MEDICAL EDUCATION

Self directed learning

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Why self directed learning?

It is now recognised that medical education has to be a lifelong process. The practice of medicine and its underlying knowledge base change so rapidly that it is essential that doctors continue to learn throughout their professional career. However, continuing professional education is not simply a matter of keeping up to date, but also entails reflection on practice in order to incorporate new experiences, to relate present situations with previous experiences, and to reorganise current experiences based upon this process. Self directed learning enables the learner, whether student or practitioner, to do these important things.

As defined by Knowles,[1] self directed learning is a process in which individuals take the initiative, with or without the help of others, in diagnosing their learning needs, formulating learning goals, identifying human and material resources for learning, choosing and implementing appropriate learning strategies, and evaluating learning outcomes, that is, they take responsibility for, and control of, their own learning (see box 1).

If self directed learning skills are a prerequisite for the good doctor, then we should ensure that those entering the profession are encouraged and helped to develop these skills as part of their education. Medical education has traditionally relied on didactic and teacher dominated methods of teaching, which have done little to help students develop either the skills or the right attitudes for lifelong learning. Although the widely accepted definition of teaching is 'helping someone to learn', medical teachers have too often concentrated on what they teach (for example, the urge to 'cover the subject' in lectures) rather than how to help students learn most effectively and efficiently (not to mention enjoyably). Fortunately progress is now being made to introduce more active, student centred methods of education, and to focus attention on the needs and aspirations of the learners rather than those of the

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Self directed learning activities

- Setting own learning goals
- Identifying appropriate learning resources
- Selecting appropriate learning strategies
- Selecting important from unimportant
- Integrating material from different sources
- Time management
- Monitoring achievement of learning outcomes
- Monitoring effectiveness of own study habits

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teachers. The latest recommendations on the undergraduate curriculum from the UK General Medical Council specifically state that learning through curiosity, the exploration of knowledge, and the critical evaluation of evidence should be promoted and should ensure a capacity for self education.[2]

The medical education literature provides guidance as to what will facilitate learning as well as help cultivate the critical skills of lifelong learning. Schmidt, for example, gives three principles which will make teaching more relevant and effective, based upon what is known about adult learning.[3]

(1) Building on prior knowledge: students use the knowledge they already possess to understand and structure new information.

(2) Learning in context: the closer the resemblance between the situation in which something is learned and the situation in which it is applied, the more likely it is that transfer of learning will occur.

(3) Elaboration of knowledge: information is better understood and remembered if there is opportunity for elaboration (this includes discussion, answering questions, teaching peers, critiquing).

Examples of applications that are currently being used to cultivate skills of self directed learning and reflection are: problem based learning; small group learning; self and peer evaluation; self study materials; library work and projects (both literature reviews and research); learning contracts; profiling; simulated patients; and computer assisted learning. Course features which can enhance self directed learning are highlighted in box 2. As examples of how self directed learning can work in practice, we shall focus on two contrasting methods: problem based learning and self/peer evaluation. We will discuss these two areas in relation to facilitating undergraduate learning but the principles involved are, of course, equally relevant for postgraduates and for consultants engaged in continuing professional development. A further reading list is provided at the end of the paper for those wishing to get more ideas about teaching and learning methods that foster student centred and self directed learning.

Problem based learning

In the introduction to their useful book, Boud and Feletti identify problem based learning as the most significant innovation in education

Course features that enhance self directed learning
- Clear, advance information about tasks
- Specific performance goals for assignments
- Intrinsic rewards for task completion
- Timetabling that allows sufficient time for task completion
- Trust that learners will remain on task
- Support for student learning, for example, personal tutors, study skills courses
- Formative assessment and feedback that enables students to monitor and modify their own learning
- Appropriate summative assessment, that is, that tests problem solving rather than rote repetition of facts
- Appropriate staff development/teacher training

for the professions for many years, possibly the most important development since the move of professional training into educational institutions.[4] The principal idea behind problem based learning is that the starting point for learning should be a problem, query, or puzzle that the learner wishes to solve. There are four broad goals[5]: integration and relevance of knowledge; development of clinical reasoning; independent learning; and a more interesting curriculum for staff and students.

Problem based learning originated at McMaster University in Canada in the mid-1960s and has since been adopted by perhaps 30 medical schools throughout the world as the sole or major learning method and by several hundred as one of the methods in a hybrid curriculum.

In its purest form (for example at McMaster and Maastricht), a problem is presented to a group of students and the group decides what it needs to know in order to solve it. The learning objectives of such an exercise are generated by the students and several groups of students simultaneously encountering the same problem will end up learning different things. A more structured problem based learning system might entail a list of learning objectives generated by the teachers or course organisers to which students are guided gently. Some medical schools (such as Harvard) mix problem based learning with more traditional forms of teaching such as lectures and seminars which are related to the problems being studied. Comparisons of different curricula suggest that students perform as well following problem based courses as students receiving traditional courses, but do indeed acquire a more inquisitive and self directed style of learning.[6]

Problem based learning typically occurs in small tutorial groups of five to 10 students. The teacher's role is to facilitate the learning process, not to give the students information. Students are presented with a problem and encouraged to ask themselves questions, the answers to which will help solve the initial problem and increase their understanding of the underlying processes involved. Some of the answers will come from the prior knowledge of group members, others will need to be researched.

