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Outcome-based curriculum

S. R. Smith

Introduction

A story frequently told by educators concerns a young lad and his dog, Fido. ‘I taught Fido how to whistle,’ the boy proudly tells his father. When asked to demonstrate this remarkable achievement, the boy commands, ‘Fido, whistle!’ Fido wags his tail vigorously but does not whistle. ‘I thought you said you taught Fido how to whistle. I didn’t hear him whistle,’ the father says to his son who replies, ‘I said I taught him how to whistle, I didn’t say he learned it!’

All too often, we, as teachers, focus too much on what we teach rather than on what our students learn. Outcome-based education emphasises what we expect students will have achieved when they complete their course. These learning achievements go beyond just knowing; rather, they describe what learners can actually do with what they know.

Planning backwards

The traditional model of medical education (‘planning forwards’) begins with the delineation of the knowledge fundamental to medicine, teaching that knowledge, then testing whether students have learned that information, typically by some form of closed-book examination (Fig. 20.1). The hope is that acquisition of this knowledge base will lead to students becoming good doctors.

The outcome-based model (‘planning backwards’) goes in the opposite direction, starting with the good doctor and working backwards (Fig. 20.2). The faculty designing the curriculum begins by defining the attributes of the successful graduate, then they figure out how they would know whether students had attained those outcomes, then they create learning opportunities that would enable the students to achieve them.

Choosing outcomes

The easiest way for a medical school to create an outcome-based curriculum is to adopt outcomes that others have defined. Abilities in nine areas were described at Brown Medical School (Smith et al 2003):

1. Effective communication
2. Basic clinical skills
3. Using basic science in the practice of science
4. Diagnosis, management, and prevention
5. Lifelong learning
6. Professional development and personal growth
7. The social and community contexts of healthcare
8. Moral reasoning and clinical ethics

The ‘Scottish doctor’ model has 12 outcomes, categorised into three elements (Simpson et al 2002):

- What the doctor is able to do:
  - clinical skills
  - practical procedures
  - patient investigations
  - patient management
  - health promotion and disease prevention
  - communication
  - medical informatics.
• How the doctor approaches his or her practice:
  - basic, social and clinical sciences
  - attitudes, ethical understanding and legal responsibilities
  - decision-making skills and clinical reasoning.
• The doctor as a professional:
  - the role of the doctor within the health service
  - personal development.

The US Accreditation Council on Graduate Medical Education (ACGME 2003) lumps the outcomes into a smaller set of six general competencies:
• patient care
• medical knowledge
• practice-based learning and improvement
• interpersonal and communication skills
• professionalism
• systems-based practice.

Using an already established list of outcomes has the advantages of ease, simplicity, comparability and established credibility. However, simply adopting someone else’s list has its own drawbacks. The faculty and students may not feel the same sense of ownership, unique characteristics of the school may not be represented or sufficiently emphasised, and the outcomes may be interpreted differently from what was originally intended.

If a school chooses to create its own list of outcomes, it ought to maximise the amount of participation in the process to increase the buy-in from students and staff. Since the only requirement of participation is that they have an opinion on what qualities they appreciate in their own doctors, everyone can be part of the process, from PhD basic scientists to students to clinical professors.

A nominal group process technique can be used to maximise participation and minimise the impact of overbearing personalities. Each person in the group is allowed to add a desirable attribute of a good doctor. This continues in a round-robin fashion until no new attributes are suggested. Attributes may be grouped together, with the permission of the persons who proposed them. Participants then vote by placing a star next to the attribute they believe is most important and ticks alongside to the three attributes they feel are next most important. The stars are counted as two points and ticks as one point. The votes are tallied and the attributes with the highest votes are selected as the outcomes.

Defining outcomes

Having chosen the outcomes, the curriculum planners must define each more fully. This is best accomplished by small writing committees comprised of individuals with a particular interest in that outcome.

The definition should be relatively short, but detailed enough to be clear (Harden 2002). The following is an example from the nine abilities described at Brown Medical School:

Ability 7 - The social and community contexts of healthcare. The competent graduate provides healing guidance by responding to the many factors that influence health, disease and disability, besides those of a biological nature. These factors include sociocultural, familial, psychological, economic, environmental, legal, political and spiritual aspects of healthcare seekers and of healthcare delivery. Through sensitivity to the interrelationships of individuals and their communities, the graduate responds to the broader context of medical practice.

Another example is drawn from the ‘Scottish doctor’ learning outcomes:

Outcome 6: Communication. Good communication underpins all aspects of the practice of medicine. All new graduates must be able to demonstrate effective communication skills in all areas and in all media, e.g. orally, in writing, electronically, by telephone, etc.

Developing criteria

Once the definition of the outcome is agreed upon, the next step is to delineate criteria. The criteria describe specific tasks that students will be expected to undertake to demonstrate mastery. For example, procedures such as taking a blood pressure, performing a urinalysis and interpreting a chest X-ray could be delineated as criteria under the medical procedures outcome.

The group charged with delineating the criteria should also provide examples of ways in which the criteria could be demonstrated. An example for the lifelong-learning outcome might be: ‘presents findings of research to other students in problem-based learning group’. These illustrations help other teachers think of ways to incorporate the outcomes in their own teaching activities.

Levelling

The competence of students grows as they progress through their education. Teachers’ expectations should also increase in parallel fashion. Tasks assigned to students at the beginning of their course of study should be simpler than those assigned at the end of their training.

"It is a highly questionable practice to label someone as having achieved a goal when you don’t even know what you would take as evidence of achievement"

Mager 1962

Faculty should classify learning expectations into a minimum of two levels: one appropriate for the novice or beginning student and another that specifies the expectations necessary for graduation. A third level of achievement higher than the minimum required for graduation should also be specified. Students should be allowed to differentiate themselves at this advanced level, based on their individual interests and talents.

The complexity of the challenge should increase at the intermediate and advanced levels. For example, novice students should be expected to demonstrate good communication skills with patients who are relatively free of significant communication impairments, whereas more advanced students could be challenged with patients who are not native language speakers or who have hearing or speech impairments.
Tasks for beginner, intermediate, and advanced students should present greater challenges to their skills at each level.

Evaluating outcomes

Performance-based assessment (see Ch. 44, Performance assessment) goes hand in hand with outcome-based education. Satisfactory performance requires students to skilfully apply the knowledge they possess to a specific task.

Performance-based assessment is not a radical departure for clinical medicine. Clinical teachers are accustomed to asking students to demonstrate physical examination skills or to interpret a diagnostic image. In outcome-based education, the same approach is applied systematically across all outcomes.

Much of this can and should be accomplished using real patients in real clinical situations. Certain practical limitations, however, preclude the use of real patients in all teaching situations. Basic science courses, for example, do not usually involve real patients. Even in real clinical situations, the variability of clinical practice means that there can be no guarantee that every student will have the opportunity to work with patients with specific medical problems. Also, not every patient with the same problem presents in the same way. Simulations can be substituted when the use of real patients is impractical. Readers should refer to Section 6 to learn about the various forms of assessment that can be employed, with Chapter 44 on objective clinical examinations being particularly relevant. The objective structured clinical examination (OSCE) enables the faculty to design an assessment that can measure particular outcomes very precisely.

Faculty should specify which outcomes they wish to assess with an OSCE, then build the OSCE around that blueprint. For example, at Brown Medical School, the OSCE given in the last year of medical school measures four of the nine abilities required for graduation: effective communication; basic clinical skills; diagnostic, management, and prevention; and moral reasoning and clinical ethics. The OSCE consists of eight standardised patient stations with an interstation exercise following each of the cases.

The following are examples of performance-based assessments that could be used to measure attainment of each outcome in the curriculum at Brown Medical School. The purpose is simply to stimulate readers’ imaginations regarding how outcomes might be evaluated at their own institutions.

Effective communication

Oral communication (see Ch. 35) can be assessed even in basic science courses by incorporating speaking assignments in the course. Students in our anatomy course, at Brown Medical School, must give a 10-minute presentation that relates the anatomy to a clinical situation. The students demonstrate the anatomy on a prosection as they present their clinical correlation. The faculty rates the students’ oral communication skills on the basis of clarity, organisation, fluency of speech, volume, tone and pace.

Assess communication skills by focusing on how the student is speaking rather than on what is being said

Students can also be evaluated on their oral communication skills in problem-based learning groups or in case presentations on clinical clerkships. Faculty must concentrate on the communication skills apart from the content in order to properly evaluate students and give them adequate feedback. Focusing on the communication for the first 30 seconds of an oral presentation enables the observer to make fairly reliable characterisations. Selecting another 30-second segment later in the presentation enhances the reliability of the observations after students’ initial nervousness has subsided.

More advanced oral communication skills can be assessed using real or standardised patients who represent a greater communication challenge to students. Examples include telling a woman with previously treated breast cancer that metastases have been detected, obtaining a history through an interpreter or communicating with a reticent adolescent. Faculty should directly observe students, either through live direct observation or through an audio or preferably video recording. Recorded interactions have the advantage of enabling faculty to review the students’ performances in short segments, stopping, and providing feedback. If the observation was direct and not recorded, faculty should focus on a short segment of the interaction, and then provide feedback based on specific behaviours observed during that segment rather than broad generalizations based on the entire interaction.
Written communication skills are easily assessed through formal writing assignments such as having students write a short opinion piece on a controversy in healthcare policy. The writing sample can be evaluated based on its ease of readability, clarity, organisation, tone and the degree to which it is free of errors in spelling, grammar and usage.

Writing skills can also be assessed in clinical settings. Legibility can be assessed in students’ entries in patient records. Students can be asked to draft consultation letters to assess their ability to write clearly, concisely and correctly.

Basic clinical skills

Bedside teaching

Bedside teaching (see Ch. 13) represents the way in which clinical skills have traditionally been assessed. Clinical tutors observe students obtaining a history or examining the patient or performing a clinical procedure. Procedure logs can help ensure that this actually happens. Students are required to obtain faculty members’ signatures attesting to the adequacy of specific clinical skills that have been directly observed. Assigning responsibility to students to obtain the signatures increases the likelihood that the observations will actually be done.

Videotaping

Given the hectic schedules of students and faculty, videotape recordings of encounters between students and patients offer the advantage that they can be jointly viewed at more convenient times. Videotapes are particularly useful to assess the history-taking skills of students. Videotapes are less ideal when used to assess physical examination skills or clinical procedure skills because of limitations of fields of vision.

Standardised patients

Standardised patients (see Ch. 29, Simulated standardised patients) can be used very effectively to assess physical examination skills. Standardised patients have proved particularly useful in teaching and assessing female breast and pelvic examination skills and male genitourinary and rectal examination skills.

Simulations

Nonhuman simulations can be used safely and efficiently to assess skills in clinical procedures. Plastic manikins can be used to teach students how to perform lumbar punctures, catheterise the bladder, insert nasogastric tubes, obtain arterial blood samples and many other common procedures.

Using basic science in the practice of medicine

Students can become excited about the relevance of basic science when they are asked to demonstrate their knowledge of the underlying scientific facts and principles through clinical correlations (see Ch. 33). At the Memorial University of Newfoundland, the physiology faculty designed a three-stage paper-based ‘triple-jump’ examination in which students were presented in class with a clinical situation, then asked to list the topics in biomedical science necessary for understanding the physiological responses in such a person. Students pursued their own learning objectives outside of class, followed by an in-class examination derived from the students’ own work (Hansen & Roberts, abstract presentation, 1993).

During the clinical years, students can be assigned to present an update on the latest scientific explanations of the mechanisms of disease related to the patients they are caring for. This can be done either as an oral presentation to their faculty supervisor and fellow students or as a written report as part of the patient record.

Diagnosis, management and prevention

Medical teachers are comfortable with assessing students’ skills in diagnosis, management and prevention. Student ability is most often assessed through oral presentations to faculty preceptors and by written lists of differential diagnoses and management plans as part of the medical record.

OSCEs also can be used to assess these outcomes, both during the interactions with standardised patients and in exercises following the encounters with them. Examples of standardised patient cases that assess these outcomes are: offering the standardised patient an opinion about the nature of a headache after obtaining a history, diagnosing depression in a patient presenting with somatic complaints, offering the patient a management plan for the treatment of low back pain and providing the patient with contraceptive options. Examples of exercises without standardised patient present include: interpreting a chest X-ray, electrocardiogram or Gram stain, and writing a prescription for an antihypertensive drug in a patient newly diagnosed with hypertension.

Diagnosis, management and prevention can be applied to populations as well as to individuals and families. Students can be told to undertake a community diagnosis in which they ascertain the health status of the population, then propose plans for better management of the health problems, including public health measures designed to prevent or minimise illness and injury.

