

asme

Medical Education Booklet No. 18

Some educational strategies in curriculum development: the SPICES model

R. M. HARDEN, SUSETTE SOWDEN AND W. R. DUNN

Centre for Medical Education, University of Dundee

Further copies of this booklet are available from the ASME Office,
2 Roseangle, Dundee DD1 4LR

Educational strategies in curriculum development: the SPICES model

R. M. HARDEN, SUSETTE SOWDEN AND W. R. DUNN

Centre for Medical Education, University of Dundee

Summary

Six education strategies have been identified relating to the curriculum in a medical school. Each issue can be represented as a spectrum or continuum: student-centred / teacher-centred, problem-based / information-gathering, integrated / discipline-based, community-based / hospital-based, elective / uniform and systematic / apprenticeship-based.

The factors supporting a move towards each end of the continuum are presented for each strategy. Newer schools tend to be more to the left on the continuum, established schools more to the right. Each school, however, has to decide where it stands on each issue and to establish its own profile.

This SPICES model of curriculum strategy analysis can be used in curriculum planning or review, in tackling problems relating to the curriculum and in providing guidance relating to teaching methods and assessment.

*CURRICULUM; *EDUCATION, MEDICAL, UNDERGRADUATE; *MODELS, THEORETICAL; TEACHING/methods; PROBLEM SOLVING; COMMUNITY MEDICINE/educ; CLINICAL CLERKSHIP

Introduction

The past decades have seen an increased interest in curriculum planning and rethinking of approaches to medical education in medical schools, both in the developed and in the developing countries. Pressures for change have come not only from the medical profession. For example, Melville & Johnston in their

book *Cured to Death* (1982) remark that '... through years at an authoritarian medical school idealistic young doctors are moulded into rigid doctors who have lost much of their original ability to sympathise with patients and listen to their problem' and '... when the fledgling doctor emerges to confront the world of his patients the very process of becoming a physician will have rendered him incapable of dealing with the majority of problems that will face him.'

The increased interest in curriculum planning in medical schools has been associated with the development of concepts such as 'problem-based learning', 'student-centred learning', 'community-based curriculum' and 'integrated teaching'. One result is that in new schools such as the University of Gezira in the Sudan, McMaster in Canada, Maastricht in the Netherlands and Newcastle in Australia, the curricula appear to be very different from those seen in more established medical schools. The intended result is that the doctors produced will be better equipped to meet the needs of the community which they will serve.

Concepts such as student-centred learning or problem-based learning are sometimes applied to curricula without a full understanding or feeling for the curricular process and what is being achieved. When applied they all too frequently represent only a thin gold veneer to a curriculum package. This may arise from the fact that teachers have an inadequate understanding of the concepts. A further problem relates to situations where no clear distinction is made between the educational aims of a medical school and the strategies adopted to achieve these aims. The concepts become the gods that are worshipped and appear as ends in themselves, while the real aims and purposes of the curriculum are

Correspondence: Professor R. M. Harden, Centre for Medical Education, Ninewells Hospital and Medical School, Dundee DD1 9SY, Scotland.

forgotten. If a teacher questions one particular strategy, such as problem-based learning, it may be seen as an attack on the whole curriculum, and on the aims of the medical school, which are to produce doctors who are able to solve problems. A teacher may agree that a student's training should be orientated more to the health care needs of the community, but may question how this can best be achieved. For example, what proportion of the training time should the doctor spend in the community and how should this experience be supervised? Thus, the aims and the curricular strategies of a medical school are often perceived as a total package.

In newer medical schools the curriculum package contrasts sharply with the curriculum package in more traditional schools (Fig. 1).

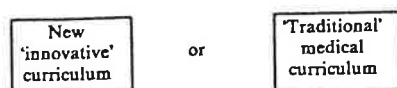


FIG. 1. The curriculum seen as a complete package.

Teachers, when offered 'A New Innovative Curriculum' or 'A Traditional Medical Curriculum' as alternatives, may reject the innovative approach because one or more components of it seem inappropriate in their own situations. By doing so, they discard the elements of the package which could be usefully transferred to their own institution, throwing out the baby with the bath water.

It is hoped that this booklet will deal with some of these problems. Its aims are:

- (1) to give teachers a better understanding of curricular strategies in medical education; and
- (2) to provide teachers with an instrument (the SPICES model) which they can use in curriculum analysis, review and development.

The educational strategies

The six curriculum issues which teachers or medical schools have to consider are shown in Fig. 2.

Each issue is presented as a spectrum between two extremes. On the left are the more innovative approaches (SPICES) and on the right are the more traditional strategies. For example, at one end of the spectrum there is fully integrated teaching with no departmental or discipline-based teaching, while at the other extreme there is fully discipline-based teaching with no integration.

The issues are interrelated and decisions about one

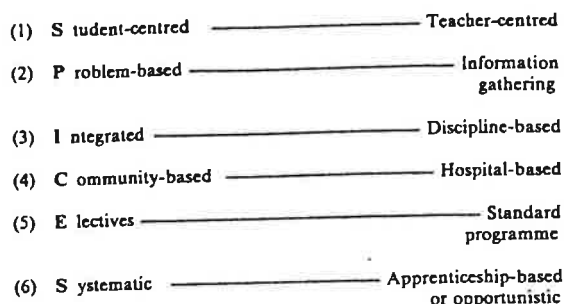


FIG. 2. Curriculum strategies.

clearly may affect another. However, there are advantages in looking at each issue separately. By doing so medical schools or individual teachers can decide where they stand on each issue and therefore which particular educational strategy they wish to implement in their own school. Moreover, by looking at each educational development in terms of these issues, teachers can obtain a better understanding and insight into the curriculum as a whole.

In this booklet the issues are described in more detail. The factors are also discussed which might affect where a school should be on each spectrum.