In its commonest form in the early years of medical programmes, a problem is progressively unfolded, with additional information becoming available. The problem can be simple or elaborate, written on paper, introduced by a video or in some combination of formats. Effective problems can be based on a variety of questions – an individual patient, a puzzle in normal function, an ethical dilemma, or an issue of community concern. Supplementary materials may include further written information, laboratory data or pathology slides, reading lists, and computerised databases.

A typical problem in paediatrics might be as follows: 'An 11 year old girl has not attended school for three weeks because of recurrent episodes of central abdominal pain. A full history, examination and relevant special investigations have failed to reveal any organic cause'. Initial discussion of the problem, usually with a tutor present, is used to identify gaps in knowledge and learning goals are set for later individual or small group study. This problem, with some guidance from the tutor, may lead the students to explore the organic causes of abdominal pain and their appropriate investigation and management, psychological and sociological theories concerning the mechanisms of 'non-organic' pain, methods of psychiatric assessment of children and families, the role of services dealing with special educational needs, psychological treatments and many other related areas. In subsequent sessions the tutor will have to be prepared to provide more information to the students about the problem, for example, the results of the child's physical investigations or the family background.

When planning problem based learning, attention must be given to the resources that will be needed by students in between tutorials to answer the questions they have set themselves. These will include library and audiovisual materials, but may also include staff who will need to be warned that a group of questioning students may descend on them to seek explanations that will help their learning.

While no two problem based learning sessions are the same, most proceed through the following stages:

(1) Analysis of the problem.

(2) Identification of the information required in the form of questions.

(3) Study to formulate the answers to questions.

(4) Application of the newly acquired knowledge to the initial problem.

Thus, much of the work carried out by the students will be in between the tutorial sessions facilitated by the teacher when the group meets to review progress. Teachers are required to operate in very different ways to facilitate this kind of learning: clear learning objectives need to be set for each problem presentation and tutors must learn skills in small group teaching to facilitate the analysis and questioning which should occur in the initial session. They also have to resist the temptation to control the direction of the discussion and to provide information instead of encouraging students to find out for themselves. Studies have shown that tutors with expert knowledge of the problem being discussed are more directive, speak more frequently and for longer, provide

more direct answers to questions, and suggest more topics for discussion than do non-expert tutors.[7] These effects may discourage the development of active, self directed learning.

Teachers and students involved in problem based learning curricula overwhelmingly support the process. The energy and shared sense of purpose in the tutorials is often infectious; the opportunity to test ideas and use the language clearly improves cooperation and fluency; students are actively engaged and have the time for self study (and to pursue other interests). The evidence about whether problem based learning is worthwhile is still fragmentary, partly because good comparative studies are difficult, but what is known without doubt is that graduates from problem based learning curricula perform no worse than others and that both staff and students have a more interesting and enjoyable experience.

Self/peer evaluation
The ability to evaluate one's own work and that of others, is a skill which all doctors should acquire and one which is essential if students are to continue to set learning objectives for themselves after qualification and/or contribute to the learning of others. Despite this, there are often few opportunities to develop this ability in traditional curricula. Whether such assessments should be summative (contributing to decisions about the student's future) or formative (providing guidance about future study) is open to debate. What is clear, however, is that such assessment helps students to develop skills of critical analysis and constructive feedback, and promotes openness about the assessment process.[8]

Self or peer assessment is often a key component of problem based learning but can be introduced as part of the learning process in conjunction with most forms of teaching. For example students might be set the task of assessing their own ability to examine the cardiovascular system at the mid-way point on a paediatric firm. To do this they would have to consider what constitutes good practice, what would be a minimal acceptable performance, how much variation is allowed between students while still performing an 'acceptable' examination and so on. The process of deciding on these criteria and standards would, of itself, be an important learning experience as would the subsequent experience of participating in the assessment, observing and judging the skills of others, and receiving feedback on one's own performance.

Students may involve staff in discussions about setting standards and staff may be involved in the assessment of some or all of the students. Discussions about the possible reasons for differences between marks awarded by themselves, by peers, and by teachers provide further useful opportunities for learning.

Students are increasingly expected to work in groups on projects and assignments. Similar principles can be applied to self and peer assessment of this kind of work. Assessment of group work is often difficult for teachers as it is not clear which students within the group are responsible for the work. Within the framework of self assessment, groups can be asked to provide a mark for the piece of work produced but also marks for the relative contributions of the members in their group. Advance knowledge of this form of marking can have interesting effects on the motivation of group members to collaborate and contribute!

For those wishing to find out more, a useful series of papers on self and peer assessment in higher education has been collected by Brown and Dove.[9]

Conclusion
The ability to acquire skills in self directed learning may be the key link between undergraduate education, postgraduate training, and continuing professional development. If future and current practitioners are to adopt an ongoing reflective and critical approach to practice, we should aim to provide learning opportunities that promote self confidence, question asking and reflection, openness and risk taking, uncertainty and surprise. Teaching techniques that encourage these skills are being introduced widely and have been shown to be at least as effective as traditional methods of education while promoting more enjoyment and enthusiasm among both staff and students.

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