Lifelong learning

Lifelong learning comprises both skills and attitudes. The skills involve being able to identify one’s own learning needs, to undertake the appropriate learning activities, and to apply what one has learned. Attitudes of curiosity, a drive for excellence, a
williness to honestly appraise one’s own weaknesses and a motivation for learning fuel the quest for lifelong learning.

Problem-based learning groups (see Ch. 22, Problem-based learning) are an excellent venue in which to assess this ability in students. The faculty facilitator can observe the degree to which students contribute to the delineation of learning issues, adequately investigate the learning issues and apply what they have learned to the case under discussion. The attitudes of lifelong learning can be observed in the clinical setting when students take the initiative themselves to learn more about their patients. This can be observed when students cite sources they have explored in learning more about their patients’ problems.

Structuring the curriculum to allow students to pursue independent interests provides another excellent opportunity to assess lifelong learning. In designing their projects, students should be asked to explicitly state what incident or event made them think about what they needed to learn. Students should also be asked to explicitly describe their proposed learning strategies and resources. Students should suggest ways in which faculty could determine whether the student had successfully achieved the learning goals. This model of assessing lifelong learning in students closely parallels the model for continuing professional education for practising clinicians.

Professional development and personal growth

Portfolios (see Ch. 46) may be the best way to assess professional development and personal growth, since self-reflection and self-awareness are such an important component to this outcome. Students select the material that they wish to put into their portfolios that is important and meaningful to them. For example, some students may wish to write a short reflection essay about their feelings after having first encountered a cadaver or after their first interview with a patient. Ideally, students should discuss these reflections with a trusted faculty advisor.

Faculty advisors assess students’ achievement of this outcome not so much on the specific content of the discussions as much as on the degree to which students have thoughtfully reflected on the incidents, honestly confronted their own feelings and values and drawn lessons that help them grow both personally and professionally.

Professional development and personal growth are best assessed over a long period of time by the same faculty advisor. Specific time for these activities must be built into the curriculum because they are unlikely to happen on their own, given the other pressures on students.

The social and community contexts of healthcare

Service learning enables students to make connections between what they have learned in class about the healthcare system and the reality that their patients actually encounter (see Ch. 15). By reflecting on their experiences, students can bring their own values into their analysis of what they have seen. Journals are a particularly good way to capture these reflections. Faculty can assess the journal entries on the degree to which they demonstrate evidence of careful observation, curiosity, connections, self-awareness, empathy and social consciousness.

Students’ ability to understand the nonbiological factors that influence health can be assessed by involving students in discharge planning for patients with complex health and social service problems. Students can make home visits to assess the home situation and the patient’s progress, accompany patients to community health resources and work with other health professionals involved in the patient’s care.

Community health projects initiated by students reflect an advanced level of competency, demonstrating a commitment to public health and social justice. Formal assessment of such initiatives can be undertaken in a seminar format in which the student leaders present an overview of their efforts to a panel of faculty, perhaps augmented by community representatives.

Assessing students in nontraditional outcomes such as this one requires a different approach to evaluation than used in more familiar areas of student performance. Greater reliance must be placed on the subjective judgments of experts. Those who are selected as evaluators must be recognised as experts in the outcome being assessed by their peers and students. The judges should come from a diverse range of disciplines and experiences. The assessment process must allow an energetic dialogue among the evaluators to assure that the judgments are not idiosyncratic or arbitrary (Smith et al 2007).

Moral reasoning and clinical ethics

Students can be asked to present ethically challenging cases to faculty supervisors. The ensuing discussion enables the faculty to assess the student’s ability to identify ethical issues in a clinical context and to analyse them appropriately (see Ch. 36). OSCE stations can be designed with the same goals in mind. The OSCE format has the advantage of being able to demonstrate whether students can detect an ethical component and allows direct observation of the students’ clinical ethics skills during interactions with patients (Smith et al 1994).
Students can also write formal papers on ethical controversies. This approach is particularly useful to assess students’ ability to explore the moral dimensions of issues of health policy. The evaluation focuses on how well students can argue their positions on the basis of moral principles rather than the particular position they take.

Problem solving

Problem solving means more than calculating the correct answer to a computational question in physiology. Problem solving as an educational outcome means being able to get the job done in messy situations. In a very real sense, problem solving is a meta-outcome, requiring students to utilise all the other previously enumerated skills to assess a situation, frame the problem, devise an action plan, negotiate with multiple players, mobilise resources, execute the plan, respond flexibly and creatively to unanticipated obstacles and constantly monitor progress. Being a good problem solver is the essence of being a professional.

The best way to assess problem solving is to put learners into real clinical situations in which they have primary (but closely supervised) responsibility for patient care. Clinical supervisors must restrain themselves from giving too much direction, instead observing how students set priorities, juggle multiple tasks simultaneously, filter and interpret large amounts of data and respond agilely to changing circumstances. Of course, clinical supervisors must be ready to intervene to safeguard patient safety and assure appropriate care, but should do so only when necessary and with the least amount of intervention needed to get things back on track. Ideally, this could be done by suggesting to students that a new approach is needed and asking the students to come up with alternative plans.

Summary

An outcome-based curriculum rests on sound, practical, time-tested principles of good education:

- Define what you want students to come away with from your course. We must go beyond simply knowing, to being able to implement what one knows.
- Design assessment methods to ascertain whether students have achieved the learning you expected.

The goal of teaching is to help students learn. Therefore, we make our expectations of learning clear, precise and public. Since assessment drives student learning, we create assessments with the primary purpose of helping students learn. The assessment should reflect, as authentically as possible, the actual tasks that students will be expected to perform in actual situations.

The course of study should present students with repeated opportunities to experience, practise, and gauge their progress in the assessment tasks in varied contexts and situations, at increasing levels of challenge and complexity. Faculty should repeatedly assess student performance and ask themselves how the learning experience might be improved to enhance student performance.

References


Harden R M 2002 Learning outcomes and instructional objectives: is there a difference? Medical Teacher 24:151–155


Introduction

Other chapters in this book look at how students learn in large-group settings such as lectures, in small groups and ‘on the job’ working with their colleagues. What matters, irrespective of the approach adopted to teaching and learning, is the learning achieved by the individual. In postgraduate and continuing education, and in traditional and innovative undergraduate education programmes, learners spend a significant proportion of their time learning on their own. Indeed, the formal learning in the taught part of an educational programme may represent only the tip of the iceberg (Fig. 21.1).

After a lecture, students master the topic by reading their notes or the relevant sections in a textbook. Students prepare for small-group work and follow up such sessions by studying on their own. In the clinical setting, too, students need to find out more about the underlying problems of the patients they have seen, from further reading or the use of electronic information sources. The intensity of independent learning in the traditional undergraduate curriculum usually increases before a formal examination, with students attempting to revise or master the contents of a course over a relatively short period of time, sometimes at the expense of attendance at other scheduled sessions. In distance learning, independent learning is the major or sole activity.

"Self instruction may be an alternative to other forms of teaching, but it can also be combined with them"
Rowntree 1990

The importance of independent learning may not be fully recognised – time for it is not formally scheduled in the curriculum and appropriate learning resource material and support for students are often not provided. The closest to recognition of independent learning as a formal part of the curriculum may be the provision of a list of recommended textbooks. There is an increasing emphasis being placed, however, on independent learning with the acknowledgement that learning is not something that someone else can do for students but that it must be done by students for themselves.

In this chapter we will consider:
• what we mean by ‘independent learning’ and related terms such as ‘self-learning’
• why independent learning makes a key contribution to the curriculum
• some current trends in independent learning associated with the development of new learning techniques.

What is independent learning?

Six key principles

The concept of independent learning means different things to different people. It incorporates six key principles:
• Students learn on their own
• Students have a measure of control over their own learning. They may choose:
Chapter 21: Independent learning

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Think about the extent to which – the student control of their learning would, in your studies, be advantageous

- Students may be encouraged to develop their own personal learning plans (Challis 2000).
- The different needs of individual students are recognised and appropriate response is made to the specific needs of the individual learner – ‘just-for-you’ education.
- Student learning is supported, to a greater or lesser extent, by learning resources and study guides prepared for this purpose.
- The role of the teacher changes from a lecturer or transmitter of information to a manager of the learning process – a more demanding but a more rewarding role (Harden & Crosby 2000).

Terms used

A number of terms have been used to describe this approach to learning. These terms are often used interchangeably although different meanings may be implied.

"Flexible learning is a generic term that covers all these situations where learners have some say in how, where or when learning takes place"

Ellington 1997

- Independent learning – emphasises that students work on their own to meet their own learning needs.
- Self-managed learning, self-directed learning or self-regulated learning – emphasises that students have an element of control over their own learning, with responsibility for diagnosis of learning needs and identifying resources. Implicit in this approach is that students have a clear understanding of the intended learning outcomes.
- Resource-based learning – emphasises the use of resource material in print or multimedia format as a basis for students’ learning, and the freedom this gives to the student.
- ‘Just-for-you’ or flexible learning – emphasises the wide range of learning opportunities offered to students and flexibility in responding to individual student needs and aspirations.
- Open learning – often used interchangeably with flexible learning. It emphasises the provision of greater access for students to their choice of education.
- E-learning – learning is facilitated by information and communication technology.
- Distance learning – emphasises that students work on their own at a distance from their teacher. Implicit in the approach is that the teachers interact with students at a distance and facilitate the students’ learning.
- ‘Just-in-time’ learning – resources are made available to learners when required. This facilitates ‘on-the-job’ learning and the integration of theory and practice.

The two ideas underpinning the above concepts are:

- learners study individually on their own
- learners have charge of the learning process.

Both features are absent in the lecture but present in independent learning where students direct their own studies to achieve the prescribed learning outcomes (Fig. 21.2). In many education programmes, students work on their own, e.g. reading prescribed texts, but have little control of their learning. In other situations, students may control their learning, as in problem-based learning, but greater emphasis is placed on group rather than on individual work.
The importance of independent learning

There are many reasons why independent learning has become more fashionable as a paradigm of learning in medical education.

New learning technologies

"Web and Internet technologies are transforming our world, presenting opportunities we could only imagine a few years ago"

Horton 2001

Developments in the new learning technologies and e-learning are occurring at an astonishingly rapid pace, and the implications for traditional approaches to education, and indeed for medical schools as we know them today, are profound. The dramatic developments taking place in e-learning cannot be questioned, bringing a whole new dimension to what is possible in independent learning (Masters & Ellaway 2008). In addition to the use of the internet, personal digital assistants (PDAs), MP3 players and mobile phones can play podcasts or vodcasts of lectures and tutorials for use by the student at a time and place convenient to him or her. The potential for the new learning technologies including their support for independent learner is described in Chapters 28, 29, 31 and 32. The development of new social software that allows students to generate their own context and share this with their colleagues supports a more personalised and support centred view of learning.

Distance and blended learning

With the development of e-learning, distance learning has increased in popularity in undergraduate, postgraduate and continuing education. The CRISIS criteria for effective continuing education, developed in the context of distance learning, recognise the potential advantages implicit in independent learning (Harden & Laidlaw 1992):

- Convenience for the student in terms of pace, place and time (‘just-in-time’ learning)
- Relevance to the needs of the practising doctor
- Individualisation to the needs of each learner (‘just-for-you’ learning)
- Self-assessment by the learner of his or her own competence
- Interest in the programme and motivation of the learner
- Systematic coverage of the topic or theme for the programme.

A blended learning approach can be adopted where e-learning is combined with face-to-face learning to create an integrated learning experience.

Active learning

Independent learning, if planned appropriately, encourages a more active approach to learning. Students adopt a deep rather than a superficial approach to learning and search for an understanding of the subject rather than just reproducing what they have learned. Students are encouraged to think and not just recall facts.

The traditional curriculum emphasises the views on a topic of the teacher or lecturer with whom the student is in contact. The student may be seduced into the notion that there is one right answer or one approach to a problem. Independent learning allows him or her to be exposed to the rich environment of many visions and interpretations.

The needs of individual learners

Learners are not a homogeneous group – they have different needs and different aspirations and learn in different ways. The adoption of an independent learning approach encourages these needs to be recognised and allows for learner choice in terms of content, learning strategy and rates of learning (Fig. 21.3). In ‘just-for-you’ learning, the learning programme is customised to the needs of the individual student or doctor.
Students can choose the learning method or approach which suits them best. They can skim learning material rapidly if they already understand it and spend more time with what is new or challenging to them. In mastery learning, students work with appropriate resource material until they reach the level of mastery required.