Student-centred learning

Definition

In a student-centred approach to the curriculum, the students have to take more responsibility for their own learning. The emphasis is on the students and on what and how they learn. In contrast, in a teacher-centred approach, the emphasis is on the teachers and on what they teach. The teacher-centred approach can be likened to eating in a restaurant with a table d'hôte menu where the diners have to eat what the restaurateur chooses. The student-centred approach can be likened to an à la carte menu where the diners choose what they want.

In a teacher-centred approach the teacher is the centre or key figure and there is emphasis on activities such as the formal lecture and on the formal laboratory (Fig. 3). Individual students have little control over what they learn, the order in which they learn things and the methods they have to use. The learning itself tends to be more passive than active.

The following is an example of a typical teacher-centred approach:

Students in the human physiology course have

Teacher-centred learning

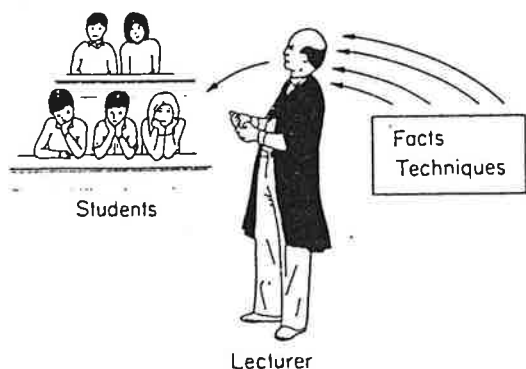


FIG. 3. A teacher-centred approach.

four lectures per week and one practical class. The lecture topics are not published and to discover what they require to learn students must attend the lectures. The laboratory work is based on a manual prepared by the course staff. A student is given little opportunity or encouragement to study the subject in more depth. About 10% of the class fail the end of course examinations and have to re-sit the examination 3 months later. Feedback on their examination results is not provided nor do they receive help with their study techniques.

In a student-centred approach the student is the central or key figure (Fig. 4). Students, under the guidance of a teacher, may decide their own learning objectives, select the appropriate learning resources to achieve these objectives, decide the sequence and pace of their own learning and are responsible for assessing their own learning progress. The learning itself tends to be active rather than passive.

The following is an example of a typical student-centred course:

Students studying biochemistry receive a set of objectives which outlines both the minimum requirement of the course and these areas which they can study in more depth. Students study the subject individually from printed material or programmed tape/slide presentations. The students can choose to use the material at a time suitable to them and can take as long or as short a time as they wish to study any programme. At

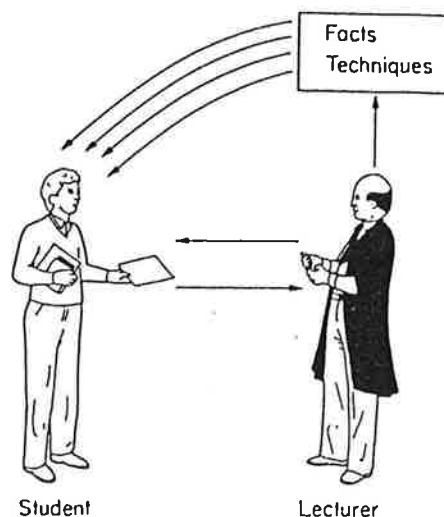


FIG. 4. Student-centred approach to learning.

any stage they can refer to standard textbooks or to a member of staff if they have a problem or wish additional information. The students carry out practical exercises at the time most appropriate to their study of the subject. When the students feel they have mastered a phase of the course they arrange for an assessment. If their assessment is unsatisfactory they are told why by a member of staff and remedial work is suggested.

The difference between a teacher-centred and a student-centred approach is summarized as in Table 1.

TABLE 1. Differences between teacher-centred and student-centred approach to curriculum planning

Teacher-centred	Student-centred
The teacher decides:	The student, under the guidance of the teacher, decides:
(1) learning objectives	(1) learning objectives
(2) course content	(2) course content
(3) the method the student will use to achieve the objectives	(3) the method the student will use to achieve the objectives
(4) the learning resources (e.g. the lecture)	(4) the learning resources (e.g. references to articles, etc.)
(5) the sequence and pace of learning	(5) the sequence and pace of learning
(6) time of assessment	(6) time of assessment

Some factors supporting a move towards a more student-centred approach

A student-centred approach has potential educational advantages:

- (1) *Emphasis on the student.* What matters in

education is what the students learn,¹ not what the teacher teaches. A student-centred approach therefore puts the emphasis where it should be—on the student.

(2) *Increasing motivation.* It may be more motivating for the students. As Winston Churchill said 'Personally, I'm always ready to learn, although I do not always like being taught'.

(3) *Preparation for continuing education.* By allowing the students to be more actively involved in their own learning and to take more responsibility for it, the students are encouraged to continue with their own education after graduation and for the remainder of their professional life.

Some factors supporting a move towards a more teacher-centred approach

(1) *Experience of teachers.* Many teachers may have experienced only a teacher-centred approach and may perform better in this situation. Staff in a student-centred curriculum have to adapt to a different role: they have to help students to learn and to find their own way, rather than act as a never-ending source of information for the students.

(2) *Fewer demands on teachers.* Implied in a student-centred approach is the notion that a range of learning experiences and resources should be provided. Considerable advance preparation by teachers is required to meet these needs. In some respects lectures remain the cheapest and quickest method of communication with the students.

(3) *Experience of students.* Students' previous experience may be with a more teacher-centred approach. Initially, they may find a student-centred approach more threatening and demanding.

Problem-based learning

Information gathering

Definition

The emphasis in many undergraduate medical education programmes has been on imparting to students a large body of basic science and clinical knowledge. Once qualified, students are expected to be able to synthesize this information and apply it to the care of their patients. There is, however, a growing body of thought that this type of undergraduate programme does not prepare students adequately for their career as doctors and that it is insufficient as a method of learning.

Several medical schools such as McMaster in Canada, Maastricht in the Netherlands and Newcastle in Australia have adopted a problem-based learning approach to overcome these deficiencies of the medical curriculum. The purpose of this approach is generally twofold:

- (1) to use problem-based learning as a vehicle to develop a usable body of integrated knowledge; and
- (2) to develop problem-solving skills.

