principles, both before and during the session, such as the physiology and anatomy of the system, or the clinical topic that will be discussed. Learners who have well-organized prior knowledge regarding the topic demonstrate better strategic behavior, make better judgments, and assimilate new instruction more completely than learners with limited prior knowledge. A pre-test to assess understanding of prior learning is a good practice.

The advantage of this elaboration principle is that it ensures that the structure of the session is explained to the students in advance, appropriate illustration is provided, and the learning process is organized. Moreover, it stimulates students to study the prerequisite concepts and principles, and increases their cognitive engagement.

3. Establish relevance by relating education to real life problems, and integrating basic sciences with clinical sciences. Significant learning, it is argued, takes place when learners choose what, how, and when they want to learn. When the material to be learned is personally relevant, learning outcomes improve. The goal is therefore to enhance the ability of learners by engaging them in real life tasks.⁷ When the learning process is meaningful to the learner's situation and work environment, the information is likely not only to be retained, but also to be used, leading to a change of behavior and practice. Therefore, the challenge is to stimulate the students' learning by explaining the relevance of the learning content for their practice. For medical and other health professions' students, basic sciences should not be taught separately from the clinical sciences and real life clinical problems. The tendency in traditional methods of teaching is to teach students something that will be used later (maybe after a few years), and the content of a unit is seen as independent of its clinical application. It would be much better if the tasks and content (for example, basic sciences and clinical application) were combined to provide an authentic context for the student to see the relevance of what they learn during a course. The principle is to foster transfer of learning, helping learners to integrate what they have learned to allow them to tackle complex tasks, or problems.⁹ In the classical approach, curricula are atomistic and modular, and integration is left to the learner. Modern programs are holistic and provide integration by enabling learners to practice complex (holistic) tasks in increasing steps of complexity.

4. Stimulate curiosity and interest among students. Human beings (curious beings) have a natural propensity for learning. Inquiry methods of teaching and learning either start from existing interests, or confusing phenomena, or paradoxes that are presented to the students. This will hopefully produce a reaction in the students that is conducive to active contribution and participation, which will foster deep learning. Many of the principles discussed in this article have a role in stimulating curiosity, such as learning stimuli (triggers), safe environment, constructive feedback, and the next principle encouraging students' contributions. It is a good idea to use different instructional methods

like demonstrations, discussions, seminars, small group work, questions and answers, and so forth, as they break the rhythm, reduce passivity, increase enjoyment, and hopefully stimulate more active participation.

5. Encourage students to actively contribute to the educational process. Students do not learn much just by sitting in lecture rooms listening to teachers. New knowledge is constructed by the learner in a process of building new relationships essential to learning. One model suggested for the building process is the notion of "schema" - the building blocks of cognition.¹⁰ Learning is enhanced when learners participate in the construction of the model (schema construction), and later in summarizing the topic (schema refinement). Active contribution facilitates a deep approach to learning, characterized by understanding concepts, rather than rote learning of facts. For example, the teachers rather than explaining to their students the consultation model, or characteristics of a good doctor can divide the students into small groups asking them to role play a consultation, and discuss the positive and negative aspects, or asking them to list the characteristics of a good doctor. Alternatively, the teacher can show the students one model, and ask them to add to it, or show them a model, and ask them to compare it with their model.

6. Provide a safe learning climate. When students feel secure and comfortable asking questions and expressing themselves, then the learning climate is likely to be a safe one.¹¹ Significant learning takes place in non-threatening environments. Frequent quizzes that carry marks create stress for students, and therefore may hinder learning. Similarly, humiliating or embarrassing the students makes the environment unsafe and conducive to superficial learning. Clinical teachers should ensure as far as possible that students are not exposed to early failure. Students should be asked to perform simple tasks at the start, and be praised for the positive aspects of their performance, so as to enhance their self esteem and confidence.

