These difficulties are not enough to excuse complacency. Rigorous research design and application are needed to attract research funding, to provide valid generalisable results, and to elevate the profile of educational research within the medical profession.

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Evaluating educational interventions

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Recent extensive changes have taken place in medical education at all levels in both the United Kingdom and the United States. These changes need to be assessed to measure how well reforms have achieved their intended outcomes. Educational innovation can be complex and extensive, and its measurement and description is made more difficult by the confounding and complicating effects of each later stage in the continuous curriculum. The radical curriculum reform at undergraduate level in the United Kingdom, managed care in the United States, and the increasing use of community sites for learning in both countries may greatly affect how medicine is practised and managed in the next century.[1] We should know more about the educational processes and outcomes that result from the new courses and programmes being developed in medical schools and postgraduate training.

What is educational evaluation?

Educational evaluation is the systematic appraisal of the quality of teaching and learning.[2] In many ways evaluation drives the development and change of curriculums (figure). At its core, evaluation is about helping medical educators improve education. Evaluation can have a formative role, identifying areas where teaching can be improved, or a summative role, judging the effectiveness of teaching. Although educational evaluation uses methods and tools that are similar to those used in educational research, the results of research are more generalisable and more value is invested in the interpretation of results of evaluation.

Evaluation can also be a hindrance to curricular change. In the United States, for example, enormous weight is placed on the standardised multiple choice type assessment (USMLE) that is taken by all medical students. Although many people believe in the exam, it has been a major barrier to curricular reform. Medical schools feel that any curricular change may sacrifice students' performance in this examination, which in some circles is still seen as the "gold standard." This reliance on conventional educational tools to compare a new innovative curriculum with the traditional curriculum has caused schools such as McMaster a great deal of angst.

Summary points

Evaluation drives both learning and curriculum development and needs to be given serious attention at the earliest stages of change.

Summative evaluation can no longer rely on a single assessment tool but must include measures of skill, knowledge, behaviour, and attitude

New assessment tools do not necessarily duplicate each other but assess and evaluate different components of a doctor's performance

Assessment needs to be part of an ongoing evaluation cycle intended to keep the curriculum fresh, educationally sound, and achieving its intended objectives

At this point it is worth differentiating between monitoring, evaluation, and assessment. Assessment refers to the quality measures used to determine performance of an individual medical student. Monitoring is the gathering and recording of data about courses, teachers, or students and is regularly carried out at institutional level. Evaluation uses data gathered in the monitoring process to place a value on an activity. According to Edwards, evaluation seeks to "describe and explain experiences of students and teachers and to make judgements and [interpret] their effectiveness."[3]

Approaches to evaluation

Recommendations intended to evaluate changing medical programmes have been made in the light of the extensive changes going on in medical schools in the United States.[4] Four general approaches to educational evaluation have emerged over recent years. We have classified these as follows:

Student oriented—Predominantly uses measurements of student performance (usually test results) as the principal indicator.

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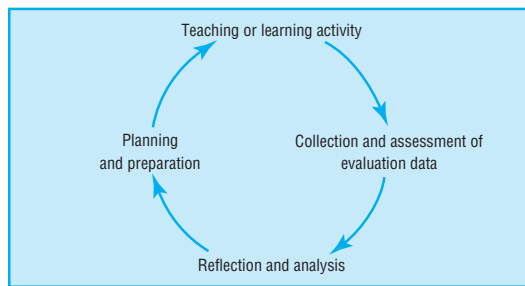Correspondence to: Dr Wilkes mwilkes@ucla.edu

Evaluation cycle[3]

Programme oriented—Compares the performance of the course as a whole to its overall objectives and often involves descriptions of curriculum or teaching activities. This approach "closes the loop" of course or curriculum design by bringing together coherent accounts of how each element of the course—for example, use of teaching resources or choice of assessment methods—has contributed to the whole.

Institution oriented—Usually carried out by external organisations and aimed at grading the quality of teaching for comparative purposes. A wide range of information and evaluation models is used in this approach. For example, the recent round of visits to university departments in the United Kingdom by the Quality Assurance Agency on behalf of the Higher Education Funding Council used observation of teaching and examination of course materials to assess teaching quality.