**Student motivation**

Independent learning gives students more responsibility for their learning and greater participation in the learning process. It allows them to choose the appropriate level for their studies. This in turn gives them a sense of ownership of their learning which has a positive effect on motivation.

**The role of the teacher**

There are pressures on academic staff to provide coherent and effective teaching and learning programmes despite increasing student numbers and decreasing units of resource. A greater emphasis on independent learning and the sharing of learning resources between institutions can make a contribution. This may be associated with a changing role for the teacher.

The teacher’s role as a manager of the students’ learning is well accepted and consistent with an independent learning approach (Harden & Crosby 2000). This facilitative role leaves teachers time for more contact with individual students. While many teachers feel most comfortable in the traditional role of lecturing, others have discovered talents in developing resource material, a role which is also being recognised and rewarded.

**Learning outcomes**

There is a move away from a process model of curriculum planning to a product one where the learning outcomes are made more explicit and where outcomes influence decisions about teaching and learning and about assessment.

With the destination to be reached clearly charted, students are less dependent on attending lectures to ascertain what they should learn. With a clear statement of expected learning outcomes they can plan their own route. Independent learning thrives in such an environment. Moreover the acquisition of the skills of self-learning and the ability to keep up to date with developments in medicine are learning outcomes about which there is general agreement. Traditional teaching methods do not emphasise the development of these skills. In contrast, independent learning encourages not only mastery of the content area being studied but also the development of generic skills of self-learning.

**Trends in independent learning**

Independent learning is not new. To a greater or lesser extent, students have always worked independently. One can identify, however, a number of changes in current approaches to independent learning, many triggered by developments in e-learning.

**An increasingly important role**

It was demonstrated four decades ago in a randomised controlled trial (Harden et al 1969) that medical students learn as or more effectively when they work independently, using learning resources prepared for the purpose, compared with students who attend lectures. Until recently, however, teachers have been slow to move away from an emphasis on lectures. There has been, however, a significant change and independent learning is now playing an increasingly important role in the curriculum:

- Time previously scheduled for lectures or small-group work is often rescheduled for independent learning.
- Independent learning is now an explicit planned part of the learning activities, and protected time is allocated for it in the timetable.
The role of the lecture is changing. Lectures are used to support independent learning rather than independent learning being used as an adjunct to support the lecture.

Students make increasing use of the internet as a learning resource.

**A planned and supported initiative**

Independent learning has to be carefully planned and not left to chance. The choice is not between a planned programme including lectures and other scheduled activities on the one hand, and on the other, students being left to fend for themselves and using any learning resources they can find.

"The curriculum must motivate students and help them develop the skills for self-directed learning"  
GMC 2002

Planning by the teacher for independent learning includes:

- Recognising the role of independent learning in the curriculum, making this explicit to students and scheduling it in the timetable.
- Ensuring students have the necessary study skills with which to engage in independent learning in the first instance. Study skills training needed may include:
  - how to assess needs
  - how to plan learning
  - how to manage time
  - how to locate and use appropriate resources including electronic resources
  - how to evaluate outcomes of learning.
- Identifying the resources to be used by students in their studies, including textbooks and e-learning resources.

**A wide range of resources available**

To develop learning resources, expertise is needed in the content area, in the delivery medium and in instructional design.

An increasingly wide range of resources to support independent learning has become available. Regrettably, however, the technical sophistication of the resources available is often not paralleled by their educational sophistication. Many lack the basic principles of educational design such as the incorporation of meaningful interactivity and feedback.

Too often computers have been used merely as mechanical page-turners and the internet has been abused, encouraging passive learning rather than a deeper understanding and reflection. The need is now recognised to incorporate proven effective educational strategies into the instructional design for self-learning.

"There is no right way to develop self-instructional materials. But there are lots of wrong ways"  
Rowntree 1990

**Support for students**

The adoption of independent learning does not imply that the teacher abandons the student to work on his or her own. The role of the teacher as a facilitator in independent learning is important. This can be achieved through interactions between student and teacher, face-to-face, by telephone or on the internet. The teacher can also prepare study guides to support the student’s learning (Harden et al 1999). This is discussed in Chapter 27.

"A study guide can be seen as a management tool which allows teachers to exercise their responsibilities while at the same time giving students an important part to play in managing their own learning"  
Harden et al 1999

Study guides can:

- provide guidance for students on the management of their learning, with advice on what they should learn, how they should learn it and how can they assess whether they have learned it.
- suggest activities for students which reinforce their learning and relate it to clinical practice.
- provide information for students not readily available through other sources to which they have access.

Students may also get support from their colleagues. This concept of peer-to-peer collaborative learning has gained increased recognition. Students may be helped by:

- their peers
- students in the later years of a course who are assigned to help more junior students.

"A peer support website can broaden student interest in learning independently and is especially pertinent to the needs of less confident students seeking to improve their academic performance"  
Baker & Dillon 1999
The range of contexts

The wide range of contexts in which independent learning can occur is now recognised. These include:

- at home
- in areas in a learning centre or teaching institution developed for this purpose
- on the job or in the workplace.

Summary

Independent learning, including e-learning, should occupy a key role in the curriculum. The twin aims are mastery of the topic under consideration and the development of the skills of self-learning. Teachers and curriculum planners should decide:

- How much time should be scheduled in the curriculum for independent learning? It is unlikely to be less than 25% or more than 75%.
- How to recognise and institutionalise the position adopted with regard to independent learning through:
  - protected time in the curriculum identified in the timetable
  - provision of appropriate learning resources
  - recognition in the assessment procedures
  - a staff development programme to orientate staff.
- The range of methods or tools to be offered to the learner, e.g. printed material, the internet, videodiscs, curriculum-based simulations and virtual patients.
- How students will be supported as they work through the programme. Study guides can be seen as a tutor to which they have constant access.

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Further reading

Introduction

What characterises problem-based learning?

Problem-based learning (PBL) is a student-centred approach to active learning, originating from McMaster University (Norman & Schmidt 2001). Rather than systematically building knowledge in individual subjects, students in groups are presented with a well-structured problem or case which they study collaboratively, usually for a week or longer. In two or three discussions, they share ideas, identify key issues and pose questions to follow up either individually or collectively. Effective problems stimulate interest and critical thinking, encouraging active learning. A tutor facilitates and supports the learning process rather than acts as the source of information. The process is regularly monitored by participants and tutor. After the group meeting, practical laboratory and clinical activities are designed to support the learning. Some seminars, lectures, practical classes or clinical sessions relevant to the issues of the week may be offered. PBL students consult libraries, computer-based resources and seek help from experts; they often choose to study in small informal groups.

For nearly 40 years, PBL programmes have been successfully implemented (e.g. Henry et al 1997, Des Marchais 2001) and graduates perform effectively in practice (Dean et al 2003, Katinka et al 2005, Schmidt et al 2006). Originally designed as an integrated ‘whole of programme’ approach, PBL has been adapted successfully for dental, health and biological science programmes (Schwartz et al 2001, Dangerfield et al 2007). Evidence has accumulated over many years to demonstrate that, graduates from PBL programmes learn effectively (e.g. Dochy et al 2003). They demonstrate self-directed learning, critical thinking, teamwork, understanding rather than memorisation, and are confident using professional and scientific language. Both staff and students enjoy the experience if they are appropriately prepared and supported.

A problem, usually focused on a patient or a family, initiates and stimulates the learning. The presentation may be on paper, computer, film or video. The group (ideally of fewer than 10 students) is stimulated to explore basic scientific and clinical mechanisms together with social, psychological, ethical or professional issues. Because the process is potentially open-ended, it is crucial to design well-structured, realistic problems that meet explicit goals. Both students and staff need initial training and ongoing support to understand and apply the process effectively (Figs 22.1 and 22.2).

Each problem is designed for students in discussion to construct their own understanding; they share their individual experiences and each makes a distinctive contribution (Woods 1994). After the initial trigger, students brainstorm issues broadly, and a scribe notes suggestions (usually on a board) for later review and organisation. An effective problem stimulates the group to identify and explore key issues, even if they lack prior specific knowledge. Problems are structured to match the students’ growing knowledge and confidence, and to include a range of age-groups, occupations and geographic locations.

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Chapter 22: Problem-based learning

Group’s progress, the processes of individual learning, the quality and effectiveness of each problem and the helpfulness of the tutor. Tutors discuss each group’s overall progress and evaluate each student’s contributions and participation.

PBL is introduced early in a programme to encourage active learning. Concurrent clinical experience in hospitals, practices or skills laboratories may be included, so that knowledge and skills develop in parallel. Students value clinical opportunities; their diverse experiences in turn enrich and provide a context for tutorial discussions.

Effective problem-based learning prepares students for professional practice by:

- encouraging critical thinking, communicating and evaluating ideas
- stimulating reflection on learning and evaluating their own contributions
- supporting ongoing self- and peer-assessment
- introducing reasoning early, later to be refined in clinical settings
- applying critical thinking and evidence-based decision making
- enhancing the transfer and retention of knowledge when clinical scenarios stimulate active discussion and later study, including libraries, museums, practical work, quality websites
- offering practice in communicating professional concepts, using medical and scientific language
- supporting effective teamwork with peers and tutors.

Staff develop and map a sequence of learning problems to provide a structure for a modern, relevant, progressive and integrated curriculum, minimising redundancy, overload and gaps. It incorporates regular evaluation for staff and students, supporting ongoing evolutionary change and periodic major review (Field & Sefton 1998).

A problem-based tutorial in action

The initial impression of an observer is usually of an open, lively and free-flowing discussion in which all participate. The tutor facilitates, but does not dominate, dictate or drive the group. Notes are usually made on a board by a scribe appointed for each problem. The atmosphere is friendly and informal as students express ideas, share knowledge, organise ideas and develop diagrams of key concepts. They list issues to follow up individually or collectively.

In different schools, the number, duration, structure and sequence of tutorials vary. As students and tutors gain experience and expand their knowledge, groups become more targeted, confident and efficient.

Effective tutors do not dominate or instruct. Indeed, it may not be immediately apparent to an observer who is the tutor. She or he quietly observes and monitors the process, ensuring that all are included, discussion flows effectively and interactions focus on relevant issues.

Frameworks and sequences for problem-based learning

Well-designed problems are underpinned by a structure for reasoning, explicit to both tutors and students (Fig. 22.3).
Typically: A trigger initiates the problem: on paper, computer, video, or sometimes a patient. For an example of a computer-based ‘trigger’ and associated resources, see University of Sydney http://www.medfac.usyd.edu.au/showcase/pbl/index.php#pbl.

- Groups brainstorm to identify cues and key issues for discussion.
- Broad thinking produces a rich array of ideas, mechanisms and outcomes.
- Hypotheses are critically explored through reasoning and then organised by priority or likelihood.
- The need for additional information is identified and learning issues are determined, whether to be followed up individually or by the group.
- Hypotheses are tested and refuted or supported by information that is progressively revealed as the sequence of tutorials unfolds.
- A conclusion is reached on diagnosis and/or management.
- The group reviews the learning process to identify areas for improvement.

In breaks between tutorials, students pursue learning issues either individually or informally in groups. They are encouraged to be critical and to adopt an evidence-based approach. They may attend other teaching sessions or make clinical visits. When they reconvene, groups share and review key learning issues before progressing with the problem.

### Characteristics of an effective PBL group

An effective group is cohesive, motivated, mutually supportive; knowledge is freely shared and all are actively engaged in learning. The group understands the process and pursues its task energetically. Members respect each other’s contributions but examine them critically. Discussion flows as students cooperate rather than compete. Tutors encourage quieter members and tactually constrain the more confident members to avoid their dominating discussions. Individuals are particularly supported during times of personal stress.

The atmosphere is friendly and good-humoured. Discussion is open but tactful and constructive. Difficulties that arise are not ignored, but dealt with sensitively in a climate of mutual tolerance.

Group members look forward to tutorials and may spend time together outside sessions, whether in ongoing discussion, social or sporting activities. Successful established groups induct new tutors and restrain excessive interference from overly directive teachers.

Roles are shared; all take turns in scribing on a board, leading discussion or accepting responsibility for acquiring particular information. If a tutor is delayed, well-established groups confidently start the tutorial and proceed effectively.

Groups often share food and drink inside the rooms if permitted, or by taking ‘time out’.

### Staff development

The importance of tutor training to equip teachers for new roles cannot be overemphasised (Farmer 2004). Basic training is usually mandatory in PBL programmes and ongoing development may be a local requirement. Some teachers find it hard to relinquish more didactic roles that allow them to display content expertise, but most enjoy supporting the new learning skills of the students.