7. Provide your student with opportunities to practice and plenty of learning resources. The teacher should ensure that there are a plenty of opportunities for the students to practice new skills, for example, case studies, assignments, web-based questions and cases. Role play and simulations in the clinical skills lab, standardized patients, manikins, and students practicing among themselves can help students master the essential psychomotor and other skills to a specified level of competence.¹² These methods provide hands-on learning experiences for the practice of clinical skills, which are deemed essential for effective and safe

management of future patients. The practice should be complemented by appropriate assessment and feedback, before students can engage in encounters with real patients.¹³ The relevant resources, such as articles, books, videotapes, should be available to the students. These resources can be provided in the form of reading materials, self-assessment exercises on the web, and other internet resources. Computer-aided learning and simulators in clinical skills laboratories are other examples. Encourage learners to identify and share resources, and devise strategies for using the resources to promote achievement of learning objectives.

8. Establish a collaborative and team-based learning environment. Good learning, like good work, is collaborative and social, not competitive or isolated. The teacher should foster cooperation and exchange of views between students. The student needs not only intellectual development, but also ethical development and professionalism. Learning is rarely an isolated event. Future health professionals will be learning from and with other people. A collaborative atmosphere, in which each student is encouraged to understand different perspectives, and even contribute to the development of different perspectives will be conducive to learning in the long term.⁷ Cooperative learning is the instructional method of choice to maximize student learning. It develops when certain conditions are present, such as positive interdependence, individual accountability, promotive interaction, social skills, and group processing.¹⁴ Positive interdependence is a situation, in which students work in small groups to maximize learning of all members, share resources, provide support to each other, and celebrate success. Individual accountability means giving an individual test to each student, having students explain what they have learned, or observing and documenting the contribution of other students. Promotive interaction occurs when group members help and assist each other, exchange information and material, provide each other feedback, challenge each other's reasoning and conclusions, work hard to achieve common goals, and act in trustworthy ways. Cooperative learning requires interpersonal, small group skills, and group processing. Students need to learn decision making, trust building, communication, and conflict management skills in order to promote cooperative learning.

Clinical teachers can promote collaborative learning by dividing students into small groups, and working on a common task like a project, reflecting on a report, or on a literature review. The teacher can use a discussion board and internet technology to promote collaborative learning. The teacher can pair low achievers with high

achievers, to encourage peer teaching and learning, and reward the high achievers for helping the low achievers. Team-Based Learning (TBL) is not just “group work” of any kind. It is a specific instructional strategy that motivates students to prepare for class, and increasingly hold each other accountable for doing so, in addition to peer evaluation. Without peer evaluation, it is not TBL.^{15,16}

9. Implement effective assessment procedures. Assessment is a well known strong stimulus and motivator for studying and hopefully for learning. Design assessment procedures in such a way that they evaluate thought processes and deep learning, for example by embedding knowledge assessment in scenarios, or patient cases.¹⁷ This will in turn assess deep learning, such as diagnostic and problem solving ability of the students. Remember that superficial assessment (relying on factual recall) drives only superficial learning.¹⁸ Similarly, the timing of assessment needs to be evenly spaced in the unit and course. Exclusive reliance on end-of-year (course) assessments is not sufficient, they do not diagnose how well students are doing, and which of your students need additional support. Frequent quizzes that carry marks without feedback (summative assessment) encourage superficial (rote) learning. It is, therefore, important to supplement them by quizzes that do not carry marks, but provide formative assessment aimed at stimulating discussion, and include timely feedback on students’ strengths and areas for improvement. The exclusive use of multiple choice questions that usually test only recall (‘knows’ level) is not advised, instead, we

should test all 4 levels of competence as shown in Miller’s ‘Pyramid of Competence (Figure 1).¹⁹ The short answer questions cover the ‘knows how’ level, the Objective Structured Clinical Examinations (OSCEs) for the ‘shows how’ level, and portfolios assess the ‘does’ level, which in professional practice refers to performance in context (Figure 1).