Stakeholder oriented—Takes into account the concerns and claims of those involved and affected by the course or programme of education[5] including students, faculty patients, and the NHS (in the United Kingdom) or managed care organisations (United States).

In addition to these broad approaches, evaluators are concerned with other outcomes from the educational intervention.[6] These outcomes may include the goals and organisation of the course; whether participants achieved the learning objectives of the course; whether learning led to long term behavioural changes as the result of new knowledge or skills, and whether the program achieved longer term effects intended to improve the health of society (improved health outcomes, decrease costs, improved test ordering, etc).

Current medical education programmes are often complex with teaching spread over many disciplines, delivered in many different locations (hospitals, clinics, classrooms, laboratories, etc), and spanning several years. A wide range of learning and teaching styles are used and students therefore have varied experiences during their training. Using just one approach to assess learning is fraught with difficulties. It is not surprising that many of the innovative courses set up over the past 20 years have used a pragmatic approach with an eclectic choice of assessment methods. There are four possible strategies for evaluating an educational programme, beginning with the most basic tools—structural issues. Did the students attend lectures? Did the lecture follow the intended outline, etc? The next step is usually some sort of before test/after test multiple choice examination to measure gains in knowledge. This approach may be acceptable for the early stages of an undergraduate course or for a

targeted intervention in continuing medical education. But when the aim of an educational intervention is to combine knowledge and acquisition of skills to form competence or change practice behaviour this approach is too simplistic. In this case an objective structured clinical examination, computer based examination, or videotape of an actual patient (or standardised patient) encounter may be better. The most important, and most difficult, level of evaluation examines not at the level of the intervention or provider but seeks to evaluate whether the intervention actually had a benefit on the health of society.

Traditionally, medical education was primarily concerned with the delivery of knowledge. It is therefore unsurprising that assessment tools in this area are well developed. However, over the past decade medical educators have developed various new techniques intended to better assess skills, attitudes, and behaviour. Medical schools the world over are using a variety of practical examinations (for example, the objective structured clinical examination) intended to evaluate interactions between student and patient (including history taking, physical examination, and clinical reasoning). The feedback of students and house officers is important in evaluating curriculums, and methods for gathering their views have been described,[7–9] although the questionnaire remains the commonest form of feedback in medical courses.[10] Medical schools in the United States are experimenting with computer based examinations intended to move beyond the simple assessment of knowledge by integrating features of clinical reasoning and data acquisition.

As medical schools include more small group teaching (case based or problem based learning), often using materials from multiple disciplines, they are finding that multiple choice questionnaires, short

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Educational evaluation around the world

United States [10 13–18]
- Long term outcomes: career choice
- Case or problem based learning *v* conventional teaching
- Community track *v* conventional hospital track
- Faculty development programmes
- Using students as assessors or evaluators

Canada[19–20]
- Student learning as outcome of curriculum change
- Student attitudes and knowledge in problem based learning *v* conventional teaching
- Effects of medical school

Europe[9 21–27]
- Clinical skills training
- Tutor roles and influence
- Diagnostic competence between schools
- Using students in evaluation
- Career preference
- Multiprofessional education; primary care

Australia[28–31]
- Long term outcomes: attitudes to career; performance of graduates
- Clinical competence; distance learning

answer exams, and even computer based exams no longer capture the goals of the course. Instead, self assessment, peer assessment, and written essays or critiques are playing an increasing part in evaluation. But barriers still exist to the wider implementation of these assessment tools. Their development requires a sizeable commitment of faculty time and institutional resources. Furthermore, as with any curricular change, it requires an institutional shift in thinking such that the goal of assessment is not a precise numerical grade but a global assessment with specific narrative feedback. In addition, the medical school infrastructure (governance, leadership, reward systems, allocation of teaching time, promotion, and intense competition among faculties) often poses insurmountable barriers to the development of innovative evaluation programmes.

Evaluation of process and outcome

Medical education is a complex combination of systematic teaching and learning activities within a professional environment where unplanned learning is an important objective part of clinical learning. How students learn is as important as what they learn, and understanding how they learn can contribute much to improving what they learn.