Proponents of problem-based learning argue that their clinical problem-solving skills can and should be taught to students in their undergraduate years.

In a problem-based learning approach, students tackle patient problems, health delivery problems, medical science problems or research problems. These act as a stimulus for learning in the basic sciences or clinical medicine (Barrows & Tamblyn, 1980). The appropriate choice of clinical problems in the early years of the course can encourage the students to learn the relevant anatomy, physiology, biochemistry, molecular biology and immunology. It is essential however that the students ask the questions 'Why, or what, are the underlying mechanisms, what are the theorems developed in science to explain these phenomena in this problem?' (Barrows, 1973). The following is an example of the use of such a problem:

A student is given a history of a patient with dys-hormonogenesis. The patient has a goitre, signs and symptoms of hypothyroidism, a low circulating serum thyroxine and a high serum TSH. By studying the problem the student has to find out the actions of thyroid hormone and to work out which of the patient's features could be explained by a low circulating thyroid hormone level. He or she has to learn about thyroid hormone synthesis in order to understand why a deiodinase enzyme deficiency results in hypothyroidism.

In order to understand why the patient has a goitre the student has to learn about the hormones secreted from the hypothalamus and pituitary and about the feedback loop. To understand the complaint of tingling in the fingers he or she has to read about the anatomy of the wrist and the nerve distribution to the hand. The family history of the patient introduces some of the concepts of genetics.

In contrast to problem-based learning, in an 'information-gathering' or 'knowledge-collection'

approach the major objective is the acquisition of facts, concepts and principles.

Some factors supporting a move towards problem-based learning

(1) *Developing problem-solving skills.* Clinical problem solving is central to the effective delivery of health care by the physician and problem-based learning is a way of developing problem-solving skills.

'A feature of medicine is that decisions have to be taken frequently on the basis of uncertainty. This should be recognized in the curriculum. Training in medical school is therefore expected to instil both the knowledge necessary to solve problems with clear cut answers and *the capacity to reason and act in situations which do not have only one solution*' (our italics) (Benbassat & Cohen, 1982).

The skill of a physician is not an art but an exacting self-discipline, every bit a 'scientific method' in its own right. This is a method that a good clinician performs intuitively but one that can also be learnt by students in their basic medical education (Barrows, 1973).

(2) *Developing an integrated body of knowledge.* Another reason why problem-based learning is a desirable educational method is that learning through problem-solving is much more effective for creating in the students' mind a body of knowledge which is usable in the future. It provides a vehicle whereby the students can obtain an integrated body of knowledge and it is more likely that such an integrated body of knowledge will be of greater use to the students when they practise medicine, than knowledge acquired by other means in a more traditional curriculum.

(3) *General educational advantages.* Problem-based learning has other more general educational advantages. In problem-based learning the active participation by the learner, the provision of feedback and the greater relevance of the content to the student all combine to facilitate student motivation in learning and retention of what is learned.

(4) *Dealing with an overcrowded curriculum.* Problem-based learning helps to solve the problem of the irrelevance of much of the knowledge which students have to acquire in a traditional curriculum. The use of problem-based learning will help ensure that the curriculum does not become overcrowded and cramped with factual detail. It helps to emphasize the

acquisition of the basic principles together with the minimum of essential information which all students should know in each part of the course. In the traditional curriculum there is a danger of teaching inert ideas, which are useful only for passing examinations but not for the practice of medicine.

Factors supporting a move towards an information-gathering approach

(1) *Understanding the fundamentals and vocabulary of each discipline is important.* With problem-based learning students may not have the opportunity to gain an understanding of the structure and framework of each discipline. Some teachers argue that students should initially study each discipline to acquire the basic concepts and knowledge constituting that discipline. Once they have an understanding of the concepts and vocabulary of the disciplines, students will then be in a better position to tackle problems.

(2) *The development of a logical progression of concepts in a discipline.* In planning a problem-based curriculum, it may be difficult to ensure a logical progression in the development of concepts in each and every discipline if disciplines proceed in parallel.

(3) *Resource availability.* Resources and material are more readily available to support a traditional approach than a problem-based curriculum. Development of problems and learning resources requires a great deal of preparation time on the part of the teaching staff.

(4) *Teacher expertise may be lacking.* Teachers may lack experience in planning and implementing a problem-orientated curriculum and a staff development programme may be required to familiarize them with the approach.

(5) *Student insecurity.* Students may feel insecure with a problem-based approach, especially where their past experience is with a traditional information-gathering approach.

Integrated teaching

Discipline-based teaching

Definition

Integration is the organization of teaching matter to interrelate or unify subjects frequently taught in separate academic courses or departments.

In the traditional discipline- or speciality-based curriculum the teaching emphasizes the classical

disciplines such as anatomy, biochemistry, pathology, community medicine, and surgery. Contact with patients tends to be later, often after completion of a basic medical science course. In the traditional curriculum we have the building block principle in which each subject has its own block of time and is usually restricted to one part of the course. The early curriculum subjects are expected to lay the foundations for those subjects that follow. It is left to the students to put together the knowledge gained in each discipline into an overall picture of medicine. The students learn about different aspects of peptic ulcer from separate courses run by the departments of anatomy, pathology, radiology, medicine and surgery. This traditional discipline-based approach is illustrated in Fig. 5.

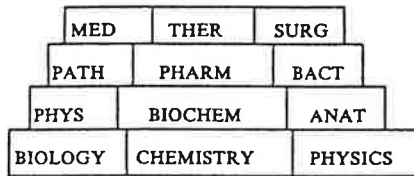


FIG. 5. The building block principle in the discipline or speciality approach to medical education.

In the past two decades, more emphasis has been put on the teacher taking responsibility for this integration and on bringing the subjects together so that they are presented to the students as a

meaningful whole. Integration may be round systems as shown in Fig. 6.

