

MEDICAL PRACTICE

Medical Education

The McMaster curriculum: a critique*

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British Medical Journal, 1976, 1, 1191-1196

“. . . science has been taught too much as an accumulation of ready made material with which students are to be made familiar, not enough as a method of thinking, an attitude of mind, after the pattern of which mental habits are to be transformed.”—DEWEY¹

“In methods of instruction . . . out and out didactic treatment is hopelessly antiquated; it belongs to an age of accepted dogma or supposedly complete information, when the professor ‘knew’ and the students ‘learned’.”—FLEXNER²

It may seem odd to start presenting a new medical curriculum with quotations well over half a century old. But a close reading of the report of Abraham Flexner,² on which most subsequent medical education was founded, does show that many of the principles that the new wave of medical education has developed were already clearly understood in 1910. It was the methods and administrative arrangements that developed in the decades after his report that seemed to confound the principles. It is a sobering thought for those of us who have been concerned with a new medical school. We have tried a fresh approach, an alternative to conventional methods, and in presenting the McMaster curriculum, I shall do my best to balance our achievements and our problems.

History

Dr John Evans was appointed dean in 1965 and there were four years of planning before the first students entered in 1969. At the time

*This article is based on the Horder Memorial Lectures delivered at St Bartholomew's Hospital, November 1974.

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there was widespread concern that medicine and medical education had drifted away from the needs of society at large. Both were concentrated on hospital care and on technology, and the emotional needs of the individual and the needs of the community in which he or she lived were, it seemed to many, being ignored. Methods of medical education were also worrying—conventional lectures, fixed curricula, passive learning, anonymity of students seemed somehow to have led to a malaise in teacher and student. The principles and methods developed by the founders of this school reflect this concern. Four classes have now graduated and 100 students enter each September and graduate in less than three years. Through all this activity the principles of education established in those first four years have remained largely unchanged.

Objectives

The general objectives of the MD programme are a guide to students and staff. In summary, they require students to develop the knowledge, ability, and attitudes to prepare them for subsequent training in any field of medicine; the ability to identify medical problems and define them in terms of basic mechanisms and to be able to select and make use of appropriate clinical, behavioural, and laboratory techniques and resources in the community for their solution; the ability to assess their own educational need and to manage their continuing education; a critical attitude toward research, medical practice, and the role of the doctor; and ability to work effectively in a group.

These general objectives are relevant to any branch of the profession and the undergraduate experience is planned as the first part of a continuing education. The consolidation of clinical competence which is the responsibility of the postgraduate years and the newly opened programmes in family practice, to complement other specialty programmes, completed the full range of opportunities for further professional training in all branches of medicine.

Administration

The MD education committee runs the programme, acting through planning groups, tutors, and clinical services. Since all members of faculty are members of individual departments, the departments

may be said to supply the staff for the programme, while the education committee recommends policies, methods, and content. These it recommends to faculty council, to which it is accountable. This arrangement is a version of so-called "matrix management." All department chairmen are members of the council, so there are checks and balances within the system. Students hold positions on all committees and also have a major role in selecting future medical students.

Student selection

The methods and aims of our selection process have been described.³ Students have to have completed three years of undergraduate work before entry, a usual requirement in North America. We assess standard academic grades, but, in addition, take account of other qualities that suggest the applicant would achieve our objectives. Given that assessments of these qualities are often largely subjective, it is not surprising that not all of our choices look as promising as we had hoped, but, on the other hand, we do select what seems to me to be an interesting and enthusiastic group with a strong drive to learn. It is my own feeling that the most important of our admission policies is that we do not confine our selection to students of biological science, but bring in others of a wide range of background experience, some who have already followed other careers or taken higher degrees.

Structure and methods

The programme lasts for 118 weeks, with short vacations that spread it to a rather brief two years and eight months. On satisfactory completion of each phase of the programme the degree of MD is awarded, comparable to the qualifying degrees of MB, BS in Britain. There is a free period of two months, spent mainly in preparing for the national examinations for licensure by the Medical Council of Canada.