New tutors find it helpful first to observe a group in action; indeed, it may be required. Tutors who have taught in other programmes or have initially observed PBL groups elsewhere need to be aware of local differences in goals, expectations and organisation.

The nature of staff development and ongoing support varies in different schools. Initial training may involve observation and practice with a group from the programme or recruited for the purpose. Alternatively the PBL process may be modelled amongst the trainees themselves. If PBL is being introduced for the first time, staff may seek opportunities to observe the process in another school that has similar philosophies and practices.
Effective training of staff ensures that the necessary background, goals and local strategies are considered, together with information on assessment and evaluation. Specific issues of institutional emphasis (e.g. evidence-based medicine or information technology) require explanation, practice and ongoing support. Tutors need skills in monitoring the process and giving feedback.

To summarise, tutors in a training session will:

• Review the goals and expectations
• Understand the tutor’s role
• Clarify local practices and requirements
• Acknowledge and share concerns, finding solutions
• Identify helpful resources and support
• Practise new strategies
• Share experiences
• Meet fellow tutors
• Participate enthusiastically!

In addition to materials supplied to students, tutors are usually issued with handbooks or on-line information, highlighting issues for each problem. Guides for tutors may also contain essential information to be revealed progressively as the problem unfolds.

One important source of continuing support is engagement with other tutors. A useful strategy is to meet and discuss progress in the current problem and review the next problem, ideally with case writers and/or subject experts present. Issues of content and process are discussed, while difficulties or confusions are resolved; experiences shared and strategies reviewed. Such meetings encourage tutors to contribute to the quality control of the programme.

Starting as a PBL tutor

To become a confident tutor:

• first observe a class
• access staff training and development (may be mandatory)
• review the sequence of problems
• study tutor guides, web-sites and relevant literature
• understand assessment requirements

Before the first session, tutors need information:

• Are the students beginners or ‘old hands’? What do they know already? What are their expectations?
• What model of PBL is used? How many tutorials? What are the reasoning steps?
• Are guides, handbooks or on-line information supplied to tutors/students?
• What is the tutor’s role in guiding the breadth and depth of learning?
• What additional learning activities are provided? What resources are available (IT, museums, library, notes, formal classes including practicals and clinical work)?
• How do students in difficulties access support?
• How are students assessed? Do tutors contribute to summative assessment?

At your first tutorial, introduce yourself and allow time for each student to do the same. New tutors generally find it easiest to start with an established group. Helping students to form a new group requires particular skills; some tutors prefer that role.

The PBL tutor’s role

Good tutors support appropriate interaction by maintaining an open and trusting environment. They reflect on their own performance and encourage students to do likewise. PBL teachers enjoy facilitating learning and enhancing reasoning skills.

Does subject expertise matter? With training, senior undergraduates, research students and staff at all levels of appointment have become effective tutors. Successful tutors are drawn from diverse disciplines but the majority are most comfortable tutoring in areas related to their own expertise. Some prior knowledge or experience may allow tutors to enhance a group’s effectiveness providing that they facilitate and do not dictate. Relevant experience leading to a sense of comfort may come from a background of teaching, research, or clinical practice in an area, or from previous tutoring on the same problems (Wilkerson 1994).

Individuals with broad backgrounds – educational, scientific, health professional or humanities – have been effective medical PBL tutors. Staff who direct the group, deliver mini-lectures or interrupt the free flow of discussion are inappropriate since they circumvent the essential exploration and interaction that underpin the success of PBL.

Effective tutors encourage behaviours that enhance the sessions, ensuring general participation. They need to know if they are expected formally to assess individual students. Tutors help set expectations and provide thoughtful insights to the group, but some teachers who are expert in an area find it difficult to facilitate rather
than dictate. That shift in role requires an understanding of the goals of PBL, flexibility and an awareness of students’ learning needs.

At the end of the session, tutors encourage the group to review its performance. Effective tutors reflect on their own contribution:

- Are we achieving the faculty’s and the group’s goals?
- Were there aspects I should have handled better? What were the high or low points?
- Did I intervene too much or too little?
- Was the time well balanced?
- Did everyone participate effectively? If not, how can I best encourage or restrain?
- Should I have a word with student…?

What is the tutor’s role in assessment?

Tutors must be familiar with local assessment policies. Individual students and/or groups may be assessed summatively (determining progression) or formatively (for feedback).

The group

At the end of each problem, groups review their processes and progress, to encourage self-reflection and enhance their collective performance. Some students, however, are uncomfortable with self-assessment and personal discussion. Differences reflect national characteristics, cultural backgrounds, fluency in the local language, confidence and personality. Overall, the comfort of students with PBL and the level of trust in the tutor and fellow members will affect their willingness to engage in meaningful revelation and reflection.

The skills of a tutor are tested when the group is unwilling to take responsibility for the process or to participate effectively. Trust is essential and must be established early; students who fear a penalty or negative outcome are unlikely to commit themselves honestly and openly. Facilitative strategies include posing open-ended questions or inviting comments on particular situations.

Useful questions to discuss include:

- How did we go as a group? What went well?
- What could I have done better as a tutor?
- Were there difficult situations? What helped to resolve them?
- What have you found to be particularly helpful?

Formative assessment of groups can occur when tutors change groups for one problem in order to provide independent feedback to the group and to the regular tutor. If substantial difficulties are apparent, more formal reviews require expert observation or the use of group assessment instruments.
Individual students

Tutors are usually expected to provide formative feedback to each member. One useful device is to ask students to complete a simple self-assessment questionnaire reviewing appropriate behaviours; the tutor returns them with comments and may interview each individual privately.

Students will be assessed using a variety of written, oral and/or clinical tests to determine progression and ultimate graduation. Students who are competitively graded in examinations may be unwilling to share knowledge and contribute to the group process. Tutors then need particular skills to encourage cooperation.

Tutors are usually expected to note absences as well as to assist and perhaps report on students who experience difficulties or who are consistently disruptive. In some programmes they may be required to judge each student’s performance summatively, but that is difficult to do objectively, even when criteria are established and training is provided.

Evaluating PBL tutorials

Students value the opportunity to comment on the effectiveness of teaching and learning, providing that the demand is not excessive, their views are taken seriously and there is evidence of change. At the end of each problem, and particularly in the final tutorial of a term, time is usefully allocated for reflection and discussion.

Both the process and the learning in PBL tutorials can be evaluated against explicit goals. The tutor’s review of the effectiveness of group processes offers insights for the members. In addition, specific questions of content can be resolved and common confusions noted. Tutors can pass on their group’s views to curriculum managers who should notify students of any changes that result.

Students evaluate their tutor. They identify the skills considered most important for effective facilitation and provide constructive feedback to tutors and managers. Issues include:

• tutor characteristics: helpfulness, interest, enthusiasm
• support for clinical reasoning
• enhancement of group process
• encouragement and recognition of independent learning
• the appropriateness of interventions by tutor and members.

Summary

PBL is a proven strategy for learning. A PBL tutor is a facilitator rather than a source of information, a role that requires training and ongoing support. Broad goals of PBL include the encouragement of self-directed learning, scientific and clinical reasoning, communication and teamwork. Tutors must recognise local expectations and strategies. They need to know the students’ previous learning experiences, the nature of parallel educational activities, resources available for students and staff as well as the nature and timing of assessments. Roles of tutors in different institutions vary, so local expectations relating to goals, tutorial processes, assessment and evaluation must be understood.

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Further reading


Integrated learning

D. Prideaux

Introduction

Medical education courses draw on disciplines from the physical, human and biological sciences, humanities and the social and behavioural sciences and clinical sciences. Traditionally the disciplines were taught separately with an emphasis on the basic sciences in the early years and clinical experiences in the later years. Students, however, were expected to combine all the knowledge and skills from the disciplines and apply them to their clinical work.

In the later part of the 20th century medical education reformers advocated the combination of the disciplines and the organisation of integrated learning experiences for students where they called upon knowledge and skills from across the disciplines in addressing patient cases, problems and issues. Integration was promoted in teaching and learning approaches rather than assuming that students would somehow integrate their disciplinary knowledge on their own. While integration was once regarded as a mark of innovation in medical education it is now more widely accepted as a feature of all programmes. The degree of integration varies. Harden (2000) conceptualised a ‘ladder’ of integration with 11 steps or stages ranging from treating the disciplines in ‘isolation’ from each other to ‘interdisciplinary’ and ‘transdisciplinary’ designs (Fig. 23.1)

Types of integration in medical education

There are two main types of integration in medical education. Integration through dedicated approaches or integration through specific contexts. In the first of these the programme is deliberately structured to organise or facilitate learning across the disciplines around key concepts, themes or problems. There are two common approaches in medical education. These are:

- horizontal integration
- vertical integration.

In horizontal integration there is integration between the various disciplines within any one or each year of the course such as in courses organised on a body systems basis. In vertical integration there is integration of disciplines taught in the different phases or years of the course. The early introduction of clinical skills and their development alongside basic and clinical sciences is a good example of vertical integration.

Integrated learning through context is more common in the clinical components of medical courses. As clinical services become more integrated so too do the learning experiences available for students. The increased emphasis on clinical experience in primary care and general practice settings has brought additional opportunities for integrated learning in current medical school curricula.

The rationale for integrated learning

The rationale for integrated learning is frequently unstated or not argued strongly. It is assumed that integrated learning will result in a more relevant, meaningful and student-centred curriculum but the assumption often remains untested.

A rationale for integrated learning can be found, however, in some of the writings in cognitive psychology. Regehr and Norman (1996) have summarised these writings. It is easier to retrieve and use information when it is combined in meaningful schemata.

"Information in isolation is inert and unhelpful"

Regehr & Norman 1996

Regehr and Norman (1996) also refer to the concept of ‘context specificity’. The ability to retrieve an item from memory depends on the similarity between the condition or context in which it was originally learned and the context in which it is retrieved.
There are at least three ways to address context specificity. One is to promote the elaboration of knowledge in ‘richer’ and ‘wider’ contexts. Horizontally integrated system or case-based curricula can provide such elaboration. Repeated opportunities to use information in different contexts can also reduce the effects of context specificity. Such opportunities can be found in vertically integrated courses where there is revisiting of knowledge in different situations and in different combinations of disciplines.

An additional way of reducing the effect of context is to make the learning contexts as close as possible to the context in which the information is to be retrieved. This provides an argument for integrated learning within integrated clinical contexts such as in primary care, family medicine or general practice.

Approaches to integration

**Horizontal integration**

In horizontally integrated courses the disciplines are combined together around concepts or ideas in each year or level of the course. Commonly this is done using a body system approach. The early years of medical courses are frequently organised into blocks or units corresponding to body systems such as:

- cardiovascular
- respiratory
- renal
- gastrointestinal
- endocrine/reproductive
- musculoskeletal.

Within these blocks students learn the basic sciences of anatomy, physiology and biochemistry together with social and behavioural sciences and clinical sciences as applied to normal and abnormal structures and functions within the systems (Fig. 23.2).

Horizontally integrated courses are becoming more popular as increasing numbers of medical schools around the world adopt problem-based or case-based learning approaches. In these approaches, specifically constructed cases become the focus for a week or 2 weeks of study. The cases may be organised by system blocks but each case in itself is also integrated. They are designed so that students must draw on knowledge, ideas and concepts from across the disciplines in order to generate and pursue learning goals. Problem-based learning, in particular, emphasises elaboration of learning as students generate learning goals and discuss them in small groups calling on all relevant knowledge across the disciplines.

**Vertical integration**

In vertically integrated courses the disciplines are organised into themes or domains which run throughout all years of the course. Many medical courses are now organised around four main themes which, while given different names, generally deal with the following:

- clinical and communication skills
- basic and clinical sciences
- social, community and population health
- personal and professional development.

A common way of organising a vertically integrated curriculum through the themes is to use a spiral approach. Within each of the themes there may be sub-themes or blocks which provide the basis for integration across the years of the medical course. For example there may be a sub-theme such as life cycle...
which is present in each year of the course in one or more themes. The studies in each year revisit those from the previous year or years, build upon the sub-theme and extend the learning to higher levels and greater complexity. Each turn of the spiral represents an extension of the studies from the previous turn (Fig. 23.3).