Integration may be described as horizontal integration or as vertical integration. Horizontal integration is integration between parallel disciplines, i.e. disciplines such as anatomy, physiology and biochemistry or medicine, surgery and therapeutics traditionally taught on the same phase of the curriculum.

The following is a description of a horizontally-integrated course:

In the third and fourth years of the medical curriculum, lecture courses in medicine, surgery and therapeutics have been replaced by a course of lectures integrated round the systems of the body, for example the cardiovascular, the respiratory, the urogenital and the gastrointestinal systems. Teachers from departments such as medicine, surgery, child health, general practice, cardiology, etc. present to students information relevant to each system.

Vertical integration is integration between disciplines traditionally taught in different phases of the curriculum. Vertical integration can occur throughout the curriculum with the medical and clinical sciences beginning together in the early years of the curriculum and continuing until the later years. More emphasis may be placed on the medical sciences in the earlier years and on the clinical sciences and the practice of medicine in the later years. This is illustrated in Fig. 7.

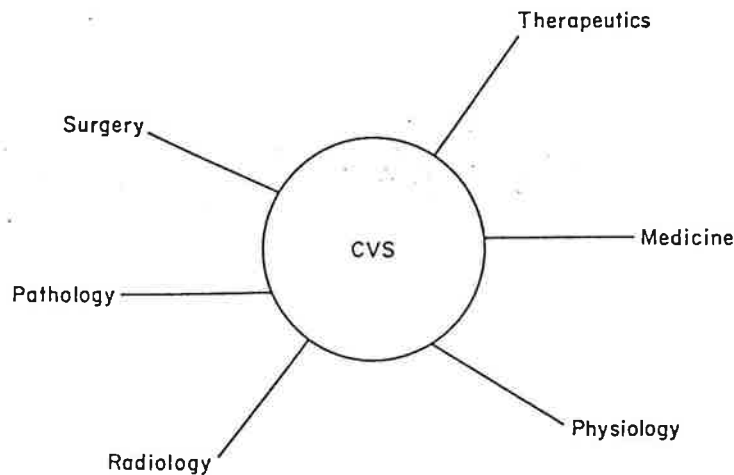


FIG. 6. Course integrated round cardiovascular system.

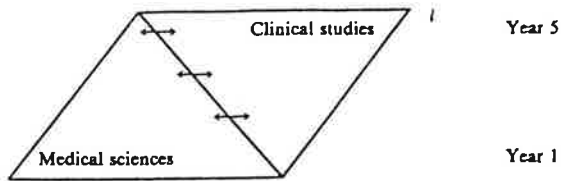


FIG. 7. Vertical integration.

The following is a description of a vertically-integrated course:

During the first 2½ years of the curriculum students are divided into small groups and presented with patients who have chronic diseases. To tackle each problem the students have to apply knowledge from subjects such as anatomy, physiology and biochemistry.

While it may be useful to think in terms of horizontal integration or vertical integration, in practice integrated courses often have elements of both. The following is an example of a course in which both horizontal and vertical integration occur.

The nervous system course integrates the basic structure and function of the nervous system with clinical neurology and disease processes in the brain and spinal cord. Lectures and demonstrations are given by neuroanatomists, radiologists, neurophysiologists, neuropathologists, neurologists and neuropharmacologists. The course is taught by pre-clinical and clinical staff from different specialities.

Some factors supporting a move towards integration

(1) *To reduce the fragmentation of medical courses.* A major advantage of an integrated course is its ability to demonstrate the essential unity of medicine and the interrelationships between disciplines by reducing the fragmentation of the medical education experience. Where medical and clinical subjects are integrated around problem-based or system-based courses, students are encouraged to have a holistic view of patient problems. Their view of a patient is not restricted to only the medical or the surgical or the psychological aspects, but they come to see the patient as a whole.

(2) *To motivate the students and shape attitudes.* A common criticism of medical training is that students, while enthusiastic and interested in their studies when they enter medical school, are less so by the time they reach the later years of the course. Most are not interested in becoming anatomists,

physiologists or biochemists but wish to become doctors and will be more interested in the subjects if they see their relevance to medicine. Moreover, a curriculum which exposes students first to animals (in biology and physiology), then to dead humans (in anatomy) and parts of humans (in pathology) and only later to live patients, is in many respects an unsatisfactory preparation for a career in medicine.

Students are more likely to be motivated to learn where they see the relevance of medical science subjects such as anatomy to clinical studies, and where they are able to apply the knowledge from clinical disciplines to patient problems which they are likely to encounter in practice.

(3) *To improve the educational effectiveness of teaching.* Knowledge learned in isolation and not applied is rapidly forgotten. This has been demonstrated repeatedly in the traditional medical curriculum. By the time students come to their clinical training, not only have they forgotten anatomical details, but also the key points and principles of the subjects. The content of integrated courses is presented in such a way that it is more likely to be learned by students. For example, clinical presentations or problems in the early years can act as organizers for the students' knowledge, facilitating learning of a body of otherwise unrelated information. Students can develop 'sets' of information which can be applied to a number of other problems. In addition, collaboration between subject experts in the development of courses improves the educational effectiveness of teaching by promoting the relevance of what is taught.

(4) *Higher level objectives.* A criticism of medical training has been the emphasis that exists on lower level objectives such as recall of knowledge. The introduction of integrated teaching can encourage the development of higher level objectives such as application of knowledge and problem-solving skills.

(5) *Promotes staff communication and collaboration.* Staff from different disciplines will be brought together by their common interests in the task to be accomplished. A particular advantage of vertical integration is that by integrating the clinical disciplines with the basic and medical sciences, staff become aware of the whole curriculum, and this encourages them to think of the aims and objectives in terms of the institution and not just of their own department. A further advantage of this collaboration is that it promotes an awareness of each other's

research interests and may facilitate collaborative research activities.