The programme is divided into four phases of unequal length with additional elective periods and other "horizontal" programmes spread across the phases (see fig).

	Year 1	Year 2	Year 3
September 1	Phase I	Summer break	Summer break
		Phase III B	Phase IV
		Elective	
	Phase II		
	Christmas break	Christmas break	Christmas break
	Phase II	Phase III B	Phase IV
	Elective		
	Phase III A	Revision	
		Phase IV*	

Curriculum plan. Phase IV includes a 16-week elective period.

PHASE I

In phase I⁴ students are introduced to the medical community and its resources and gain an overview of the structure and function of the body with some introduction to pathological mechanisms. They are introduced also to a self-directed learning style quite new to most, working in small tutorial groups on biomedical problems as the main focus of study and using available resources but few, if any, lectures. The ideal tutorial group seems to be five students. The tutor is not chosen for his expertise in any specific academic area but for his skill in getting a group to work together and in settling students into this method of learning. Tutors in phase I are particularly well-experienced.

During the 10 weeks, about 15 biomedical problems are available as a focus for study. These are descriptions of medical situations that

require analysis and further study, and usually there is a continuing account of developments, which provides new challenges to the tutorial group. Examples used currently include a child who pulls boiling water over herself at home, an infant with diarrhoea and vomiting, a retired widower with arterial disease of the legs requiring amputation, and a family with a child with Down's syndrome. The situations are presented realistically, usually in written form, sometimes with videotaped interviews, and recently some have been portrayed by simulated patients⁵—a most effective and realistic method.

In initial assessment of the problem, the tutorial group will identify its relevant components—the problem relating to Down's syndrome is designed to raise some obvious points of genetics, methods of diagnosis and genetic counselling, assessment of development, and also some more complicated areas relating to education, institutional or home care, and the emotional reaction of parents and siblings. During this early discussion students learn some approaches from each other and they clarify how much each can contribute and how much each has to study to master the problem. There is, of course, no "solution" to these problems—they are not puzzles with an answer. Each will bring his own background to the discussion—an experience in the family, a background of education, a background of genetics, and so on. The tutor encourages and stimulates the discussion but tries not to direct or dominate the group. After an hour or two the group will decide how next to proceed, set a plan of action, and will probably spend two or three days working from textbooks and slide-tape lectures, consulting a geneticist, visiting a school for mentally handicapped children, and examining a normal child to begin an assessment of growth and development. The resources and opportunities are available but not obligatory.

Individual initiative and co-ordination of the group are both important. To give some manageable limits an approximate depth of study is usually agreed upon and each problem has a focus around a reasonably circumscribed topic, although the potential range is obviously large. At subsequent tutorials, further discussion of the problem and exchange of information occurs. The group has usually been working together but the tutor is now in a position to help them decide how well they are doing and how firm is their mastery of the topic—detailed facts are not the prime aim, rather a grasp of concepts and progress in organising learning, and a proper balance of priorities. Subsequent clinical developments with the problem may now be looked at and the analysis of these will further test the grasp of the topics. Two or three tutorials spread over a week might be occupied with one problem. Increasingly, we have realised the value of students writing analyses of the problems to define priorities and relevance and to integrate knowledge.

Home base—It has been our experience that "a place to call their own" has been an advantage for tutorial groups, and each part of the curriculum (other than phase IV) has a series of "home bases" in which areas for each tutorial group are set up. These are a focus for study and discussion, with audiovisual equipment, microscopes, and books at each student's desk, and resources such as reference books, specimens, anatomy, pathology, and radiology displays distributed through the area, with notice boards, coffee room, and seminar rooms adjacent. Other hospitals in the city, the library, and the wards are all used, but the home base creates a sense of community.

PHASE II

The general theme of phase II is the reaction of the body to stimuli and injury, which may be seen as the result of excessive stimuli. It lasts for 12 weeks and concentrates mainly on concepts of cell biology and general principles of how cells, tissues, and the whole organism respond to stimuli. It is divided into five units dealing in turn with inflammation, neoplasia, metabolic homeostasis, ischaemia, and behaviour.