10. Incorporate frequent and constructive feedback. Feedback is a planned learning experience during which, one or more people help someone (usually a student) who has performed a task to improve his or her performance by pointing out what was carried out well, and what needs to be improved, and how this might be achieved.²⁰ Feedback is an effective educational tool when used appropriately.²¹ Without it, mistakes go uncorrected, good performance is not reinforced, and clinical competence is achieved through trial and error, or not achieved at all. A review of literature on feedback demonstrates that feedback has a positive effect on physicians’ clinical performance.²²

Beware of blindsiding students with unexpected negative comments, as this will reduce trust, and reduce the sense of safety. Having the student point out his or her weakness is more appropriate. The principle is apparently simple, and is easy for educators to master, and put to good use. The feedback session is most effective when it is timely, preferably immediately following observation, and held with the trainee’s consent. It should be structured in such a way that first the trainee comments on the positive aspects of his/her performance, and then the trainer (or others) lists the positive elements in the trainee’s performance using positive, descriptive, non-judgmental, and specific language. This is followed by comments by the trainee on points for improvement of his/her performance, and ways to achieve that. The trainer then lists what is to be improved and how, using descriptive verb sentences, rather than judgmental statements and adjectives, for example “the antibiotic regimen chosen did not provide coverage for H-influenza” rather than saying “your choice of antibiotics indicates a lack of appreciation for the possibility of enterococcal infection,” or even worse “your choice of antibiotics is bad”. The tutor then summarizes the key points.

11. Invite feedback on teaching from teachers and students. Teachers not only provide feedback to their students and colleagues, they also welcome feedback on, and evaluation of their teaching. Feedback coupled with reflection should be an integral part of our teaching practice, as they are associated with change and improvement. Evaluation of a teaching session, whether it is didactic or clinical, could be conducted by inviting

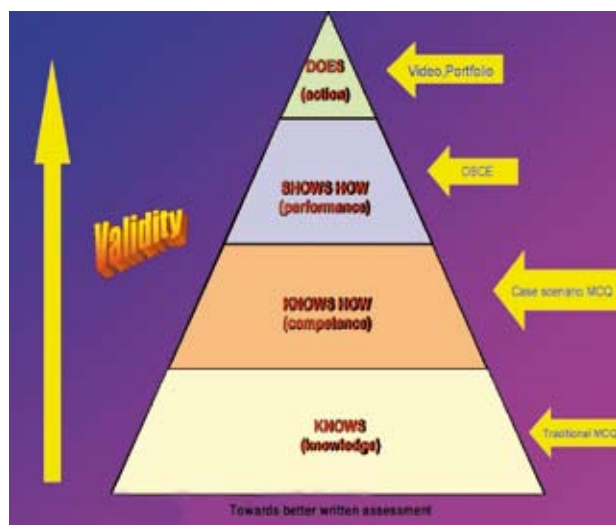


Figure 1 - Miller's Pyramid of Competence. A model for assessment of clinical competence. OSCE - Objective Structured Clinical Examinations, MCQ - Multiple Choice Questions

a colleague to attend and assess teaching skills (peer observation), using a simple checklist or questionnaire, or by asking the students to give feedback. A study found that clinical teachers are able to improve by using feedback from residents.²³ Teaching sessions can also be videotaped and observed afterwards by the teacher alone, or with a colleague. This can be a particularly informative technique for evaluating teaching performance.