(6) *Brings about a rationalization of teaching resources.* Integrated teaching can bring about rationalization of teaching resources. It brings together all the experts in the faculty in a given field so that the most appropriate members assume responsibility for each aspect of teaching. Learning resource material can be shared.

Some factors supporting a move towards a discipline-based approach

(1) *The content and fundamentals of a discipline may be neglected.* Individual disciplines or specialties have specific messages to convey to students and these might get lost in integrated courses. Examples in therapeutics are the mechanisms and importance of drug interactions and clinical trials. A discipline-based approach assists the student to grasp the underlying fundamental structure and concepts which constitute a discipline.

(2) *Omission of topics.* An integrated curriculum is usually designed round a systems-based approach. This can lead to the problem that, unless the curriculum is very carefully monitored, important topics such as 'the breast' may be overlooked. Close supervision and discussion is required if holes in the knowledge fabric are to be avoided.

(3) *Better teaching.* Teachers may be more able to convey an excitement and enthusiasm when teaching in their own discipline. As Oliver Wendell Holmes wrote, 'I know of no teachers so powerful and persuasive as the little army of specialists. They carry no banners, they beat no drums; but where they are men learn that bustle and push are not the equals of quiet genius and serene mastery'.

(4) *Discipline-based teaching can be less costly.* Integration can be costly in the terms of faculty time for planning and implementation, especially in team

teaching courses where every participating faculty member is required to attend all teaching sessions.

(5) *Teachers may feel more comfortable in a discipline-based approach.* In an integrated curriculum, teachers may be asked to change from a system with which they are familiar and with which they have had experience.

(6) *Integrated teaching can have an adverse affect on student guidance relating to career choice.* One aim of a medical course is to provide the student with guidance regarding his future career in medicine. If students do not see departments and staff functioning in their own specialties, they may lack insight as to the scope of the specialty from a career point of view.

Community-based education

Definition

A criticism of medical education is that its hospital-based approach has fostered an 'ivory tower' approach to medicine in which students during their training have little contact, if any, with the community which they are being trained to serve.

Specialization in medical practice has increased in many countries since the 1930s and this has created a situation in which primary care has been perceived as the weak link in the health care delivery system. At the International Conference on primary health care at Alma Ata in 1978, the importance of primary health care was emphasized. Medical schools in both developed and developing countries are reviewing their curricula in order to establish whether they are producing doctors who can serve the health needs of the society in which they practise.

In the traditional hospital-based approach to medical education, the teaching is centred on the main teaching hospital. The staff in the university departments attached to this hospital are the teachers. Students spend most of their time listening to

Hospital-based education

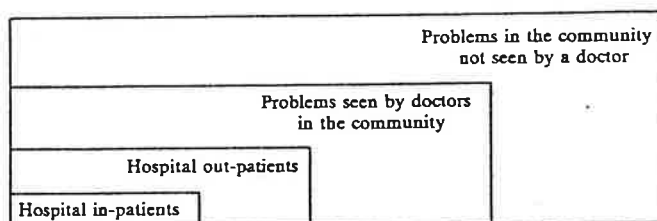


FIG. 8. Students' view of medical needs and health care problems in hospital in-patient setting.

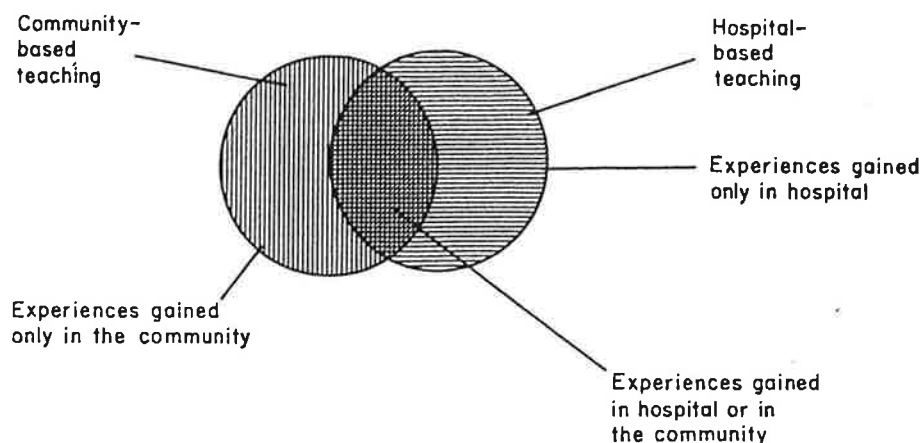


FIG. 9. Medicine in both the community and hospital context.

lectures, attending tutorials and attending to patients admitted to hospital wards as in-patients. They may never see patients in their own home or see a general practitioner in action in a health centre. This approach has been criticized in terms of the atypical and specialized view of medicine given to those who experience it. Students experience only a narrow view of medical needs and health care problems, as only a small proportion of them are seen in the hospital in-patient setting (Fig. 8).

In a community-based education, medical students receive their training in a community setting. This may be a general practice, a family planning clinic, a family home, a neighbourhood health clinic or a rural hospital.

The aims of a community-oriented programme will vary depending on factors such as the stage in the curriculum at which students enter the community, the amount of time students have to spend in the community setting and the community needs at that particular time. During their training in the community, students may be learning about the social and economic aspects of illness. They may be learning about the health services in their community, or they may be acquiring clinical skills as a result of their contacts with patients. They may be learning about the approach adopted by the practising health personnel in dealing with patient problems they encounter or they may be learning more about the frequency and types of problems encountered outside a hospital setting. The students may be working with the health personnel to promote the health of the patients whom they see.

Some factors supporting a move towards community-based education

(1) *Provides community orientation.* There is a need for medical schools to train doctors willing and better able to deliver primary health care. Students tend not to be convinced about the importance of primary care unless they have experience in the practice of it and unless they see their teachers, who may be preaching. In hospital-based curricula it is in the process of becoming a doctor that the trend towards specialization has been initiated, intensified and maintained, as in the Chinese proverb 'A young branch takes on all the bends that one gives it'.