As in phase I exploration of these areas is through the medium of biomedical problems. For instance, the inflammation unit presents a problem of a streptococcal sore throat that leads to acute nephritis. Clinical and laboratory information leads students to explore basic principles of bacterial pathogenicity, mechanisms of resistance to infection, and the concept of an immunological basis of disease. Some of these themes had been introduced in phase I, but now there is the opportunity to explore in greater depth. The problems are chosen to act as models of fundamental concepts—students are putting down roots upon which their knowledge will grow. New tutorial groups have been formed with new tutors.

PHASE III

In phase III, four units, each of 10 weeks, are occupied with the major body systems. They are: (a) blood, gastrointestinal system, and nutrition, (b) cardiorespiratory system, (c) neuroscience, locomotor system, psychiatry, and (d) renal physiology and electrolyte, reproduction system, endocrinology.

Tutorial groups change at each unit. Normal and abnormal are explored together and the standard subdisciplines of microbiology, anatomy, pathology, behavioural science, etc, are woven into the unit through the media of biomedical problems, lectures, resources, and demonstrations. Radiology is very important in anatomy and pathology. A wider range of problem-based learning methods is now used. These include the biomedical problems as described for phase I, but now with much more specific detailed information for analysis and explanation. Also included are short problems, sometimes with solutions available (these are helpful, especially for self-evaluation); computer-based models of cardiac, respiratory, and renal physiology; pharmacokinetics;²¹ simulated patients as a basis for learning;²² and access to real patients. Lectures and demonstrations are usually restricted to about four or five a week, reserving them for major conceptual areas that are conveyed best in this format or for teachers whose expertise and style are best suited to this medium.

It is the task of planners to make sure that biomedical problems are selected and composed to stimulate study of concepts that are fundamental to various disciplines. The weft of a standard discipline may be seen across the warp of biomedical problems. In microbiology, for instance, the biomedical problems of the unit devoted to the haematological and gastrointestinal systems and nutrition are constructed to include manifestations of the normal response of the blood and reticuloendothelial system to infection; the results of their failure in leukaemia and bone marrow suppression; the ecology of commensal organisms in the gut; and the behaviour of pathogenic organisms in relation to epidemiology, infectivity, invasiveness, local mucosal immune response, enterotoxin production, and the role and effect of antibiotics. Each problem acts as a model for concepts that may be used in other settings, and the exploration of each problem becomes a training in the method of future exploration of similar problems, the student organising reference material and developing the habit of efficient use of experts for advice and teaching.

PHASE IV

The student is now a clinical clerk, responsible, under supervision, for patients: for the medical history, examination, and organisation of investigation and management. While the student is often acting as an intern, the experience is, in fact, meant to be the epitome of problem-based learning, because for the first time there is genuine responsibility for a patient, seen in the past only as a theoretical responsibility.

The objectives of the phase relate to general approaches to clinical problems rather than detailed subspecialty objectives, for comprehensive clinical competence is the responsibility of the postgraduate programmes. Nevertheless, the phase is organised in the settings of individual specialties, mainly because that is how clinical services, by tradition, are organised, and also because there are legal minimum requirements for licensure. These logistic constraints have, unfortunately, confounded our initial intention of making phase IV an integrated experience. Eight weeks are spent in medicine and eight in surgery. Four weeks each are spent in family medicine, psychiatry, obstetrics and gynaecology, and paediatrics. Sixteen weeks are for elective experience.

So far, most of the rotations have been taken in university teaching units in the various hospitals within the city of Hamilton. Recently there has been a successful extension to community practices in family medicine and to north-western Ontario in the general area of Thunder Bay, where residency training and a preferential admission of students has already been established as part of a plan to improve educational links and to explore methods of providing health care in sparsely populated areas.