There are few medical courses which now rigidly maintain a preclinical/clinical divide with the former presented in the earlier years of the course and the latter towards the end. Students now have early clinical learning experiences which increase in emphasis as they proceed through the course. There is a corresponding decrease in emphasis on the basic sciences but they still have an important part to play in the clinical years in providing an explanation of the mechanisms of disease and disease processes. This increases the potential for integration of clinical and science disciplines. For example anatomy and imaging are being presented in an integrated approach throughout medical courses. The establishment of clinical skills units has also fostered integration. Dent et al (2001) have reported on an Ambulatory Care Teaching Centre (ACTC) in which students’ early experiences in the clinical skills centre integrate with patient-based experiences in the ACTC during subsequent system blocks.

**Fig. 23.3** Vertical integration – a spiral curriculum

Contexts for integrated learning

In the rationale for integrated learning set out here it is argued that one way to achieve such learning is to ensure that the learning context is itself integrated. With medical practice becoming more specialised, particularly in large teaching hospitals, this is becoming increasingly difficult to achieve. This is one of the reasons underlying the calls for more clinical experiences for students in general practice, family medicine or primary care. It is claimed that these contexts will provide opportunities for students to experience a patient-centred approach rather than a disease-oriented one and will enable them to experience a broad spectrum of illness to which they can apply the integrated knowledge from the studies in their medical courses.

“When students learn complex tasks in an integrated manner, it will be easier for them to transfer what they have learned to the reality of day-to-day work settings”

*Janssen-Noordman et al 2006*

The Parallel Rural Community Curriculum (PRCC) model pioneered in the School of Medicine at Flinders University enables students to take a whole year of clinical studies in rural general practices and associated small rural hospitals. They learn the same content from the major clinical disciplines as those students in the Flinders course who take the year in a teaching hospital, but do it in an integrated patient-based approach. Students in this integrated approach perform better in end-of-year examinations than their teaching hospital-based peers, thus providing evidence for the importance of matching integrated learning programmes with integrated learning contexts (Worley et al 2004) (see Ch. 15, In the community). This programme and the increasing interest in enabling students to undertake clinical studies in rural, ambulatory, community health centres and district general hospitals has led to the implementation of further integrated longitudinal learning experiences in many parts of the world.

One of the additional features of the PRCC and other longitudinal programmes is that students make a contribution to the clinical and other services of the general practices health services and hospitals in which they work. This idea is encapsulated in the ‘symbiotic’ approach to clinical education which emphasises that medical schools should enter a mutually reinforcing relationship with their health services (Prideaux et al 2007). In such a relationship, student learning should be enhanced by the health services and, in turn, the students and their programme should make a contribution to the enhancement of the clinical services in which they are placed.

In a symbiotic curriculum, education and clinical service are mutually enhanced.

A symbiotic relationship can be achieved by enabling students to have longer placements in clinical services and by providing guidelines and support for students to direct their own learning from patients rather than expecting them to be constantly directly ‘taught’ by busy clinical staff. In a recent paper Bleakley and Bligh (2006), of the Peninsula Medical School in the southwest of England, have advocated a shift from the
It is regarded as paradoxical by some medical educators that integrated curricula require a greater degree of structuring than those based around traditional disciplines. In a course based on separate disciplines, concepts and key ideas can be defined by the well-structured approaches existing in the disciplines. In an integrated curriculum, concepts and key ideas from several disciplines must be combined together in some logical way. Hence there has been increasing interest in medical education on approaches to the organisation and articulation of curriculum and curriculum content.

There is much contemporary interest in medical education in outcomes-based approaches to curriculum design and development (Harden et al 1999). In an outcomes approach those responsible for the course define broad and significant outcomes that students must attain on graduation. There is then a process of ‘designing down’ so that learning and assessment systems match the outcomes. More recently the outcomes approach has been incorporated into a dynamic model of curriculum design which is well suited to the construction of integrated curricula (Prideaux 2007).

In a similar manner, integrated curricula can be defined by key concepts or ideas that transcend disciplines. For example, ‘homeostasis’ can be used as a key concept to integrate content from biochemistry and physiology. Clinical studies can be integrated by examining the effects and outcomes of disordered homeostasis. The key is to define a set of concepts that will effectively integrate all the content required in the course (Fig. 23.4).

Curriculum maps can be employed effectively in this process. One way of designing maps is to place the key concept or idea in the middle of a diagram and then to draw the content from across the disciplines that will contribute to the understanding of the concept. There then can be a selection of the linked content to provide the material for study in the medical course. Maps can also be used as a double-check on the curriculum. Those responsible for the disciplines can draw up their own maps of essential concepts and content to be covered. This can be matched against the material covered in the integrated approach to identify omissions or overlapping content.

Searchable computer databases provide an effective way of determining the coverage of content in integrated courses and are increasingly employed in medical schools across the world. Course content can be logged onto the computer and can be subject to searches according to a number of criteria, including discipline, key concepts, common presentations or illnesses and system complexes. Students can have access to the data bases as a guide for their own learning and preparation for assessment. They can match what they learn in their integrated programmes to what is expected in the course as a whole, by careful examination and searching of the database. This gives them responsibility for their own learning. Databases can be linked to electronic resources to support student learning. In this way students can access ‘reusable learning objects’ which may be shared by different medical schools.

All these approaches require a greater degree of central rather than departmental control of the curriculum. Indeed, they require the breaking down of so-called departmental ‘silos’. In most medical schools the responsibility for curriculum content and organisation now lies in a central committee or decision-making body representative of the disciplines and groups in the course. It is this body which oversees curriculum content and the contribution of the disciplines.

Learner integration

An important distinction made by curriculum writers is that between the ‘intended’ curriculum and the ‘real’ curriculum as it is experienced by students. There may well be a difference between the curriculum as it is intended and written down by its designers and how it is actually received by the students who experience it. Thus the real measure of the degree of integration of a curriculum is not what is written down in plans, statements and booklets but rather how much integration takes place in student learning.

“A number of empirical studies have shown, however, that effective competence-based learning is not achieved by offering students separate building blocks because this does not facilitate transfer of what students have learned”

Janssen-Noordman et al 2006
Contemporary medical education curricula emphasise self-direction in learning and there is much interest in the concept of ‘constructivism’. In constructivist approaches students actively construct or develop their own learning from the range of experiences available to them. Again this makes the question of achieving integration more problematic. In a didactic approach the integration can be presented to students in a pre-packaged way although, of course, the question still remains as to whether it will necessarily be received in that way. In more self-directed and constructivist approaches, learning plans and goals, study guides and learning pathways should be designed to facilitate integrated learning, but in the final analysis it will be up to the students to construct their learning in an integrated or non-integrated way.

Newman and colleagues (1996) have provided a critique of constructivist approaches where student engagement has become an ‘end in itself’ rather than the pursuit of quality learning and ‘intellectual’ outcomes for students. They use the term ‘authentic learning’ which they argue has three central components. These are:

- the construction of knowledge
- disciplined inquiry
- ‘value beyond’ the school or educational context in which the learning takes place.

These three components bring together some of the earlier discussions presented here. As indicated above, a major task for curriculum designers will be to design learning tasks that enable students to construct their learning in integrated ways. This can be facilitated through the use of:

- study guides
- learning logs and portfolios
- online materials
- independent projects.

This construction of knowledge should be underpinned by a process of rigorous inquiry. The central elements of the process of inquiry as set out by Newman and colleagues are:

- building on a prior knowledge base
- providing for in-depth learning
- providing for elaborated learning.

These match the central elements of problem-based learning. Thus problem or case-based approaches will provide a strong foundation for authentic integrated learning.

Providing integrated clinical contexts for learning will demonstrate the value of what is being learned beyond the medical school environment and indicate its relevance to clinical practice. This potentially is the most important area of all. If student learning is to be meaningfully integrated it must be anchored in the realities of clinical practice. There must be a high degree of involvement of students in the actual tasks and activities of integrated clinical services so that they can clearly see that integrated learning is not just something important for success in medical school, but will be an important part of their continued development as medical professionals. The interprofessional learning experiences offered at Linköping University in Sweden are an example of this. Students from different health disciplines work together in the authentic tasks of actually running an interprofessional patient care service.

The frequently quoted adage in medical education that ‘assessment drives learning’ must not be ignored. If integrated learning is to be achieved it must be driven by integrated assessment. As in the process of structuring the curriculum, integration must be deliberately incorporated into the assessment process. The most important step is to ensure that integrated learning is represented in assessment blueprints. This requires a central process of test and examination construction, with responsibility for assessment residing with the medical school overall rather than with individual departments, similar to the design of the curriculum as indicated earlier.

There are now established methods for assessing integrated clinical learning once it has been represented in the blueprints. The objective structured clinical examination (OSCE) format is ideal for assessing integrated clinical learning. Similarly, portfolio-based assessment and the mini-CEX can promote this form of testing. Written assessments too can be focused on integrated learning. Many medical schools using problem-based formats have adopted case-based assessment methods which attempt to evaluate the processes of problem-based learning as well as the integration of student knowledge. Multiple-choice and short-answer questions which are are focused on the assessment of application, analysis, synthesis and evaluation rather than recall do provide opportunities for students to demonstrate that they can integrate and apply their learning and knowledge base. There is growing interest in progress testing where students are regularly assessed through integrated exit level items with student achievement documented and recorded.
Conclusion

Building an evidence base about integrated learning

Despite the advocacy of integrated learning, many of the claims made for it remain largely untested. As yet there is not clear evidence about the impact of integrated learning nor about the best ways to achieve it. Certainly Newman and colleagues found some support for their concept of authentic pedagogy and the interrelationship between pedagogy, assessment and performance in the school population. However, there have been few studies of integrated learning in the medical education context.

There is a need for some programmatic research around the concept of integrated learning. It is important to ask and to seek responses to questions such as those below.

- What factors promote integrated learning?
- What factors limit it?
- What curriculum designs promote integrated learning?
- What is the perceived relevance of integrated learning for students?
- What is the effect of integrated assessment on integrated learning?
- Does integrated learning provide value beyond medical school?
- Is integrated learning promoted by student participation in authentic integrated clinical contexts?

There will be a need to pay careful attention to questions of research design. Simple comparison of student performance in integrated and nonintegrated programmes may not prove to be productive because of the interrelationships of variables and the very real difficulty in classifying programmes as wholly integrated or nonintegrated. Nevertheless answers to the questions above and others like them will assist in establishing both the nature and place of integrated learning in medical education and, ultimately, in assessing the effect of student engagement in integrated learning on subsequent practice as a medical professional.

Summary

Contemporary medical educators have increasingly called for the integration of student learning across the disciplines contributing to medical courses. A rationale for this kind of learning can be drawn from cognitive psychology through the concept of ‘context specificity’. Retrieval of learning is enhanced where there is similarity between the context of initial learning and the context of retrieval. Horizontal integration addresses context specificity by enabling elaboration of learning in richer and wider contexts such as those provided in case-based or systems-based curriculum designs. Vertical integration provides repeated opportunities for use of information in different contexts in theme-based or spiral curricula. Integrated learning is also promoted where the learning context itself is integrated, as in general practice or family medicine clinical services.

Integrated curriculum designs require structure around outcomes, concepts or maps. Nevertheless, irrespective of what is intended, it is the reality of integration for the learner that is important. Constructivism and authentic learning can promote integration and integrated assessment will drive integrated learning.

However, despite widespread advocacy of this approach, there is little evidence about integrated learning. There is a need for research evidence about its nature and place in medical education so that its contribution to the ongoing medical practice of medical graduates can be assessed.

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Interprofessional education

H. Barr

Chapter 24
Section 3: Educational strategies

Introduction

Much of what you are learning about professional education in this book will be invaluable if and when you join the growing number of teachers from medicine and other health professions developing and delivering interprofessional education (IPE). With luck, you will be offered orientation for roles that may seem unfamiliar at first, but a lot that you need to know and do may be transferable from your experience in medical education. This chapter will help you evaluate the relevance of that experience and to identify the additional knowledge and skills that you will need to understand and teach IPE. Permit me to ‘second guess’ some of the questions that you may ask. Answers are necessarily brief, but further reading is suggested as well as conferences run by interprofessional associations which will enable you to build on the basics.

Why interprofessional education?

IPE was first introduced in health and social care 40 years ago in sporadic and spasmodic ‘initiatives’ in North America and Europe. It was endorsed 20 years later by the World Health Organization (WHO 1988) which promoted the international movement that we have today.

According to WHO, IPE can:

- develop the ability to share knowledge and skills collaboratively
- enable students to become competent in teamwork
- decompoundise curricula
- integrate new skills and areas of knowledge
- ease interprofessional communication
- generate new roles
- promote interprofessional research
- improve understanding and cooperation between educational and research institutions
- permit collective consideration of resource allocation according to need
- ensure consistency in curriculum design

(Who 1988, pp 16–17)

(The WHO at that time preferred the term multiprofessional education, but has since adopted interprofessional education.)