12. Provide your students with opportunities to reflect on their practice. Learners should be given opportunities to reflect on their practice, and this involves analyzing and assessing their own performance, and developing new perspectives and options.²⁴ How can the teacher encourage reflection among his students? This can be carried out through a structured logbook in a random case analysis discussion. The portfolio contains descriptions of patients seen, what was learnt, and what further learning should take place, and how a similar consultation could be handled better in the future. Open/reflective questions can be asked, and the appropriate use of silence during the discussion can be promoted. A portfolio can be used that includes not only evidence of achievement of a certain learning issue, but also reflection on the experience.²⁵

Strategies that may be employed include think-aloud modeling, where the teacher talks out loud to the class while performing a complex activity, such as a clinician working through a clinical problem where all can see, and hear the writer in action.³ The teacher in the clinical setting may also invite students to bring cases that they have examined, or managed during clinical rotations. These problems are then presented in class, and the facilitator thinks aloud as she/he searches for a solution. The class discussion later focuses on the strategies that were used. Encouragement to think on what is being taught can coincide with encouragement to think on how it is being learned.

13. Use a short structured discussion model in the clinical teaching. At the bedside and in ambulatory settings, reflection can be encouraged by a short structured discussion using the One Minute Preceptor Model (OMPM), which consists of 5 steps.^{26,27} The steps are: 1) get a commitment; 2) probe for supporting evidence; 3) reinforce what was carried out well; 4) give guidance regarding errors or omissions and finally; 5) teach a general principle

An example of an application of the OMPM in clinical practice is, a medical student sees a patient, and reports to you the history and findings. After this the student waits for your comments: 1. Applying the first step you get a commitment by asking him or her "What do you think is going on with this patient?," and ask

"What would you do next?," or "How would you treat or investigate this patient?"; 2. The second step is "probe for supporting evidence". The purpose of this step is to understand the learner's clinical reasoning process. You can ask for example "What are the points in favor of the first proposed diagnosis?," or "What are the points not in favor of the diagnosis?"; 3. The third, and 4. The fourth steps are in the form of a feedback starting with what was carried out well, for example "You selected the drug that covers the main pathogens", and providing guidance on what was not carried out well, or omitted for example, "The request of that investigation costs the patient, and this test does not change the management". 5. The last (fifth) step is to teach a general principle that could be carried out with generalizing an aspect of the case to other situations, for example, "The diagnosis of asthma should be considered in any child presenting with cough". It must be remembered that this method is very practical during clinical practice. However, there is a possibility of having errors during application (Table 1). Although the OMPM is widely used, it is a teacher-centered approach. A learner-centered approach model is called the SNAPPS model.²⁸

What is SNAPPS?²⁸ SNAPPS is the acronym for a learner-centered model for case presentations to the preceptor in the outpatient setting. It consists of 6 steps: 1. Summarize briefly the history and findings; 2. Narrow the differential to 2 or 3 relevant possibilities; 3. Analyze the differential by comparing and contrasting the possibilities; 4. Probe the preceptor by asking questions on uncertainties, difficulties, or alternative approaches; 5. Plan management for the patient's medical issues; and 6. Select a case-related issue for self-directed learning.

The SNAPPS model for case presentations to the preceptor in the ambulatory setting is a good example of learner-centered teaching. It works effectively under the typical conditions in a preceptor's office, encourages students to be more proactive in their learning, and fosters a partnership for learning between the student and the preceptor.²⁸

14. Develop lifelong learning and study skills. Many medical schools include courses that teach study skills

Table 1 - Possible errors of the One Minute Preceptor Model.²⁹

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- Taking over the case
 - Not allowing sufficient time for the student to think
 - Long discussion like lecture
 - Leading questions, that is, questions that suggest a particular answer
 - Pushing the learner too hard
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in the first year, which help students to perform their tasks at the school properly. Such skills include note taking, reading for understanding, time and stress management, and so forth. Learners are supported to learn in the beginning, however, support is then withdrawn gradually. This allows a gradual transition towards independent learning. Learners should be given opportunities and supported to use self-direction in their learning. This is viewed as a goal towards, which learners strive so that they become empowered to accept personal responsibility for their own learning, personal autonomy, and individual choice.²⁴