ELECTIVE AND "HORIZONTAL" PROGRAMMES

The elective programmes afford an opportunity to create an individual experience. Sixteen weeks in phase IV and 10 weeks in preceding phases is elective. Students no longer work in tutorial groups but design and negotiate their programme with their chosen supervisor. They pursue areas of personal interest, strengthen weak areas,

study individual topics (often to systematise what has been explored piecemeal), dissect cadavers, explore medical settings elsewhere in Canada and abroad, or simply repeat clinical experience of the standard programme. Most take some subspecialty subjects such as ophthalmology, orthopaedics, dermatology, otorhinolaryngology. Each student has a student adviser from the beginning of phase I, who is a guide, adviser, confidant, and advocate, and who receives and discusses with his student the evaluations of progress in successive phases. The student adviser is particularly involved in the general planning of electives.

In addition to these electives in blocks are some other programmes that run concurrently with the rest of the curriculum. All students take the interviewing and clinical skills programmes, the rest are elective:

The interviewing programme lasts through phases I and II. Tutorial groups work with a preceptor to learn a comfort and skill in talking to people, dealing with difficult patients, who may be hostile, prejudiced, depressed, or discursive, and to develop an early insight into the therapeutic use of an interview. These are skills over and above the taking of a conventional medical history.

The clinical skills programme through phase III develops ability in history taking and physical examination. It also gives added reality to the clinical problems under discussion.

The community physician programme—Starting towards the end of phase II, a student is attached for one half-day a week to a family practitioner working in the community.

Emergency medicine—Set up to prepare students to handle crisis situations, emergency medicine is popular, virtually every student taking part, attending emergency departments and ambulance calls on a regular basis, with seminars in major topics. The sense of reality that it adds to the tutorial discussions, and the security of a growing experience of clinical medicine, while not part of the original reason for creating the elective, have proved to be strengths of the programme.

Team electives—One of the reasons for putting students in small tutorial groups was that it would help them learn to work cooperatively as part of a team. Since the groups so far have been only of medical students, some attempts have been made to widen the formal relationships and involve other professions such as nursing, physiotherapy, and social work. One of these has been in the team elective in which students take part in the care of patients as one member of an interdisciplinary team. Some of the best settings have been in the diabetic day care centre, rehabilitation programme, and paediatric haematology.

There are many other elective specialties—for example, the programmes in human sexuality and in death and dying. Both have included students of several disciplines. They take the interest of students well beyond the more traditional bounds of much of the rest of the programme into areas of sensitivity and understanding that are often left unattended in standard programmes.

An appraisal of the McMaster programme

STRENGTHS

It is in phase I that most of our principles of education are first established, so we shall return to phase I for it is largely in these principles that the strength of the programme lies, and subsequent phases are all based upon them.

Learning is, so far as possible, active rather than passive. One of the main methods of stimulating this is the study of a problem—so-called "problem-based learning." The problem is presented in such a way that component parts have to be identified, a plan of action made, and learning then is in the exploration of the problem. It is common experience to learn best when researching a problem that is a challenge. There is a second potential benefit of problem-based learning: it develops a skill in dealing with problems, one of the main tasks of a doctor.

The initiative for learning is largely in the hands of the students (although not entirely because there is obviously a framework set up by the planners). Since individual students have different backgrounds and different aspirations, it is possible for each one to define his own objectives and aims, exploring some topics in detail and others more simply. Students learn to organise their own methods of learning and to take individual initiatives. These habits, continued into professional life, will be invaluable in continuing their education.

The exploration of a clinical and human situation is used to study basic mechanisms. Now, as at the time of Flexner, it is accepted that,

while the traditional biological and behavioural disciplines of "science" do not together supply all the needs of clinical medicine, nevertheless the scientific basis of medicine is the proper foundation for rational clinical care. Whereas the post-Flexnerian schools separated "science" from "medicine" by setting up isolated pre-clinical schools (no part of Flexner's own philosophy), we have chosen, rather, to reflect a current ability of research to ask questions of basic principle within the clinical setting. The relevance to the students' future profession and the motivation of this creates invigorate student and teacher alike.