The case for closer collaboration has gathered momentum down the years as the needs of patients have seemingly become more complex and more challenging. It is now painfully apparent that no one profession can respond adequately to the multiplicity of problems that many patients present, be they children at risk, alienated young people, members of dysfunctional families, chronically sick and disabled people living longer, or amongst the growing number of old people surviving to an advanced age. The case has, however, been brought to a head in quite different terms in those countries where inquiries into medical errors, e.g. the USA (Institute of Medicine 2001) and the UK (Kennedy 2001), have attributed failure to problematic communications and relationships between professions (Meads & Ashcroft 2005).

Time and again, ‘joint training’ or ‘shared learning’ is invoked in the belief that it can improve collaboration, either in response to the need for comprehensive care or to reduce errors. So persistent have those arguments become that expectations are in danger of outstripping capacity to respond. IPE can never be more than part of a package to improve care or to reduce error, but an indispensable part.

What do you mean by IPE?

IPE takes many forms in many fields. It is known by many other names, such as multiprofessional education or interdisciplinary studies. ‘Interprofessional education’ now enjoys the widest currency and is most often defined as:
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Occasions when two or more professions learn with from and about each other to improve collaboration and the quality of care

The Centre for the Advancement of Interprofessional Education (CAIPE) 1997

IPE may be freestanding or woven into the fabric of two or more professional programmes. It may last from hours to years, led by a university or a service agency, delivered in the classroom, the workplace, at a distance, or in combination. Some undergraduate IPE programmes have large numbers of students and teachers, others much smaller (and postgraduate IPE programmes almost invariably so).

Many of the early IPE programmes were preoccupied with problems associated with professional boundaries and tensions. Most programmes today are positive and outward looking as they seek to unite professions in shared endeavour to improve services and the quality of patient care. They take into account problems in interprofessional relationships if and when they emerge. This shift of emphasis reflects, first, movement away from a culture of blame towards systemic analyses of failure and, second, a recognition by the professions that they have an inescapable responsibility to work together to improve the health and wellbeing of individuals, families and communities.

Arguments are rehearsed about the relative merits of IPE before or after qualification. Some exponents still hold that IPE is better after qualifying when practitioners have developed their respective professional identities and have some professional experience to share. Logistics may be less problematic at that stage than during undergraduate studies, and winning approval for modifications to curricula less constrained by the requirements of regulatory bodies. Other exponents hold that if IPE is left to this later stage, irreparable damage may already bedevil interprofessional relationships. Negative stereotypes held by one profession about another may have been confirmed during undergraduate professional education. These may be difficult to relinquish at a later stage. IPE should, in accordance with this view, begin early in qualifying programmes – the sooner the better. Informed opinion now tends to favour a continuum of IPE throughout qualifying programmes and continuing professional development although much work remains to be done to clarify how interprofessional objectives, content and methods can best be developed and integrated with professional education.

So who is IPE for?

IPE in developed countries mainly includes health and social care professions who work with individuals and nuclear families with complex needs. The care of adults and older people may include generalist and specialists in medicine with nursing, allied health professions and social work. The care and protection of children may include some of the same medical groups plus others such as paediatricians, with the police, psychology, school nursing, school teaching, social work and youth work. Different professional groupings pertain for each of the many other fields of interprofessional practice such as learning disabilities, mental health and palliative care. In contrast, IPE in developing countries may embrace a wider spectrum including paraprofessional and indigenous workers.

Undergraduate IPE programmes typically cater for more professions than do postgraduate programmes. Depending on the professional groups taught in the same university, they may include medical, health and social care professions, but partnerships are sometimes established between universities in the same or neighbouring towns to extend the professional mix. For example, medicine, dentistry and pharmacy may be in one university and nursing, allied health professions and social work in another. Combining professional groups is particularly difficult for profession-specific educational institutions, which need to enter into partnerships with each other, or with universities mounting undergraduate health and social care programmes, before IPE becomes possible. Remote locations can also pose problems where a university may have programmes for just one or two professions and time and cost to link up with students from others would be prohibitive.

Incremental steps can nevertheless be taken to introduce interprofessional perspectives into teaching (Harden 1999). These may include inviting practitioners from different professions to explain about their roles and working relationships, arranging observation visits and placements to experience other professions at work, utilising the pool of interprofessional e-learning material, or simply choosing case studies that present other professions positively and purposefully. Opportunities can also be arranged for students from different professional programmes concurrently on placement in the same hospital or neighbourhood to meet, for example, during lunchtimes or at the end of the working day, to compare their practice learning experiences.

Postgraduate IPE typically includes practising professionals who need to work closely together in a particular setting, e.g. primary care teams, with a particular group, e.g. people with HIV/AIDS, or applying a particular treatment model, e.g. in mental health. The entire programme may well be shared.

"The question is how best to prepare current and future professionals for practice, recognising that health and social care is complex and that ‘one size’ in IPE does not fit all"

Madeline Schmitt
Professor Emeritus in Nursing and Interprofessional Education
University of Rochester, NY

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What about the content?

Many writers recommend topics for IPE. Ross and Southgate (2000) compiled the following after consulting teachers in the United Kingdom: epidemiology; health promotion; ethics; critical appraisal skills; clinical skills; decision making; and care planning. Lists such as theirs clarify thinking, but may omit topics that focus directly on collaborative practice. Of these, the one most often added is ‘communications’, but this is a complex and difficult topic open to interpretations that may have little or nothing to do with collaborative practice. Headings alone may imply more commonality of learning needs than closer scrutiny confirms. The same subject may need to be taught at greater depth for one profession than for another and applied differentially to their practice.

Outcome-led formulation of IPE curricula has gained popularity. Numerous formulations have itemised collaborative competences (Barr 1998) and proved helpful in aligning professional and interprofessional objectives where the professional programmes are also competency-based. But IPE, like the professional education in which it is implanted, may then fall prey to the same criticisms that competences are behaviourist and mechanistic, addressing readiness for immediate practice at the expense of longer-term professional development.

Alive to these reservations, teachers in Sheffield developed a capability framework (CUILU 2006, www.sheffield.ac.uk/cuilu) derived from benchmarking statements for undergraduate professional programmes in medicine, nursing, allied health professions and social work (for medicine see QAA 2002) covering: knowledge in practice; ethical practice, interprofessional working; and reflection.

The interprofessional team member (CUILU 2006):

- is able to lead and participate in the interprofessional team and wider inter-agency work, to ensure a responsive and integrated approach to care/service management that is focused on the needs of the patient/client
- implements an integrated assessment and plan of care/service in partnership with the patient/client, remaining responsive to the dynamics of care/service requirements
- consistently communicates sensitively in a responsive and responsible manner, demonstrating effective interpersonal skills in the context of patient/client focused care
- shares uni-professional knowledge with the team in ways that contribute to and enhance service provision
- provides a co-mentoring role to peers of own and other professions, in order to enhance service provision and personal and professional development.

Competence or capability based outcomes help in setting interim objectives for pre-licensure IPE – preparedness for interprofessional practice – to be followed up in a collaborative environment including work-based learning between professions.

What about the learning methods?

Most interprofessional learning methods have been adopted and adapted from one or more fields of professional education. Problem-based learning (PBL), for example, has been introduced into IPE from medical education where it is well established in many schools, prompting some medical educators to see it, if not as the only interprofessional learning method, at least as the first choice. The potency of PBL in professional and interprofessional learning is well testified, but relying on any one method is needlessly restrictive and may inadvertently devalue those drawn from other fields of education. Depending on the topic, experienced teachers vary the educational methods used in response to students’ learning needs ensuring interest.

The following classification is derived from learning methods frequently used in IPE (Barr et al 2005). It may be advantageous to use different methods in combination. Practice-based and e-learning may be treated either as methods, or as context within which to introduce methods. Given the importance accorded to interaction and exchange, received learning tends to be used sparingly.

- Exchange-based learning, e.g. debates and case studies
- Action-based learning, e.g. problem based learning, collaborative enquiry and continuous quality improvement (CQI)
- Observation-based learning, e.g. joint visits to a patient by students from different professions, shadowing another profession
- Simulation-based learning, e.g. role-play, games, skills labs, and experiential groups
But does IPE work?

Generalisation about the effectiveness of IPE is hazardous. IPE, as you will have discovered by now, takes many forms capable of delivering different outcomes as findings from a systematic review confirm (Barr et al 2005, Hammick et al 2007). Analysis of the 107 highest quality evaluations (half from the USA and a third from the UK) distinguished between three overlapping types of outcome:

1. Individual learning for collaborative practice
2. Group or team-based learning for collaborative practice
3. Learning to effect change and service improvement.

The first typified undergraduate IPE and the third postgraduate IPE between experienced practitioners, especially in the workplace. The second was reported less often at either stage than the interprofessional literature might lead you to expect, but a word of caution: rigorously evaluated examples qualifying for inclusion in a systematic review may not be typical of IPE in general. Team development may be more strongly represented in work-based IPE, but less often subjected to evaluation or lead to publication and hence consideration for inclusion in a systematic review.

Findings from the review establish baseline data both for IPE and its evaluation from which to do better, but also a warning against overambitious expectations at variance with proven experience. Assertions that IPE should equip newly qualified workers as agents of change impose unrealistic expectations on students and teachers alike. Objectives must take into account the stage that students have reached in their professional maturation and, at the undergraduate stage, constraints on time and opportunity for interprofessional learning in crowded professional curricula.

“The key to success lies in ensuring that future programmes are grounded in best practice based on the evidence”
Gerard Majoor
Chairman, The Network: Towards Unity for Health, 2005

How can I get up to speed?

There is no substitute for reading, but be warned! The interprofessional literature is voluminous but uneven. Begin, may I suggest, with relevant journals. At risk of special pleading, let me commend the Journal of Interprofessional Care as the only one wholly dedicated to collaborative education, practice and research worldwide: www.informahealthcare.com. Numerous professional journals also carry helpful interprofessional
papers. They include *Education for Health*, *Learning in Health and Social Care*, the *Journal of Allied Health*, the *Journal of Integrated Health*, *Medical Education* and *Medical Teacher*. Scanning indexes for these journals may well be rewarding.

Interprofessional occasional papers with international application are accessible electronically and without charge from the UK Higher Education Academy (www.healthheacademy.ac.uk) and definitive texts included in the Blackwell/CAIPE series (see Meads & Ashcroft 2005, Barr et al 2005, Freeth et al 2005 with others forthcoming) – www.blackwellpublishing.com.

National and regional interprofessional associations have been established in Australia (website in preparation), Canada: www.cihc.ca/; the Nordic Countries: www.nipnet.com; the UK: www.caipe.org.uk and throughout Europe: www.eipen.org – each running its own conferences and workshops. The International Association for Interprofessional Education and Collaborative Practice (InterEd) – www.interedhealth.org – runs biennial conferences under the slogan of All Together Better Health and currently has a Study Group conducting a review of IPE for the WHO (Yan et al 2007). The Association for Medical Education in Europe (AMEE) – www.amee.dundee.ac.uk – is a worldwide organisation which regularly includes sessions about IPE in its annual conferences. The Network: Toward Unity for Health – www.the-networktufh.org – is increasingly active in IPE, notably in developing countries, to complement its commitment to the implementation of community-based medical education with problem based learning. IPE invariably features in the programme for its annual international conference complemented by its interprofessional special interest group.

“Now is an exciting time of progress for interprofessional education and collaborative practice. Working together for better health is more important than ever”

Jean Yan
Chief Scientist for Nursing and Midwifery,
WHO, 2007

**Summary**

Much that you bring from medical education will be readily transferable to interprofessional education, but teaching a class drawn from a range of professions is challenging. Assumptions, perceptions, expectations and experiences differ. Tensions played out may at first seem intrusive, but on reflection may be seen as opportunities to facilitate mutual understanding. Turn your classes into microcosms of interprofessional relationships in the working world. Go easy on lectures! Other learning methods that you bring with you may be more appreciated. So too may those brought by teachers from other professions. Co-teaching will be stimulating. Make time to get to know each other beforehand and be prepared to resolve misunderstandings when they surface. Join one or more of the associations where you will meet other interprofessional exponents with diverse perspectives to compare. Welcome to the interprofessional community of practice.

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Chapter 25
Section 3: Educational strategies

Core curriculum and student-selected components
S. Cholerton, R. Jordan

Introduction

In the field of education the concept of a core curriculum is not new. However in the first edition of the General Medical Council’s Tomorrow’s doctors (GMC 1993), its linkage with student-selected components as a strategy to circumscribe the requirements of basic medical education, and in so doing to reduce the curriculum overload, was considered a powerful new idea.

