

- 10 Barnes B. *About science*. Oxford: Blackwell, 1985.
- 11 Cornwall A, Jewkes R. What is participatory research? *Soc Sci Med* 1995;41:1667-76.
- 12 Flynn BC, Wiles DW, Rider MS. Empowering communities: action research through healthy cities. *Health Ed Q* 1994;21:395-405.
- 13 Irwin A. *Citizen science: a study of people, expertise and sustainable development*. London: Routledge, 1995;111-5.
- 14 Ong BN. The lay perspective in health technology assessment. *Int J Technol Assess Health Care* 1996;12:511-7.
- 15 Chalmers I. What do I want from health research and researchers when I am a patient? *BMJ* 1995;310:1315-8.
- 16 Goodare H, ed. *Fighting spirit: the stories of the women in the Bristol breast cancer survey*. London: Scarlet Press, 1996.
- 17 Goodare H, Smith R. The rights of patients in research: patients must come first in research. *BMJ* 1995;310:1277-8.
- 18 Dolan JG, Bordley DR, Miller H. Diagnostic strategies in the management of acute upper gastrointestinal bleeding: patient and physician preferences. *J Gen Intern Med* 1993;8:525-9.
- 19 Hares T, Spencer J, Gallagher M, Bradshaw C, Webb I. Diabetes care: who are the experts? *Q Health Care* 1992;1:219-24.
- 20 Coulter A, Peto V, Doll H. Patients' preferences and general practitioners' decisions in the treatment of menstrual disorders. *Family Pract* 1994;11:67-74.
- 21 Groome PA, Hutchinson TA, Tousignant P. Content of a decision analysis for treatment choice in end stage renal disease: who should be consulted? *Br J Gen Pract* 1994;14:91-7.
- 22 Alderson P. Equipose as a means of managing uncertainty: personal, communal and proxy. *J Med Ethics* 1996;22:135-9.
- 23 Lumley J, Bastian H. Competing or complementary? Ethical considerations and the quality of randomized trials. *Int J Technol Assess Health Care* 1996;12:247-63.
- 24 Chalmers I. The perinatal research agenda: whose priorities? *Birth* 1991;18:137-45.
- 25 Hamilton-Gurney B. *Public participation in health care. Involving the public in health care decision making: a critical review of the issues and methods*. Cambridge: East Anglian Regional Health Authority, 1994.
- 26 Local Management Government Board. *Community participation in local agenda 21*. Luton: Local Government Management Board, 1994. (Local agenda 21 round table guidance.) (Accepted 21 July 1997)

Continuing medical education

Learning and change: implications for continuing medical education

Robert D Fox, Nancy L Bennett

This is the third in a series of seven articles looking at international trends and forces in doctors' continuing professional development

Research Center for Continuing Professional and Higher Education, University of Oklahoma, Norman, OK 73037-0003, USA

Robert D Fox, professor

Department of Continuing Education, Harvard Medical School, PO Box 825, Boston, MA 02115, USA

Nancy L Bennett

Correspondence to: Professor Fox rfox@ou.edu

Series editors: Hans Asbjörn Holm and Tessa Richards

BMJ 1998;316:466-8

Medical education, particularly continuing medical education (CME), has been greatly influenced by studies of adult learning. The observation that it is not teaching but learning that leads doctors to change their practice has resulted in a shift in perspective: rather than education being regarded as instruction, it is regarded as facilitation of learning. This paradigm shift has been based on research into how and why doctors change their practice and into the role of learning in that process.

The direction of continuing medical education in North America and elsewhere has changed in response to the new perspective that has emerged from contemporary studies of learning and change. The nature of this new perspective is evident from a comparison of the common elements of CME in the 1980s with the approach that is now being used. Traditionally a CME programme was an educational event that applied appropriate resources and methods to fulfill set instructional objectives. Such programmes were often considered to be good if the information was valuable, the lecturer skilful, and the setting comfortable. Too often, however, there was little or no actual effect on medical practice, even though all three conditions were met.

The critical difference in the 1990s is that it has increasingly been accepted that CME programmes are based—or should be—on the principle of teaching and education as a means of facilitating learning. This new approach has been adopted in response to studies on how and why doctors change their performance in clinical practice and the role of learning in that process. This article describes some of these models and sets out the key principles that have emerged for continuing medical education in the past decade.

Understanding change in clinical performance

Understanding and managing change is an essential part of professional practice. Just as doctors wish to

Summary points

The purpose of continuing medical education is to facilitate change in clinical practice

CME should be based on the natural processes learners use to change

Three interconnected systems are used in making changes: self directed curriculums, small group interaction, and organisational learning

CME must construct systems to complement and support the learning of practice based learning

intervene in illness to change the health status of patients, the aim of CME is to intervene in those aspects of medical practice that can be improved. CME is a systematic attempt to facilitate change in doctors' practice.