The learning of the normal and abnormal occur together. The study of the abnormal often proves to be the most effective stimulus to studying the normal, because it raises and highlights questions about normal function and structure that otherwise might be ignored. Many clinical conditions may be looked at in some senses as a spontaneous or induced experiment of nature, and the need for demonstration experiments in the laboratory may, in some degree, be dispensed with. We have very few such demonstrations, although the rightness of this may be difficult to argue.

The curriculum integrates the traditional academic disciplines, a natural result of the study of biomedical problems. Relevance and clustering of learning around a model problem both make learning more effective.

The learning is in a small group. Members of the group learn with and from each other, benefiting from their diverse backgrounds. The challenge and defence of conclusions stimulate an ability to use what has been learnt, and show up the degree of mastery and comprehension of a topic. The personal interactions often highlight strengths, weaknesses, and prejudices of individuals, enlarging their view of themselves and developing their ability to work effectively in a group. These same interactions may also be traumatic, and a tutor sometimes needs a lot of skill to keep the group working properly.

Evaluation of progress is largely by the tutorial discussions mentioned in the last paragraph, and participation in these becomes, therefore, essential and guidance to each student may emerge at a time when changes and fresh plans may be made. It is of much less value to have evaluations only at the end of a series of tutorials.

To be part of this curricular programme is, for student and teacher, challenging and stimulating. The mood and interest is vigorous, despite anxieties and frustrations that I shall describe. It is my personal view that the basic philosophy and method are right and that, provided we work at it, the opportunities for us to expand our perspectives on education are excellent.

PROBLEMS

"It does not pinch; it cannot pinch, I know my business; and I never made a better shoe." (The shoemaker to Lord Foppington)

I do not believe we ever felt as sure of ourselves as the shoemaker; in fact, often we have felt very unsure. For those who may want to make a better shoe, a look at the parts that pinch might be a help.

Many of our problems result from our failing to carry out principles as firmly as we should. This failure is in some ways general; often it is individual. We intend to leave time free for study, but we find the days filled with events; we plan to have free discussion in tutorials, but find ourselves dominating the group; we bring in students without a science background and then sometimes act as if we expect them to have mastered scientific concepts within a moment; we create a curriculum that is an alternative approach, then slip back into our own tradition and feign surprise when our students' progress does not duplicate our own. Before this becomes a general confession, I ought to point out that these are not universal or even majority problems. They do not, to my mind, invalidate the programme—they make it generally harder to run and harder to be in. They are the tactical, not the strategic, problems of our progress. Are there any strategic problems? There are some. They do not lead to rout, but they do lead to enough difficulty that anyone wanting to explore similar ground should be aware of them. I have grouped them into a number of issues:

Science and rigour

We agree with Dewey's view of science,¹ and have aimed to develop an attitude of mind rather than an accumulation of facts. The use of clinical problems has a value in terms of relevance and of integration of disciplines, and it has resulted, on the whole, in most students being questioning and aggressive in their learning. Nevertheless, it does sometimes miss the mark of scientific rigour, and I think this may

always be a potential casualty of a tutorial system in which the tutor may be working beyond his areas of personal expertise.

It is one of the more difficult tasks of a tutor to judge the scientific rigour of a discussion. It is possible for a tutorial group to build a construction of facts and concepts with pieces of information culled from a variety of dogmatic sources, and to feel that the problem under study has been well analysed. The student may learn the scientific stories about the topic, and may do so with interest and a sense of their relevance to medicine, but gain only a limited insight into the basis of knowledge in science. When this occurs, the opportunity for inspiration (somewhat different from motivation) and for a scholarly view of medicine may be lost.

Some very good students are given less of a challenge than they need to extend themselves to their limit. In no way does a standard didactic course necessarily achieve these either, but I think it has been a hazard of the development of the philosophy of our tutorial system. When the school first started there was a tendency for tutors to "teach" their subject. This wrested the initiative from the hands of the students, their interest and participation would fall, and their freedom to develop their own styles and interests would be limited. In an attempt to correct this, an emphasis was put upon the tutor as a facilitator of learning, sensitive to the dynamics of the group, and encouraging proper methods of learning. These were all proper emphases and essential to the growth of the tutorial system. Some tutors did best in areas that were not their own—they were called "non-expert tutors." A false step in logic led us for a time to believe that tutors, while remaining or becoming "experts" in tutoring, should all be "non-expert" with respect to the topic. This presupposed that tutors who knew a field well could not use their expertise in ways other than in didactic teaching—a false supposition. It also linked "expertise" with a topic area, rather than what I feel to be more important, an experience and insight into the scientific method. It may be argued that experts in a field are more effectively used as a resource, but a continuing relationship is not so easy to build up.