In a community-based curriculum students, through their experience of health-related problems in the community, will appreciate how the community functions. Through working with doctors in the community, they will more fully understand their role.

(2) *The community provides useful learning experiences.* Some aspects of medicine can only be taught adequately in the community setting (Fig. 9), for example the need for continuity of care, the effect illness has on a family, the early signs of disease and the spectrum of health problems are not normally seen in hospitals. In a survey of recently-qualified doctors' views of the undergraduate curriculum, the main deficiency identified was in the area of management of patients outside the hospital environment (Richardson, 1982).

(3) *Makes use of untapped resources.* A community-based curriculum can make use of previously un-

tapped resources. With increased student numbers and the commensurate strain on teaching hospitals, curriculum planners may wish to utilize the community as a training venue. This may be more economical than expanding teaching hospital facilities. The use of health care professionals as teachers in the community increases the pool of teachers and the use of patients in the community greatly expands the pool of patients available.

(4) *Encourages active learning.* Community-based teaching can offer a form of intensely active learning for the students. They may be expected to conduct consultations with patients, perform physical examinations, take histories and write case reports, justify their diagnosis and management of the patient to the general practitioner tutors and submit reports about their experiences to teachers. These experiences can be motivating for the students.

(5) *Avoids 'student-wise' patients.* Patients in hospital frequently have been seen by several members of staff and other students. This inevitably alters the doctor/patient relationship and affects interviewing techniques. In the community 'unspoiled' patients who are not already 'student-wise' can be seen.

(6) *Introduction to the health care system.* Community-based teaching is a way of introducing students to the health care system, that is patterns of delivery, manpower, economics, decision-making, quality control and the major functions and components of the health resources of a community.

Some factors supporting a move towards a hospital-orientated curriculum

(1) *Organizational problems with community-based teaching.* The organization of teaching in the hospital may be simpler than the organization of teaching for a comparable number of students in the community.

(2) *Selection of health care personnel in the community to act as tutors or teachers.* In planning a community-oriented programme, great care must be taken in the selection of appropriate role models, whether they be general practitioners or practising specialists. Where appropriate role models are not selected, students may acquire inappropriate attitudes and skills. Doctors in the community may be relatively inexperienced as teachers and may be ineffective in their teaching role because they do not have a sufficient grasp of the curriculum and its aims. Moreover, their commitment may be more to their patients and less to this teaching role.

(3) *Hospital-based medical teachers from traditional backgrounds may lack expertise and motivation.* Medical teachers coming from traditional medical backgrounds often lack the expertise in community programmes to allow them to feel comfortable in planning and implementing these programmes. For example, they may lack insight into the health care system in the community resulting in a poorly-designed programme. When teachers are assigned to such programmes, they attempt to move back into the routine of teaching as soon as possible, assigning the responsibility for the community-based teaching to more junior members of staff.

(4) *Experience gained in the hospital context.* The hospital provides a more concentrated form of experience of disease than can be gained in the community. Some aspects of medicine are best taught in the hospital context, for example major surgery, less common diseases and investigative procedures. (Much of medicine however can be taught either in the community or in the hospital setting and the best choice will depend on the resources available) (Fig. 9).

(5) *Students may wish to explore specialist medicine as a career.* A community-oriented programme may be detrimental to those students who wish to build a career outside primary health care. They may have less time to explore clinical specialties; more time in the community means less time in specialist medicine.

(6) *Educational advantages in the hospital.* If students are attending a hospital for their clinical experience, it is possible to schedule a range of learning experiences including individualized instruction, small group teaching and lectures. Students working on their own or in pairs in the community lose the advantages of belonging to a class in which they can compare their own experiences with their colleagues and get help and support from them.

Electives

Standard programme

Definition

In a standard medical education programme, all students pass through a set of prescribed courses with few, if any, opportunities to study a subject in more depth or to study a subject of their own choosing which has not been covered in the programme. In recent years there has been a significant increase in curricular flexibility where electives are incorporated into the programme.

Elective programmes in a curriculum give students the opportunity to select subjects or projects of their own choosing. Elective programmes can be in a number of forms. They may be intercalated years of study in the curriculum during which time students can select one or more subjects to study in depth; or they may be shorter elective periods in which students can select one from a number of available courses on projects or a subject or area of their own choosing. In the U.S.A., there are some medical schools, such as that at Stanford University, which have a full electives curriculum. In this curriculum, students are free to choose their own basic medical and clinical science subjects.

Some factors supporting a move towards electives in a curriculum

(1) *Electives are a way of coping with an overcrowded curriculum.* One of the major problems facing curriculum planners in recent decades has been the enormous expansion of medical knowledge. This has been associated with the development of new disciplines as well as with an expansion of knowledge in existing disciplines. Curriculum planners accept that the medical curriculum cannot be expected to cover all areas of medicine, and electives are a way that students can tackle what are regarded by them as deficiencies in the curriculum or topics of particular interest.

The following quote from Steward & Rich (1976), writing about the 'electives curriculum' at the Stanford University Medical School, illustrates this trend.

'Several concepts were critical in the development of the elective curriculum. Most important by far was recognition of the enormous core of knowledge directly relevant to the understanding of health and disease and to the practice of medicine. This knowledge so far exceeds the amount an individual can possibly absorb that many important topics must be omitted from any curriculum that could be designed. Moreover, the rate of introduction of new knowledge and the resulting changes in practice are so great that no body of information acceptable in one year would be adequate five or ten years later. Therefore, the curriculum had to be based on two concepts: that selectivity about what is to be taught is necessary; and that developing in the student-physicians the capacity to make selections on their own behalf is essential if they are

to keep informed of current information during the decades of practice after graduation.'

(2) *Electives are a means of providing students with increased responsibility to further their own learning.* Electives can be used to increase students' responsibility for their own learning. The onus is on the students to select their own activity, to plan their own elective period and to carry out their programme of work.