Differences observed over time in patients' health and in doctors' performance and their knowledge and skills are the types of changes that have been the focus of research on CME. Change in one of these areas may or may not lead to changes in another. For example, a change in the ability to perform a clinical procedure does not always result in that procedure being incorporated into clinical practice. Furthermore, a change in clinical performance does not automatically lead to a change in patients' outcomes.

These distinctions have challenged planners of continuing medical education to identify their objectives more clearly. What has emerged is an emphasis on doctors' performance as the target of strategies to facilitate learning and change. This focus calls for needs and outcomes that are described in terms of the performance of doctors rather than their competence or the health status of their patients.

Understanding the context of change and learning

Clinical practice is influenced by many factors. Doctors who participated in a study of how and why doctors change described a collection of forces as the reason they changed their practices.¹ The forces emerged from their personal lives, their professional aspirations, and the social and cultural milieu of their practice settings. They included curiosity, sense of personal and financial wellbeing, stage of career, desire for new or enhanced competence, pressures from patients and colleagues, and pressures from the healthcare institutions in which they worked.

Different forces seemed to scatter doctors in different directions. Personal forces were associated with larger and more complex changes, professional and social forces with smaller and simpler changes. Regulations were associated with only small accommodations, which were usually made with resentment.

Once doctors note forces for change, they begin to imagine what it would be like to perform differently in the clinical setting and how the role of their staff may change. The image of change varies according to what forces are at work and what type of change is being pursued by the learner. Large or complicated changes are difficult to imagine; smaller simpler changes are easier. Rogers describes five features (box) which affect the process by which professionals encounter and use new processes and products in their professional practices.²

These ideas have been validated by a study on Canadian radiologists which found that these five features are characteristic clues as to why different types of changes are pursued and how this happens.³ It also suggested that how the change is imagined affects its adoption.

Understanding the role of needs and motivation

Once doctors develop an image of change, they use this image to estimate their personal need to make a change and to seek new levels of competence related to the image of change. This process of self assessment involves four stages:

- The doctor estimates where he or she ought to be in terms of knowledge, skill, and performance related to the change;

Features of an innovation that modify its adoption

- Complexity of the innovation
- Relative advantage over existing practices and procedures
- Opportunity to observe the innovation in use before adopting it into practice
- Compatibility with other similar products and procedures already in the professional's practice
- Opportunity to try the innovation before adopting it

- He or she also makes an estimate of what he or she presently knows or is able to do in terms of the image of change;
- The doctor estimates the discrepancy between what he or she ought to know or do and what he or she currently knows or does; and
- The doctor experiences a level of anxiety because what is known or done does not match what ought to be.

For example, a doctor considering prescribing a new drug for depression must imagine what he or she ought to know to manage the drug and its side effects. Then the doctor estimates what he or she currently knows about prescribing drugs for depression. This "gap" between what is and what ought to be is an estimate of his or her learning need. The drive to reduce anxiety associated with this need is the motivation to learn and change.

This model of need and motivation shows that altering doctors' perceptions of where they are, where they believe they ought to be, and the size of the discrepancy can alter their perception of need and the extent of their motivation to learn and change.

Understanding ways of learning

Research into the effects of continuing education on doctors' behaviour has fuelled further investigation into how learning explains changes in practice. Two different facets of practice based learning have emerged.

Self directed learning

The first model, referred to as the self directed curriculum, consists of three stages.⁴⁻⁶

- Stage 1—learning is directed toward understanding and estimating personal levels of need to learn in order to adopt a change in practice
- Stage 2—energies are applied to learning the new competencies needed to practise differently
- Stage 3—learning is organised around the problems of using new skills, altering the practice environment, or adapting the new way of practice to increase the goodness of fit.

In each of the three stages, the learner identifies and utilises resources drawn from three broad categories: human resources, especially colleagues and coworkers; material resources, especially journals and other sources of information; and formal continuing education programmes, such as national specialty society programmes. Because the selection and use of resources is under the control of the learner, the "curriculum" is self directed—it is developed and managed by the learner.



DAVID HITCH

Learners need to understand how they learn and how their learning strategies may improve in order to become more efficient and effective. Educators need to understand the natural patterns of doctors' learning so that they can design learning programmes and experiences that complement self directed curriculums in a profession where change and learning are routine and necessary.