What balance of rigour and educational expertise can be achieved? The very question belies the fact that much of the best in educational and in scientific method are indeed the same—Flexner² pointed this out long ago. Since most of us have paid little conscious attention to the methods of education, such concern that we may have for the rigour of science may be sadly obscure to our students. Conversely, those who rely only on the methods of education but let go the rigour of science will diminish the opportunity for their students to become scholars.

As a tutor, the skills to be learnt are demanding, and do not always come naturally, and some of our problems are due to our failure to learn them. It is painful to have to learn (and infuriating sometimes to be told) that our own way of teaching does not always create the best opportunity for learning. But in my own experience, despite many mistakes in learning the role, the tutorial provides perhaps the most stimulating experience both for student and tutor, and properly handled it can be the most rigorous.

Need for a pre-medical experience in biological science

Most Canadian students enter medical school with two or three years of undergraduate experience in biological science. We have encouraged students to enter from other backgrounds. We also recognise that academic backgrounds and continuing growth in behavioural science, sociology, economics, and a wider view of life are all important to the development of a doctor and that there are areas in which the rigour of "science" is equally valid; but, having said that, we still should look at the experience of those students who did not have the usual biological science background. Perhaps the most consistent difficulty is in the area of quantification and chemistry, for the descriptive aspects of biological science are more easily mastered. Students whose backgrounds have included mathematics or physical sciences have relatively less difficulty. For the future doctor measurement may be an increasingly important aspect of medicine.

For many, there is essentially no problem. They recognise that they will need to work hard in the basic science areas and organise their work accordingly. Others work well, but suffer in the process and take about a year before they feel fully comfortable. The source of their discomfort is often not a real difficulty, but a sense of insecurity. This derives variously from the difficulty they have in joining in discussions with their science colleagues. Usually this is a matter of familiarity with topic matters and with terminology rather than fundamental insights into principles. Indeed, I have often listened to discussions

in which the science student was apparently in command of an area but only by virtue of his terminology and had, in fact, closed his mind by taking for granted explanations that he no longer examined. Faced with this blizzard of terminology, the non-science student felt at a disadvantage, but, in fact, has often been asking questions that are far closer to the root of the problem, even in the basic science area. I have personally found most difficulty with students with degrees in physiology or biology who have learnt the stories but not the critical discipline of science and who cannot re-examine their preconceptions. These students are unaware of their own insecurity but create insecurity in others by turning the discussion to matters of detail and "fact." Individual members of staff may inadvertently create an impression of disapproval also by appearing to support the admission to medical school of non-science students but imply in their subsequent contact that they in some way blame them for their lack of familiarity with the stories of science. Some staff do this because they fail to grasp the aim and structure of the programme; others because they disagree with a lack of discrete basic science courses. Some do it because of proper concern for academic rigour, but expect too much too soon.

Students in this dilemma feel anxious, and we, in turn, are only now fully sensitive to the problem. Perhaps, even, our concentrating on it and analysing it has added to the problem. Previously we had a summer programme for six weeks that was very successful in giving students some familiarity with modern concepts in physiological biochemistry. This gave them security and also familiarity with the educational method and this was in some ways the main benefit. We have now replaced this with a support system through phases I and II and this appears to be effective. This support includes behavioural science as well as biological science since many students of a traditional biological science background have little sense of behavioural aspects of health and disease. In general, the difficulties of non-biological science students seem to diminish by the middle of phase III. It will be many years before a long-range assessment can be made.