(3) *Electives can facilitate career choice by students.* An advantage of the electives programme is that it can provide students with an opportunity to explore their interest in an area which they perceive as a potential career choice.

In the Medical School at the University of Michigan, there was a significant increase in career goal selection after the elective experience had been introduced. There was a corresponding decrease in the number of those undecided on their future career. In a particular student opinion survey of the elective period, three out of four students chose their electives to explore their desirability as possible careers, and one out of four felt that their interest was significantly influenced by their experience (Baik, 1978).

(4) *Electives can meet students' individual aspirations.* Students vary in their interests, needs and expectations. The electives programme can be seen by students as being flexible enough to be relevant to their aspirations.

(5) *Electives can bring about attitude change.* One of the most important outcomes of elective periods is often the change of students' attitudes towards their work, their future career, patient care, and other aspects of medicine. For example, a 4-week elective in cancer education sponsored by the University of Pennsylvania Cancer Centre gave medical students opportunities to learn about social, cultural, economic, psychological and inter-personal aspects of cancer. Prior to the elective the students expressed a degree of hopelessness for cancer patients. After the elective, it was shown that the students' attitudes had become more positive (Cassileth & Egan, 1979).

Some factors supporting a move towards a standard curriculum

(1) *Electives can overload teachers with work.* Students pursuing electives can create a burden to a faculty already overloaded with teaching, research and service commitments, especially where there is a low staff/student ratio. Supervision of electives

requires more work by the teachers than is required in the usual classroom situation.

(2) *Lack of interest and awareness by staff.* Staff in the medical school other than those directly responsible for planning the electives programme may be almost totally unaware of the experiences of students during the elective period.

(3) *Electives can affect other course work.* The core or essential component in a medical curriculum may be large and time taken off by students for elective study puts even more constraints on the limited time available for this core. Elective work may prevent students concentrating on their required course work.

(4) *Problem of assessment.* The design of a satisfactory assessment scheme for elective work may prove difficult.

(5) *Electives after qualification.* Some teachers take the view that independent work undertaken during electives can more profitably be engaged upon under supervision following qualification.

Systematic

Apprenticeship or opportunistic programme

Definition

A traditional model for much of the medical course is the apprenticeship one in which trainees are in some way bonded to their master and acquire skills by following the master and working with him. The students are attached to one teacher or clinical unit or hospital ward for a period. They see all the patients passing through the ward and learn or are taught about the conditions as they present. Thus, one morning they may be looking at the problems of diabetes, the next those of pneumonia. This 'sitting with Nellie' approach, as it has come to be referred to in industrial training, has a long history in skill or vocational training schemes. The teaching itself is largely opportunistic and in medicine is based on unpredicted clinical situations as they arise. What is taught may depend on what patients are available and on the interests of staff concerned. The hope is that the students will, over a period of time, see a representative sample of medical practice.

There is now a strong belief that what the students do see and do should no longer be left to chance and that the teaching and learning experiences, particularly in the clinical area, should be planned and recorded. This is part of the trend to more accountability, where the public and government can be

given assurances about the products of the medical schools and their curricula.

In a planned or systematic approach to the curriculum, a programme is designed for all students so that the experiences necessary for their training are covered. This may, for example, entail the students' rotating round a number of specialties and working in a number of fields within the health care delivery system. The essential components of the course will be spelled out clearly to the students and they may be given a list of skills which they have to master and a list of patients with conditions they are expected to have seen and examined. They may keep a log book recording their clinical experience. This systematic approach is reflected in the assessment system where both the breadth and depth of their knowledge is tested and may signify a move towards a more criterion-referenced assessment system.

Factors supporting a move towards a more systematic or planned approach

(1) *Students need to experience a variety and range of health problems.* Medicine is becoming increasingly specialized and one can no longer assume that the variety and range of experiences gained by students will be adequate.

(2) *Rationalization of competencies.* A more systematic approach will help the student to identify which competencies, such as cardiac resuscitation, are necessary and which are useful but not absolutely necessary. All students should have seen a patient with diabetes; less necessary is that they see a patient with pancreatic carcinoma. All students should be able to do a venepuncture and set up an intravenous infusion; less important is it that they be able to do an abdominal paracentesis.

(3) *Rationalization of time.* A systematic approach has the potential advantage that the students can become competent and confident with the least waste of time and resources. The students do not need to see further instances or get further instruction in areas where they are already competent.

Factors supporting a move towards an apprenticeship or opportunistic approach

(1) *Organizational advantages.* Clinical teaching is administratively easiest to arrange if it follows the service commitments of those involved. In contrast, a detailed systematic or planned approach can involve

significantly more timetabling and scheduling of patients, etc.

(2) *Continuity of teaching.* Attachment to one teacher or unit for a period of training provides more continuity. There is a risk where a range of learning experiences are offered and a number of teachers are involved that the students feel a lack of 'belonging' and lack of loyalty to any one unit.

Position on the SPICES continuum

Each medical school has to decide where it stands on the SPICES continuum. Many of the newer schools have taken up a position to the extreme left on all of the parameters while more traditional schools may be regarded as being on the extreme right (Fig. 10).

The question sometimes asked is which is the correct stance? Some would argue that a position on the left is more appropriate to meet current needs and that one should aim to have SPICES in the curriculum. Others would argue that the position to the right is

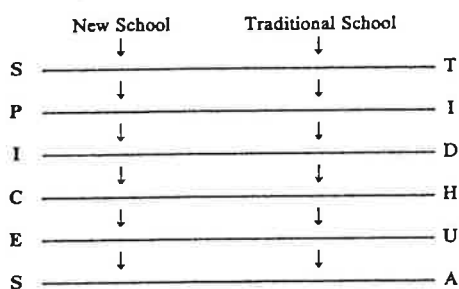


FIG. 10. Places in the SPICES continuum.

more appropriate and that this model has, by and large, stood the test of time. Such views are equally unhelpful.