Organisational learning

In self directed learning the focus is on the individual, but doctors also learn from their work with patients, on teams with other healthcare professionals, and in consultation with colleagues. Within the culture of health care, each setting from primary care to tertiary referral units represents a unique organisation with a personality shaped by beliefs, norms, and ways of thinking, learning, and adjusting behaviour to changes in the environment.

Explanations of organisational learning point to the potential power of adding together what each individual in an organisation knows in order to create some new way for the organisation to perform its functions.⁷ Understanding how knowledge grows in organisations, what fosters learning, and how organisations make changes in response is fundamental to the implementation of change. Senge asserts that organisations can learn and that learning can be enhanced by changes in organisational structure and climate.⁷ Structures can support evaluating experiences, transforming them into knowledge relevant to an organisation's core purpose and making them accessible to the whole organisation. Watkins and Marsick define a learning organisation as one that provides continuous learning opportunities, supports collaboration within the organisation, and fosters links between the organisation and other relevant organisations and individuals outside the organisation to promote its effectiveness and establish its place in society.⁸

Health care has used ideas from studies of organisational learning to develop systems to review and change organisational behaviours. Practice review procedures, patient care audits, and quality assurance reviews are examples of techniques that have become popular. Continuous quality improvement techniques, which are based on activities such as reviews of quality of care, surveillance of infection control, case reviews, and measures of patients' satisfaction, represent newer ways to shape organisational behaviours. All are intended to set standards that will ensure ongoing changes in clinical practice. Informal activities such as morning reports and rounds further support organisational learning by defining standards for behaviours appropriate to the culture. Healthcare organisations may also foster organisational learning by using outside resources. They may bring in a consultant to assess the protocol for coronary artery bypass surgery, incorporate standards set by an outside organisation for screening techniques, or collect population health statistics to improve immunisation rates in children.

Implications for the future of CME

In the future, comprehensive CME systems will incorporate what we know about learning and change into three interlocking components. The first, most basic,

Role of CME providers

- Facilitate self directed learning by providing for self assessment, the acquisition of knowledge and skills, and the opportunity to reflect on clinical performance
- Offer high quality individual and group education that provides authoritative information, knowledge, and skills based on expertise and evidence
- Assist healthcare delivery systems to develop and practise organisational learning

and essential component is the self directed curriculum designed by each doctor to incorporate new knowledge and make use of his or her own experience.

The second component is based on learning in groups. Ranging from journal clubs to formal, traditional courses of instruction, these activities may be sponsored by organisations such as medical schools and professional associations. Group learning serves as a source of interaction and helps to shape the image of change and the practice of medicine. Lectures and other formal teaching activities have a long history. They are both a creator of meaning and an artifact of the culture of medicine. Lectures will endure because they provide information on what ought to be and the opportunity to reflect on what is being done, as well as summarising evidence as to what can be done, to improve patient care.

The third component is learning within learning organisations. Hospitals, clinics, group practices, accreditation bodies, social service agencies, and governments reflect societal needs and demands in different ways. By gathering and processing information and feedback, learning organisations create some of the standards that govern practice and modify others to fit the local problems and needs.⁹ They also provide opportunities for doctors to learn how to adapt to these standards successfully.

These three systems must be integrated in order to be effective in facilitating change and learning in practice. Changes in health care, new research in CME, and future demands must be brought together in new ways that will be powerful and sensitive enough to respond to patients, practitioners, and healthcare systems.

- 1 Fox RD, Mazmanian PE, Putnam RW, eds. *Change and learning in the lives of physicians*. New York: Praeger, 1989.
- 2 Rogers EM. *Diffusion of innovations*. 4th ed. New York: Free Press, 1995.
- 3 Rankin R, Fox R. The process of innovation adoption by Canadian radiologists. *J Continuing Educ Health Professions* 1997;17:173-87.
- 4 Bennett NL, Casebeer LL. Evolution of planning in CME. *J Continuing Educ Health Professions* 1995;15:70-9.
- 5 Bennett NL, Fox RD. Challenges for continuing professional education. In: Curry L, Wergin JF, eds. *Educating professionals: responding to new expectations for competence and accountability*. San Francisco: Jossey Bass, 1993.
- 6 Fox RD, Davis DA, Wentz D. The case for research in continuing medical education. In: Davis DA, Fox RD, eds. *Physicians as learners*. Chicago: AMA Press, 1994.
- 7 Senge P. *The fifth discipline*. New York: Doubleday, 1990.
- 8 Watkins K, Marsick V. *Sculpting the learning organization: lessons in the art and science of systematic change*. San Francisco: Jossey Bass, 1993.
- 9 Confessore S. Building a learning organization: communities of practice, self directed learning and CME. *J Continuing Educ Health Professions* 1997;17:5-11.