Evaluation of progress

We have placed the evaluation of the student's progress in the hands of the tutor and the student. This permits a continuing feedback to the student and allows, although not always with resulting improvement, an evaluation of abilities and characteristics over and above the simple acquisition of knowledge. It encourages a habit of self-evaluation and it also allows direct discussion and planned adjustments to the student's work. While accuracy of facts is important, the emphasis is on the adequacy of the student's learning process rather than on the accumulation of a certain body of facts. Student participation in tutorials is essential to this evaluation.

It has to be admitted, however, that evaluation has proved to be difficult. This is partly due to the fusion of the roles of tutor and evaluator. A close identification between tutor and student, while supportive in many ways, tends to cloud an objective evaluation and sometimes evaluations, both of the student and the tutor, read more as valedictory addresses than shrewd appraisals. In trying to deal with this, much still rests on the tutor to sustain his objectivity and to gather adequate data for his appraisal. Nevertheless, to improve this data we have developed several techniques for students and tutors. These include the submission of a written problem analysis, some self-evaluation tasks and multiple choice questions, and, in the clinical setting, the analysis of the student's clinical records, an assessment of his history taking and physical examination, and analysis of a clinical problem by someone other than his tutor.

It could well be asked why we do not give everybody a standard examination. The historic reasons are that it was felt that it would divert attention from the learning of the small groups, it would place an inappropriate emphasis on the acquisition of knowledge for the purpose of an examination, would give little opportunity for constructive feedback during the course of study, and might create competition rather than co-operation. This matter is still hotly debated. Most students prefer the evaluation system as it is intended to be, but we are all somewhat dissatisfied and frustrated by the difficulty of making it work as well as we should like. A curious side effect of this format of evaluation has been an unexpected insecurity of some students with an open-ended curriculum, lacking rigid limits and boundaries. For some students it is difficult for them to know how far they should go, and having got there, how well they have done. The old, familiar, and unloved rigid curriculum and formal examinations on "core" content did at least provide a security and guide of a sort.

Can adequate evaluation be made in this tutorial system? I think it

can, but it is not easy, and some independent assessment may be necessary—one that does not remove the focus of attention from tutorial participation, but which also avoids the traps of subjectivity.

Administrative relationships

Relations between the education programme and the departments need careful handling.⁸ Individual members of staff are torn by conflicting demands of education, research, and clinical service. In a traditional system, a department head directs his staff in relation to all of these, and appropriate recognition and reward is fairly easy. Each department has its own course and demands from other parts of the curriculum are minor. In our system, the staff have many roles in many parts of the curriculum, and clinical staff are concerned at all stages. In principle, this is a great strength of the programme, which is free to use and organise the members of the departments. What makes it difficult, however, is a balanced planning and suitable recognition within the department for involvement over which department heads have limited control. This probably can be managed well enough with better planning and annotation, but there is a basic difficulty where curriculum initiatives originate in the education committee and use faculty resources that are the responsibility of department heads. Even though undergraduate education has the highest priority of the school, the formal recognition, recording, and reward for contributions has been weaker than it should be.

Cost of the programme

There are 180 university-funded full-time faculty members in the school of medicine, and from them, up to 20% of their time is required for education at large, including postgraduate and graduate supervision and continuing education. A further 70 faculty members are funded through hospital appointments, and 265 part-time faculty members contribute without salary. This, by British standards, is a large faculty. Most are doctors concerned also with the extensive residency programmes, and they carry a far larger part of the education relating to the fields of basic science than in a traditional school. Our ratio of faculty members to students is about the same as that of other Canadian schools.

Given that there is no dense course of lectures and laboratories, where does the time go? It used to go to the preparation of audio-visual aids and planning. Latterly, the tutorial system and the large numbers of elective attachments, both giving great benefit by intensive involvement, have become very time consuming.

There is one product of our organisation that does use time to a degree that is most trying—the committees that are required to co-ordinate planning. It is perhaps not just the time that is the problem here but being democratic about initiative and decision. Were the propagation of the human race to have relied on committee decision, probably none of us would be here.