To evaluate outcome it is essential to develop a longitudinal database to allow long term follow up to determine the validity of selected outcomes.[11] Possible long term outcomes of medical education include the quality of clinical care provided by doctors, cost effective decision making, professional satisfaction, and patient satisfaction. Measurement of these variables is notoriously difficult, partly because of a lack of standardised tests and partly because of ethical and professional concerns surrounding public identification of differently performing clinicians. Recently, Tamblyn et al in Quebec reported a strong association between high passing scores in a national qualifying examination and subsequent good practice in primary care as measured by a range of clinical indicators, including prescribing and referral.[12] Other schools, including the University of California at Los Angeles, have found little or no correlation between standardised examination scores and other objective indicators of clinical excellence (course grades, objective structured clinical examinations, etc) or subjective measures (faculty assessments, peer assessments, patient assessments, or allied health professionals' assessment).

International perspectives and experiences

The box on the previous page shows a snapshot of recent reports of evaluation of medical education. A wide range of approaches have been tried in each of the four international regions. Reports include a mixture of outcome and process evaluations, with the emphasis on student oriented and programme oriented approaches.

At its core, educational innovation is about introducing and implementing change. Successful change requires assessment and feedback so that alterations can be made, mistakes corrected, and momentum maintained. The management of change itself needs to be monitored. Frequent evaluation is essential, and a range

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Indicators used in evaluating educational innovations

Structural evaluation measures
- Attendance at class
- Number of applications to medical schools
- Assessment by national body

Outcome evaluation measures
- Career choice or preference
- Nature of practice
- Quality of care indicators
- Student achievement compared with other schools and national norms
- Cost effectiveness measure
- Effects of different curriculum tracks on assessment and career choice
- Patient satisfaction
- Peer assessment
- Quality of care

Process evaluation
- Group work characteristics (such as tutor and student styles)
- Entry and selection policies
- Assessment practices
- Psychometric measures including learning styles, stress, etc
- Student satisfaction with medical school

Evaluation tools
- Questionnaires
- Focus groups
- Objective structure clinical examination
- Multiple choice questions
- Viva
- Thesis project
- Qualitative written assessment
- Patient assessment
- Allied healthcare professionals' assessment
- Peer evaluation
- Self assessment

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of methods is usually necessary to obtain the best information from many sources. Such formative evaluation is different from the summative evaluation that takes place, often formally, once a new course is implemented. The box above shows the range of assessment tools currently used to evaluate the individual, the course or curriculum, and the institution.

Curriculum governance and evaluation

Curriculum governance is the term that describes the responsibility of medical educators to establish and maintain high standards of teaching and learning. Evaluation lies at the heart of this process and, like clinical governance, it uses audit, self review, and peer review as its principal methods.[32] Like clinicians, educators are accountable to their faculty, students, patients, and society. Internationally, great attention has been devoted to curricular reform and assessment of change. Unfortunately, the development of sound evaluation and assessment tools is often an afterthought, occurring when funds are depleted, the faculty is exhausted, and students are frustrated and

confused. Evaluation and assessment need to be an early part of the educational change process, serving to clarify objectives and goals and move the change process forward.

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Trend spotting: fashions in medical education

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This article explores the nature of fashions in medical education and identifies some of the questions about medical education that such fashions raise. What constitutes a fashion in a professional or academic discipline? What do such "fashions" contribute, both positively and negatively, to the development of medical education? What steps can practitioners and academics in medical education take to change a trend into an important step forward in the development of a discipline?

We define a fashion in medical education as an approach to education that is based primarily on social influences, in contrast to approaches based on established educational principles and theories, critically evaluated experiences, or the results of valid research. An analogy is the distinction between fashion in clothes (colour and style) and the quality and functionality of clothing (material and comfort). We chose multiprofessional learning and multimedia computer aided learning as case studies, and we illustrate why each should currently be characterised as a fashion rather than informed practice. Both have received attention internationally in medical curriculum reform.[1] [2]

Summary points

Unexplored assumptions about the knowledge underpinning practice underlie some fashions in medical education

Definitions of a topic may be vague or differ among practitioners

In a fashion, educational reasoning and justification are implicit at best and at worst absent

Qualitative information to substantiate empirical data is often lacking

The feasibility of implementing interventions is ignored or overlooked

Method

A Medline search was conducted and all available abstracts of articles addressing multimedia computer