Self regulated learning (SRL) involves 3 elements: first, the control of resources that the students have for example: time, study environment (place of study), and the use of others, such as peers and faculty members to help them learn; second, self regulation of motivation and affect, in order to facilitate adapting to the course demands, and to control their emotions, such as anxiety in ways to improve their learning; and third, self regulation of cognition through the use of proper learning strategies.³⁰ The SRL can be learned and educators play a role to help students assume a greater responsibility for their own learning, and the achievement of mastery goals. The teacher needs to emphasize on the meaningful aspects of the task for example, interesting and challenging to the students. We need to encourage students to set short-term goals for the course, help them develop as independent learners, through providing them with opportunities to make choices, help them develop self monitoring skills, and encourage them to solve problems by themselves.³¹

15. Present yourself as a role model. Faculty members serve as role models for the institute's values and ethics. They manifest positive professional characteristics and articulate expert thought processes, which are essential for students' professional and personal growth. Teachers who model the educational principles for their students will help the next generation of teachers and physicians become more effective, and this will ultimately lead to better care for patients.²⁴ Faculty concern and frequent faculty student contact in and out of classes is an important factor in student motivation and involvement.²³ With the current information overload in the rapidly changing field of health professions' education, the role of the faculty has undergone a major paradigm shift from being the one who "knows all the answers" to facilitator of learning processes. When a role model teacher is not sure of the answer to a question asked by a student, he or she will tell the student "I am not sure of the answer" and the teacher and the student can search for the answer, and the teacher may

even direct the student to some sources. Such behavior is a strong motivator for learning. It is interesting that the teacher's role model as a 'person' is much stronger than as a clinician.²⁴ Such important modeling activities inform the students that as an instructor and physician, you also make errors from time to time, and that "to err is human".³² We should encourage students to see errors as simply part of the learning process rather than evidence of low ability.³³ A major problem for many physicians is the expectation that errors are always the result of not trying hard enough. As a consequence, students and practicing physicians become ashamed of, and hide their errors. The delusion of perfection probably accounts for many of the unsafe conditions in our clinics and hospitals.

16. Be prepared for differences between students in speed and styles of learning. We need to select an appropriate pace of learning for the whole group of students, and be flexible, and prepared to adapt. We need to be watchful for those who might not be keeping up. As some students are fast learners, they may answer questions very quickly, and not leave enough time for the others to think. After presenting some problems or exercises, it is therefore better to leave some time for students to think before opening the discussion. Students who do not progress well, should be counseled and helped. The school should establish a counseling service to help such students.³⁴

17. Study important pedagogical resources to improve teaching skills. Clinical teachers can access resources for further learning, such as introductory publications for example, "A Practical Guide for Medical Teachers" by Dent and Harden,³⁵ or "ABC of Learning and Teaching in Medicine" by Cantillon et al³⁶ and journals (for example; The Clinical Teacher, Medical Education, Medical Teacher and Academic Medicine). Attending faculty development programs can lead to improvement in teaching effectiveness.³⁷ Effective faculty development initiatives make use of experiential learning, provision of feedback, effective peer and colleague relationships, well designed interventions based on principles of teaching and learning, and the use of a diversity of educational methods.³⁷ Participating in international and national conferences (for example; AMEE annual meetings, Ottawa Conference, National and Regional Conferences) and enrolling in Certificate and Masters courses in medical/health professions' education (for example; international programs like in the Netherlands, United Kingdom, and United States or national programs) can help faculty stay abreast with current knowledge and improve teaching skills.

In conclusion, after going through the presented guide, the medical teacher is now aware of the importance of the field of Medical Education. Clinical practice is based on evidence and as clinicians are expected to use the latest evidence, the same attitude holds to teaching. There is ample knowledge regarding teaching and learning, and it is imperative that being aware of evidence and knowledge is part of the teacher's professionalism. Whether we are lecturing, facilitating small group discussions, or teaching at the bedside, it is advisable to apply some of the points discussed above. Furthermore, we need to plan our sessions in terms of what the students are supposed to learn or do, rather than what we are going to do in the educational encounter.

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