Shibboleths

Educational "methodism" is an ever-present risk. Any school setting out to achieve some overall educational aims must take care that its methods are properly developed and are not changed under the pressures of tactical urgencies. To this end, protection and support of methods is justified. There must be equal care, however, that the method does not overrule the aim. Even our language deteriorates, unrecognised, to jargon that has a meaning to those concerned, but is irritating to others. No specific technique or method should be sustained for its own sake and no single method should be seen as the exclusive expression of the "McMaster philosophy."⁹ Visitors not infrequently pick up some aspect of the programme that is in itself entirely valid, but interpret this as being the comprehensive statement of our aims and methods. Recently such a narrow perspective formed the basis of a television broadcast in Britain; we were badly represented, and opportunities for misinterpretation were increased.

Conclusion

The development of the curriculum reflects the trends outlined at the beginning of this article. Both are part of a continuing

evolution of medical education, and no one should look at this curriculum with a view to copying it as a set piece because, on the one hand, it may not fit a need elsewhere, and on the other, the philosophy and format reflect in a large measure the views of the individuals who first formed the faculty and their attempts to solve problems present at that time. A process of reappraisal and clarification of aims is essential to any new curriculum and the end result will, in each specific setting, have a character of its own. Most schools, however, do not expect to recreate an entire curriculum, but rather wish to revise or realign. Given a standard departmental structure and funding, they may feel that McMaster presents a total package that they cannot use. This is a mistake. The various parts and methods of the programme do interlock, but they may be developed individually. As an example, problem-based learning may be a method in a single department without integrating the entire curriculum; so may small group tutorials. Both methods and several other innovations are striking in their success in several schools in Britain. A pastiche of lecture courses, a juggling of time allotments, and the creation of a faculty slot in a previously unserved discipline will not make for better education.

We are known as a school with "new" methods. But the reader will have already recognised that many of our methods have been the strength of universities that have been established for many generations—small group tutorials, learning by interaction with teachers, student responsibility for learning. Similarly there is no method of teaching or learning that can be successful without devotion to the task, and skill in education.

What McMaster has done that may be more useful than any of the specifics of its programme is to reappraise the needs for education in medicine, and to put into practice some approaches that are radically different from those that most of us have experienced. We hope to be equally open in our appraisal of achievement.

I would like to thank the Trustees of the Horder Memorial Fund for a travelling fellowship in medical education. I would also like to thank students and colleagues from whom I have learnt much about education in medicine.

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Contemporary Themes

Cervical smears: Are the right women being examined?

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British Medical Journal, 1976, 1, 1196-1197

Women having their first cervical smear fall into two categories: those for whom it is not really a matter of choice (it is usually an adjunct to another examination by their family doctor or at a family planning clinic); and those who have made some sort of choice, either to have a smear as a preventive measure or to see a doctor because they have found some disquieting symptom.

Purpose of screening

The purpose of population screening is to examine symptomless women in the hope of finding women with treatable conditions that are precursors of cancer. As Sackett and Holland¹ have recently pointed out, this aim is not always clearly distinguished from that of simple diagnosis or case-finding. We have examined a large cytological programme in the North-

western region, where the number of smears submitted annually to the Regional Cytology Laboratory by doctors, clinics, and hospitals has now reached almost 200 000 a year. Some 900 000 smears examined between 1965 and 1974 are recorded on computer file and provide evidence of the extent to which smears are being used, both by women and by their doctors, as an aid to diagnosis.

Computer findings

Of these smears, 54% (473 000) were from women having their first cytological examination; the rest were repeat smears. Of those having their first smear, 11.4% were recorded on the cytology request form as having declared a gynaecological condition, and another 17.2% mentioned or were found to have a discharge or postcoital or postmenopausal bleeding.

That almost 29% of the women coming for cytological examination for the first time presented with some gynaecological disorder, however slight, makes it clear that many women and doctors are using the facilities originally designed for a population screening programme as a diagnostic service. The earliest report of this programme² suggested that some family doctors were already using the smear largely as a diagnostic tool. The latest figures confirm that it is now a major feature, since the proportion of women presenting with symptoms was as

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