The 'newer' education strategies or SPICES offer the teachers many advantages. To continue with traditional approaches ignores the changes that are taking place in medical practice and may lead to an increasing discrepancy between the health care delivery system and the medical curriculum. However, too many spices in food may make it unappetizing and inedible; so too in the curriculum, where too many SPICES may make it equally unacceptable.

Thus, it is inherently unlikely that a position at either extreme end of the spectrum is appropriate. Each issue represents a continuum between the two

extremes, for example between a community-based programme and a hospital-based programme. These extremes, if they exist at all, are almost always undesirable. In a new school, one may see a move in the direction of the right and in the traditional school a move in the direction of the left. Indeed, it is our experience that the more innovative elements in a traditional school are frequently further to the left on the issues described than the more traditional elements in a newer school. What we believe that medical teachers should aim for is a situation where, for example, they can accept the principle and the advantages of community-based teaching without all the teaching taking place in the community, and where they can accept the advantages of integrated teaching with many courses scheduled as multiple disciplinary courses while at the same time giving each discipline an opportunity to present its unique messages. Thus the question which should be asked is this: 'Where in the continuum should a school be in relation to each of the strategies?' It is likely that the optimum position for any school will be at some point between the two extremes. The composition of the SPICES, therefore, will vary from school to school.

While discussions about one issue will affect another, to some extent decisions on the issues are independent of each other. For example, an integrated curriculum may be either teacher-centred or student-centred. 'Integration has its own theoretical basis, objectives and methods which may be quite distinct from self learning and problem orientation' (Benor, 1982). Thus the school may aim at different points on the spectrum for each of the issues (Fig. 11). West & O'Donnell (1982) have compared two curricula running simultaneously in one medical school, both aimed at training doctors for primary health care. One had a more student-centred curriculum and one a more teacher-centred curriculum. An interesting point in the study was that the students who preferred the more innovative student-centred curriculum were found to be personality types less likely to enter rural primary care than those who preferred the more teacher-centred approach. So, where one wishes to train more community-orientated doctors, it may be appropriate to have an element of a teacher-centred approach in the curriculum.

It is likely that the profile of a school on the SPICES continuum will be unique to that school. Its position will vary depending on:

- (1) the educational advantages of each approach,

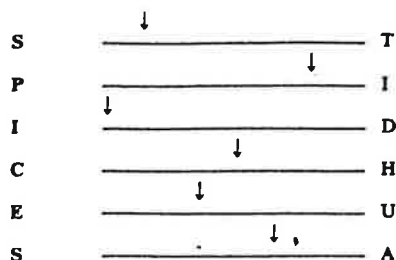


FIG. 11. A school has to develop its own profile or position on each of the issues.

taking into account the aims of the school. For example, a commitment to meet the health care needs of the local community will influence the decision towards a more community-based approach; and

(2) practical or logistical considerations. For example, are sufficient resources available to mount effectively a problem-based course and have staff in the school with the necessary experience to implement the approach? If these requirements are not met the chances of success are slight.

Uses of the SPICES model

The SPICES analytical technique described is useful in a number of situations:

(1) *The review of an existing curriculum by a curriculum committee or other group.* For example, the SPICES model may help to assess whether the curriculum relates to the perceived objectives or aims of the school. The SPICES model can provide a measure of the extent to which the stated aims of the school are a reality or simply a disguised form of science fiction.

(2) *The development of a new curriculum.* The issues reviewed in the SPICES model can provide a framework around which a more meaningful discussion about curriculum planning can take place.

(3) *The tackling of specific questions or issues relating to the curriculum.* This may relate to the teaching of one subject or topic; for example, the behavioural sciences or one aspect of the curriculum such as research. By considering each of the six issues in relation to the question a better understanding may be achieved and more meaningful decisions

taken. For example, a commitment by the school to emphasize research training for its students would suggest the position it should take on each of the issues. The curriculum would tend to be more student-centred, and more problem-orientated. A decision as to whether the curriculum should be integrated, or community-based, would depend on whether one wished to encourage interdisciplinary and community-based research. A core curriculum with some elective opportunities would provide students with more opportunities for research.

(4) *Decisions about teaching methods.* Decisions in relation to each of the SPICES issues have implications for teaching methods within the school. For example, a more student-centred curriculum will require access to resource material and the organization of small group work.

(5) *Decisions about assessment.* Consideration of the issues may also provide pointers to the most appropriate methods of assessment. For example a community orientation should be reflected in the assessment procedures and integrated courses should not be assessed by discipline-based examinations.

References

- BAIK, S.H. (1978) *The growth of the elective programme. Trends in the curriculum.* The Centre for Medical Education, Sydney. Pp. 44-50.
- BARROWS, H.S. (1973) *Problem based learning in medicine.* MD Programme, Faculty of Medicine, McMaster University Education Monograph.
- BARROWS, H.S. & TAMBLYN, R.M. (1980) *Problem-Based Learning: an Approach to Medical Education.* Springer Publishing Company Inc., New York.
- BENBASSAT, J. & COHEN, R. (1982) Clinical instruction and cognitive development of medical students. *Lancet*, *i*, 95.
- BENOR, D.E. (1982) Interdisciplinary integration in medical education: theory and method. *Medical Education*, *16*, 355.
- CASSILETH, B.R. & EGAN, I.A. (1979) Modification of medical student perceptions of the cancer experiences. *Journal of Medical Education*, *54*, 797.
- MELVILLE, A. & JOHNSON, C. (1982) *Cured to Death.* Secker and Warburg, London.
- RICHARDSON, I.M. (1982) Consumer views on the medical curriculum: a retrospective study of Aberdeen graduates. *Medical Education*, *17*, 8.
- STEWART, J. & RICH, S. (1976) The elective curriculum at Stanford University: report on the first three graduating classes. In *Recent Trends in Medical Education* (E. Purcell) Joshua Macey Foundation, New York. Pp. 127-143.
- WEST, MAGGIE & O'DONNELL, M. (1982) Personality type and curriculum preference in primary care. *Medical Education*, *16*, 34.