“The burden we place on the medical student is far too heavy, and it takes some doing to keep it from breaking his intellectual back. A system of medical education that is actually calculated to obstruct the acquisition of sound knowledge and to heavily favour the crammer and the grinder is a disgrace”

Thomas Huxley 1876

Taking the start of the pre-registration year (equivalent to the intern year in the USA) as a reference point, and framing objectives in terms of the essential knowledge, skills and attitudes, all UK medical schools were urged to define a ‘core curriculum’ that must be satisfied before a newly qualified doctor could assume the responsibilities of a pre-registration house officer/intern. In addition to this ‘core’ experience, schools were urged to provide opportunities for student-selected study in depth in areas of particular interest to them. The broad purpose of these student-selected components was to supply an experience for students which:

…provides them with insights into scientific method and the discipline of research and that engenders an approach to medicine that is constantly questioning and self-critical.

Almost a decade later the second edition of Tomorrow’s doctors (GMC 2003) continued to recommend this educational strategy and by that time the majority of UK medical schools had made significant progress towards identifying the core elements upon which their basic medical education programme is based and all had introduced student-selected components into their curricula. In 2009 the next edition of Tomorrow’s doctors will be published and whilst it is anticipated that a less prescriptive approach may be taken in respect of the amount of time each curriculum will be required to devote to student-selected components, as is currently the case for Graduate Entry Programmes (GMC 2006), the principle of core with an element of choice is likely to remain. It will be the role of medical teachers to ensure that this educational strategy can be further developed to enable both existing and new educational imperatives to be adressed and realised.

Public expectation and demand are now the principal drivers for modernisation. People increasingly want to make informed choices about how to be treated, where and by whom. To meet such public demand, health professionals need to put their patients at the centre of all they do, communicating effectively with them and their carers, recognising and respecting their rights and beliefs, and responding to the diversity of the population. While recognising that pre-registration/prelicensing education continues to provide the basis for professional competency, in the future it must do more than this. New health professionals need to be adaptable, self-reliant, resilient, and able to learn and work flexibly in interprofessional teams across traditional professional boundaries. They must be prepared to contribute to continuous service improvement through critical and creative reflection on their own practice and competent to evaluate the services they deliver.

In most countries, programmes of basic medical education are prescribed under broad statutory frameworks promoted by bodies such as the General Medical Council in the UK and the Association of American Medical Colleges in the USA. In addition, in the UK pre-registration medical programmes are, like all other higher education programmes, required to adhere to subject benchmark statements.
published by the Quality Assurance Agency for Higher Education (2002). The purpose of these is to serve as a blueprint for defining, securing and assuring academic standards.

The term ‘standards’ has been defined by the Higher Education Quality Council (HEQC 1997) as:

*the balance of attributes (types of knowledge, understanding and skills) that are acquired through the study of a particular subject, field or collection of subjects.*

Both the Dearing Report (1997) and the Higher Education Quality Council defined the purpose of standards as yielding information to stakeholders, including faculty and students, but particularly employers, government and the general public, about the attainment denoted by awards. So standards refer to the learning outcomes of degree programmes. Thus they are intended to answer the question ‘What can be expected of a student who has been awarded the degree X from institution Y?’

Since the adoption of such an outcomes-based approach is one in which the results of learning are expressed in a form that permits their achievement to be demonstrated and measured (see Ch. 20, Outcome-based curriculum), it provides stakeholders with clear indicators of attainment. Furthermore it enables medical schools to demonstrate explicitly how they meet three essential ‘duties of care’:

- **Fitness for purpose** – the medical school has a duty to articulate and provide learning experiences that meet students’ legitimate expectations
- **Fitness for practice** – the school has a duty to health service employers to ensure that medical graduates are competent and meet expectations of ‘employability’ in its widest sense
- **Fitness of award** – the school has a duty to patients and the public generally that its graduates meet appropriate standards.

While designed to be of use to all medical educators, this chapter is aimed principally at those with institutional responsibility for curriculum design, content and organisation and in that which follows we:

- explore the interrelationship between the core curriculum and student-selected components of the curriculum
- provide working definitions of the core curriculum and student-selected components
- consider the concepts underpinning and the approaches to developing the core curriculum
- discuss the essential role of student choice in enhancing student learning and meeting programme outcomes
- consider the role of student-selected components in student’s experience of research.

### Interrelationship between the core curriculum and student-selected components

Although for pragmatic and practical reasons it may have been useful to consider the core and student-selected components as separate entities within the curriculum, it is essential now that curriculum planners recognise from the outset the intimate relationship between the two.

It is important to recognise that the core curriculum and student-selected components are not mutually exclusive and that some learning outcomes will be achieved as a consequence of opportunities presented in both.

The curriculum of a basic medical education course must be designed to ensure that appropriate learning opportunities are provided to enable the student to achieve the predefined learning outcomes for the programme as a whole. While many learning outcomes will be achieved through the core curriculum, others will be attained through the student-selected components. It is important to recognise that in this respect the two components of the curriculum are not mutually exclusive and that some learning outcomes will be achieved as a consequence of opportunities presented in both.

### Working definitions

It is best to consider working definitions of both core and student-selected components in terms of experience. Thus by definition student choice implies that only a proportion of the students will elect to undertake any particular given student-selected topic, while core implies that this experience is undertaken by all, i.e. it is a common experience for the whole cohort. In terms of defining learning outcomes, any outcome which is content-dependent must be addressed in the core curriculum. In contrast any outcome which is content-independent, for example a higher-order process outcome, can be attained through the student-selected component, given that the experience is properly designed. From this it follows that before either the core or student-selected component of the curriculum is considered in any detail, a degree programme specification must be established (Fig. 25.1).

### Degree programme specification

A programme specification should set out the main purpose and distinctive features of the course of study, and give the intended learning outcomes in terms of:

- knowledge and understanding
- key skills such as communication and use of information technology
In relation to the curriculum as a whole, in this context it must be defined to embrace all those elements of the student experience enabling the achievement of the specified outcomes. For any educational programme, the curriculum is at the heart and represents the most significant part of the experience designed to enable student achievement of outcomes. In turn the curriculum guides the development of teaching, learning and assessment, and the learning resources strategy. Since the core curriculum, along with student-selected components, contributes to the whole, it is the fundamental part of the experience which must enable students to achieve the essential knowledge, skills and attitudes/behaviour by the time they graduate.

If one takes the view that standards equate to outcomes, then all outcomes are ‘core’, and assurance of outcomes is determined by assessment of their attainment. Those outcomes which can only be met through common experience should be attributed to the ‘core curriculum’, whilst those which are content-independent can be addressed through ‘student-selected components’.

The core curriculum

For the institution

The aims of a medical school are mainly dependent upon the health needs of the society which they serve. Other factors which determine the aims of a medical school are current practices in the profession, the cultural beliefs and demands of their local population and society and the prevailing scientific method. At the heart of any local core curriculum is that defined at the national level.

The Association of American Medical Colleges, through its medical schools objectives project, has identified a core set of outcomes for graduate medical education that reflect the essential attributes that clinicians need for effective modern medical practice (AAMC 2000), and in the UK a similar set has been promulgated by the General Medical Council (GMC 2003) and the Quality Assurance Agency for Higher Education (QAA 2002).

For the subject

For many specialties/disciplines a core curriculum has been defined by their national governing body. For example in the UK, the British Pharmacological Society (2002) defines core curricula for pharmacology and therapeutics for a variety of educational programmes including undergraduate medicine for which there is specific emphasis on safe and effective prescribing. The British Association of Dermatologists has developed a core curriculum which sets out its minimum requirements for UK medical undergraduates. In the USA, the Society of General Internal Medicine and the Clerkship Directors in Internal Medicine

Before considering either the core or student-selected component of the curriculum in any detail, a degree programme specification must be set out

In drawing up the learning outcomes for a basic medical education programme, heed must be paid to the recommendations of statutory and other relevant professional bodies (e.g. the General Medical Council, the Quality Assurance Agency for Higher Education, the American Association of Medical Colleges), the needs of health service employers (e.g. the NHS), and last but not least those of future patients. The programme outcomes should also be related to the input profile of entrants and the baseline requirements of the next phase of the medical education continuum (e.g. in the UK, the two year generic training Foundation Programme).

Upon successful completion of an outcome-defined or driven programme, a student will have acquired a predetermined set of learning outcomes. Some of these will have been achieved by means of a specific component of the curriculum; however, most other outcomes will have been accomplished, often progressively, from multiple learning opportunities in diverse curricular settings and subject areas.
have defined a Core Medicine Clerkship Curriculum Guide (CDIM/SGIM 2006). More recently a Family Medicine Clerkship Curriculum was developed based on the Accreditation Council for Graduate Medical Education CGME defined competencies (O’Brien-Gonzales et al 2007).

Although the process which results in the definition of a core curriculum of this nature often takes into account guidelines of the national regulatory body, generally it has not been sanctioned.

There are also examples of individuals taking it upon themselves to define a core curriculum within a particular subject area (e.g. medical statistics, paediatrics).

A word of caution should be given here for institutional curriculum planners. Such externally defined ‘core curricula’ often emanate from individuals or professional associations with the vested interest of promoting and preserving their own subject area or discipline and its identity. One of the major uses of such initiatives is to support the argument by subject specialists for the maintenance of, or an increase in, curriculum time allocated to their specialty. This is directly contrary to the original purpose of identifying a core curriculum, i.e. to reduce the overburdening of the curriculum.

For basic medical education, it is often better that such inputs from specialties and disciplines be decided at an institutional level, and incorporated into an integrated core curriculum in relation to the learning outcome ‘map’.

Exercise caution when presented with core curricula defined for a specialty/discipline

Methodologies

For an individual school, the first step is to determine a rational basis for identifying the core. In practice the commonest approach is to link determination of core to definition of content.

“The core curriculum must be the responsibility of clinicians, basic scientists and medical educationalists working together to integrate their contributions and achieve a common purpose”

GMC 2003

“The core provides the essential knowledge, understanding, clinical skills and professional attitudes which are required by any medical graduate in order that s/he may practise as a PRHO and commence post graduate training”

QAA 2002

Careful consideration of the core content is required to guarantee complete mastery of essential competencies. A variety of approaches have been used to enable institutions to identify the core elements upon which their current medical course is based. These include:

- drawing up a profile of desired competencies
- identifying a core index of clinical situations, conditions, problems, cases or presentations
- identifying a set of experiences enabling objectives to be met, e.g. a community-orientated programme
- developing core content around longitudinal themes, e.g. life cycle
- deriving core from the learning outcomes (although this presupposes the adoption of a rational method for defining the learning outcomes!).

Whatever ‘wrap’ is chosen, the basic aim is to use competencies, clinical situations or experiences as triggers for defining the knowledge base, the performance base and the attitudinal/behavioural agenda.

The choice of approach to the way in which the curriculum will be delivered can go some way to determining the ‘wrap’ adopted for defining the core. For example problem-based learning courses tend to define the core curriculum by a series of clinical problems or index cases.

There is little research which relates curriculum content to educational outcome. As such, opinion-based processes tend to dominate when curriculum content is defined. A corollary to this is that the result will depend upon those stakeholders consulted and included in the process; for example a curriculum structured around a list of core clinical cases will depend upon the range and background of stakeholders who contributed to its development. That said, there is general agreement that the involvement of as broad a range of local stakeholders as possible is essential.

- The input of teachers, such as faculty staff (academic and clinical academic), general practitioners, consultants and healthcare professionals, is crucial to facilitating ‘institutional’ ownership, as these are the people who will have to deliver the curriculum.
- The input of trainers responsible for post-graduation training can provide useful insights into what will be expected of the graduate in the next stage of their medical education.
- The input of consumer groups, including senior students, interns, patients and employers, has much to offer;
- Input of recent product – junior doctors (post-registration trainees) are a useful group in bringing a sense of modern practice, the real world of work, and the level of skills required.

When attempting to define the core, involve as broad a range of local stakeholders as possible

Curriculum planners must never lose sight of the need to constrain the content burden of the curriculum, and the downside of involving a comprehensive
range of stakeholders is that it can easily add to that burden! At programme level it is essential that the school has a robust curriculum governance structure in place, including a small, empowered group of generalists who act as the final arbiters of content. This is essential if a balanced curriculum is to be produced and useful in resolving conflicts (which mostly arise from the subject/specialty level).

Never lose sight of the need to limit the content of the curriculum

The question of overall balance is one that should be resolved early in the process: within the purpose of the institutional specification, the balancing of desired learning outcomes, topics for inclusion or exclusion, breadth and depth of content, and the proportion of student effort to be given over to the core curriculum.

Whereas medical education in the last century was mainly focused on the understanding of disease processes as they affect individuals, on their diagnosis and management, the practice of modern medicine demands much more. At the expense of depth the curriculum now must be broader than a purely disease-focused programme, it must be much more patient-focused and also take into account the health of the population.

Ensure that the school has in place robust machinery for overseeing the curriculum that includes a small, empowered group of generalists who are the final arbiters of content

Defining the core – an example

A first level of content in a patient-centred curriculum could be clinical presentations, i.e. what patients present in practice. The next ‘level’ is the core conditions with which patients present. By graduation students should have experienced learning and teaching around all of these conditions.

In some schools, particularly those which have adopted problem-based approaches, a ‘third level’ of core has been defined, that of selected (‘index’) clinical cases indicative of the condition (Fig. 25.2).

If such a three-level model is appropriate to local specification, then defining a core list of presentations will reinforce the patient-centred nature of the programme. Defining core conditions will help determine the core knowledge and skills, while defining core cases will in turn help focus both students’ learning and the integration of the programme such that the case list will provide a corpus of illustrative material for use in all stages and strands of the course.

Criteria for inclusion at any level could be based upon two characteristics: commonness and importance. The latter will subsume both seriousness (e.g. conditions which are rare but life-threatening), and educational relevance (e.g. exemplar cases which illustrate key aspects of particular educational significance).

A method for combining these criteria and determining the inclusion or exclusion of any particular example of presentation, condition or case, could be based upon a matrix approach as illustrated in Figure 25.3.

However, the approach outlined above, while useful for many topics, is not necessarily comprehensive for all. For example the health of the population is as essential a component of the core curriculum as that of the individual. While the criteria for inclusion and exclusion may prove valuable, the three-level presentation/condition/case method will require modification if it is to be applied to public health.

Besides the obvious need to define a core curriculum, i.e. to limit content to that which is necessary to meet statutory requirements and prepare the graduate for the next stage of the educational curriculum and career specialisation, other advantages of this approach are that it:

- provides the basis of a blueprint for assessment
- enables integration, particularly ‘vertical integration’, within a spiral model of curriculum design (i.e. enables students to revisit broadly the same problems at various stages in the course)
- provides a basis for better monitoring and evaluation of student experience.

<table>
<thead>
<tr>
<th>Levels</th>
<th>Definition</th>
<th>Example</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Core presentations</td>
<td>Wheeze</td>
</tr>
<tr>
<td>2</td>
<td>Core conditions</td>
<td>Obstructive lung disease</td>
</tr>
<tr>
<td>3</td>
<td>Core cases</td>
<td>Asthma</td>
</tr>
</tbody>
</table>

**Fig. 25.2** Definition of ‘core’ content

<table>
<thead>
<tr>
<th>Commonness</th>
<th>1 Low</th>
<th>2 Medium</th>
<th>3 High</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Low</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2 Medium</td>
<td></td>
<td>×</td>
<td>×</td>
</tr>
<tr>
<td>3 High</td>
<td>×</td>
<td>×</td>
<td>×</td>
</tr>
</tbody>
</table>

**Fig. 25.3** Matrix approach for deciding whether or not to include a presentation, condition or case in the core curriculum
Student-selected components

Whilst *Tomorrow's doctors* (2003) recommends that ‘the core curriculum must be supported by a series of student-selected components’, the nature of this support is complex and the relationship works both ways.

- The breadth achieved through the core curriculum is complemented by the opportunities for in-depth study associated with student-selected components.
- Student-selected components provide opportunities to study specialist areas in medicine which are not covered in the core curriculum.
- Student-selected components provide opportunities for core curricular learning outcomes to be achieved.
- The core curriculum provides opportunities for students to develop interests which can be pursued in student-selected components.
- A component of the core curriculum can provide the basis upon which a student-selected component can be developed.

Structure and organisation

When the concept of ‘core plus options’ was initially proposed in *Tomorrow's doctors* (1993) schools were encouraged to demonstrate individuality in how they incorporated student-selected components into their curricula. Whilst this has resulted in considerable variation in approach, the following good practice has emerged:

- Student-selected components should be an identifiable ‘theme’ running through the curriculum which enables students to develop skills and attitudes over an extended period of time.
- The learning outcomes of student-selected components should be well defined and made explicit to staff (supervisors and assessors) and students alike.
- Student-selected components should not be seen as an ‘optional’ part of the programme – all students must undertake, complete and demonstrate satisfactory achievement in this part of the curriculum.
- Schools should not use this part of the curriculum as an opportunity for remedial work and resit examinations for those students who have failed elements of the core curriculum.
- Student-selected components should be placed in the overall curriculum in such a way that students have sufficient experience to make real, informed choices about whether to explore a topic of interest in depth, to sample a specialty or subspecialty for career purposes or to add breadth to their experience etc.
- The systems used to allocate students to their preferred student-selected components should be fair and robust.

Choice

Student-selected components are defined in *Tomorrow's doctors* (2003) as ‘parts of the curriculum that allow students to choose what they want to study.’ This essential element of choice has important implications for curriculum planners. In theory the scope of student-selected components should be limitless; however in reality the choice will be constrained.

The range of choice offered will depend first upon a series of high-level factors, such as:

- Resource – the availability of a school’s resource, both human and physical, will inevitably limit the repertoire that can be offered.
- Enthusiasm – the enthusiasm of individual members or groups of staff offering student-selected opportunities is key to their success.
- Recognition of worth – staff have to overcome the believe that student-selected components are less important than core elements. It must be communicated that their delivery is intrinsically rewarding, essential for attaining ‘core’ outcomes and provides opportunities to educate and enthuse potential future members of the specialty/subspecialty.
- Prior learning – the stage in the curriculum at which particular opportunities are offered should be such that the students have had sufficient prior experience to be able to make an informed choice and to benefit from the choice offered by the student-selected component.
- Breadth of experience – measured access to a choice of topics not directly related to medicine may provide students with the opportunity to widen their horizons, and broaden their educational experience.
- The organisation of the curriculum as a whole and the proportion of student effort ascribed to the student-selected components will also affect the extent of choice.

While the range of topics offered will be constrained by such policy considerations, it will also depend upon the nature of the experiences themselves, e.g. the opportunity to extend core learning, a chance to explore an entirely new topic or to undertake research.

Broadly, three basic patterns have been used:

- Students select from a broad range of projects that have been suggested by staff.
- Students select a module from a limited range offered, often as an extension to ‘core’.
- Students suggest their own topic within the confines of a particular subject, discipline or module.
Student choice first implies a positive selection of a relatively small number of experiences out of a large menu of available options. Conversely, positive selection implies by necessity an opting out from many others. If a student can opt out of an experience that is considered essential to meet the outcomes overall, then by definition such an experience must be included in the core.

Tomorrow’s doctors (2003) recommends that ‘at least two-thirds of each student’s student-selected components must be in subjects related to medicine’. In order to safeguard against deviating from this guidance, but also to ensure that students do not limit their portfolio of experience to a narrow field, it may be necessary to categorise the individual student-selected components on offer. Successful approaches include defining student-selected components as clinical or non-clinical, hospital, community or laboratory-based, and science or non-science.

Outcomes

Curriculum planners must establish which core learning outcomes can be met by all students irrespective of the content of their selected components. Given the relatively low emphasis placed on the content of the student selected components, it is the acquisition of skills and the development of appropriate attitudes and behaviour that are most likely to be achieved through this part of the programme (Murdoch-Eaton et al 2004).

Examples of core learning outcomes which may be achieved through student-selected components are:

- Communication skills: ‘…clearly present information verbally, visually or in writing and communicate ideas and arguments effectively’.
- Information technology skills: ‘…demonstrate competence in using library and other information systems to access information’.
- Insight into research and scientific method: ‘…demonstrate ability to apply appropriate method of enquiry’.
- Critical thinking: ‘…demonstrate ability to critically evaluate and interpret information’.
- Reflection: ‘…identify one’s own strengths and weaknesses’.
- Self-management: ‘…effectively manage time and prioritise tasks’.

Teaching, learning and assessment

Given that range of subject areas, and therefore choice, are key features of this part of the curriculum, some unifying elements must be introduced into the student-selected components to ensure that the core learning outcomes can be achieved and appropriately assessed. A variety of learning activities/tasks can be provided to enable students to achieve such defined outcomes (Stark et al 2005). Taking the possible outcomes listed above, some examples of learning activities which may be used in this way include:

- Communication skills – opportunities for verbal and written communication.
- Information technology skills – supervised training sessions to develop information skills and proficiency in the use of communications and information technology.
- Insight into research and scientific method – opportunities to undertake a research project.
- Critical thinking – opportunities for evaluation and interpretation of information from a variety of sources.
- Reflection – use of portfolio or logbook to provide a structured approach to learning through reflection on experiences and performance.
- Self-management – opportunities to manage and prioritise stages of project.

If student-selected components are to be used to enable students to achieve core learning outcomes, then it is essential that reliable and valid assessment methodologies are developed and utilised. This will serve not only to reinforce the importance of this part of the curriculum to the student body, but also to reassure those teachers involved in the delivery of student-selected components of the perceived worth by the school of their contribution to the curriculum. Some examples of methodologies which have been used to assess achievement of the learning outcomes defined above include:

- Communication skills – assessment of an oral presentation for effective communication of ideas and arguments.
- Information technology skills – assessment of a poster for use of information technology skills in ensuring clarity of presentation.
- Insight into research and scientific method – assessment of ‘methods’ section of a written report for clarity and appropriate use of methodology.

*Student-selected study provides opportunities for study in depth and may extend beyond the traditional medical disciplines*

QAA 2002
• Critical thinking – assessment of literature review for adequate and appropriate critical appraisal of current literature.
• Reflection – assessment of a piece of reflective writing.
• Self-management – assessment of achievement of a previously agreed set of learning outcomes.

Research experience

It is widely recognised and accepted that academic medicine in the UK is under threat as evidenced by difficulties in recruitment and retention of clinical academics, and a reduction in funding for academic posts. In such a climate it is essential that students have a positive experience of research if they are to be attracted to careers in academic medicine.

Although some students gain research experience by undertaking a period of intercalation, for the majority of students in the UK this part of the curriculum is an optional opportunity, the uptake of which is dependent upon several factors including financial means. In contrast, student-selected components are undertaken by all students and therefore provide the curriculum planner with opportunities to enable all students to ‘learn about and begin to develop and use research skills’, as recommended in Tomorrow’s doctors (2003), in the motivational context of a subject/specialty/educational environment which each student has chosen.

It is clear that student-selected components can be used as a means of ensuring and assuring the acquisition of learning outcomes relating to ‘insight into research and scientific method’ as considered above, however the introduction of the Research Governance Framework by the UK Department of Health has been shown to have a negative impact on medical students’ opportunities to engage in research projects in a number of UK schools (Robinson et al 2007). The perceived unwieldy requirements, especially for gaining ethical approval, appear to have resulted not only in a change in the type of projects offered, including an increased availability of audit and literature-based projects at the expense of focused systematic enquiries involving patients and healthy volunteers, but also in the withdrawal of some staff as student-selected component supervisors. Whilst the exposure of students to the ethical approval process is clearly an important aspect of research training, the development of a shortened, simplified process for this purpose would open up the opportunities for medical teachers to provide all students with genuine research experience.

Summary

There has been a shift in balance between hospital-based services and the delivery of care in the community, the demography and cultural composition of populations are changing rapidly, the advent of ‘new’ sciences and technologies are having profound effects upon practice and public understanding of disease and disability has increased dramatically. Consequently expectations of what can and should be achieved through basic medical education are continuing to grow. The changing needs and demands of a wide range of legitimate stakeholders must be taken into account in identifying outcomes and content, and in curricular planning. It must be recognised that curriculum development is an ‘organic’, continuing process – the curriculum is never finished!

In many respects the original concepts of ‘core curriculum’ and ‘student-selected components’ are outmoded. While they focused attention on the pressing need to unburden medical programmes of unnecessary factual information, the ‘curriculum’ must be considered now as a whole, built around a ‘core’ set of learning outcomes, which for all practical purposes embody the ‘standards’ of any single course of study.

Nevertheless the provision of a motivational context, a well-structured framework for learning, opportunity for choice and the promotion of the active involvement of students in their own education, are all desirable factors identified as enhancing attainment and ensuring that basic medical education remains a rewarding experience.

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