# Medical Education

# The experiential curriculum: an alternate model for anaesthesia education

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*The shift to direct entry into residency training from medical school for all graduates will offer new challenges for anaesthesia training programmes. In this paper we argue that it also offers us an opportunity to re-evaluate our current approach to anaesthesia education. Emphasis in the residency programmes should be to provide trainees with clinical experiences and stimulation that will develop the required traditional competencies. It should also cultivate competency in clinical decision-making, intuition and judgement. Our purpose is to generate discussion by proposing an alternate curriculum model, the experiential curriculum. The basic premise is that learning is a process and outcome is to a large extent related to what the learner does. The process begins with an experience that provides for observation and reflection. Integration of the thoughts provides the basis for executing either existing or new actions. In the experiential curriculum residency training and learning are enhanced by documenting and critically evaluating the experiences to which the resident is exposed. Included within such a structured programme are the methodologies of problem-based and evidence-based learning. Faculty development will be required to help the resident pursue these skills of self-evaluation and efficient learning. We believe that incorporation of an experiential curriculum into the residency training programme will achieve the goals listed above and allow maturation of the process of lifelong learning. It will also allow greater achievement of the application of new information to one's practice.*

*L'évolution de la formation vers l'accès direct à la résidence à partir de l'école de médecine pour tous les diplômés représente une nouveau défi pour les programmes d'enseignement de l'anesthésie. Cet article nous offre l'opportunité de réévaluer notre attitude actuelle vis-à-vis la formation en anesthésie. Les programmes d'anesthésie doivent fournir à leurs étudiants en formation des expériences cliniques et les stimuler dans le but de les faire assimiler les compétences traditionnelles. Ils devraient aussi se former à prendre les décisions cliniques appropriées et à acquérir de l'intuition et du jugement. Notre objectif est de susciter la discussion en proposant un modèle de curriculum de rechange, le curriculum expérientiel. La prémisse initiale consiste en ce que l'éducation est un processus et que ses résultats dépendent largement de l'apprentissage. Le processus débute avec une expérience qui fournit observation et réflexion. L'intégration des idées constitue la base de l'exécution d'actions existantes ou nouvelles. Dans le curriculum expérientiel pour la résidence en l'anesthésie, la formation et l'acquisition de connaissances sont consolidées par la documentation et l'évaluation critique des expériences auxquelles le résident est exposé. Les méthodes d'enseignement basées sur l'étude de problèmes et sur la démonstration sont comprises dans ce genre de programme. Le corps enseignant doit évoluer et permettre au résident de poursuivre ces aptitude d'autocritique et d'apprentissage. Nous croyons que l'incorporation du curriculum expérientiel au programme de formation du résident atteindra les objectifs décrits plus haut et permettra la maturation du processus perpétuel de l'acquisition des connaissances. Elle permettra de plus réaliser plus facilement l'application de nouvelles connaissance à sa pratique.*

**Key words**
ANAESTHESIA: education, training, curriculum;
EDUCATION: anaesthesia, post-graduate.

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The change in entry criteria to postgraduate training positions will add a new dimension to Canadian anaesthesia residency programmes. At the time of writing this paper there were no positions available for mature applicants with clinical or academic experience in related fields or for outstanding candidates who wanted to transfer from other specialty programmes or from other medical

schools. From July 1994 new residents (PGY1 level) enter anaesthesia training directly from medical school. Thus by comparison, they will be younger and less experienced than previous applicants.

At the same time the realities of medical economics are impinging on the practice of anaesthesia and the training of anaesthetists. Economic imperatives are already being translated into restricted funding for tertiary services, increased emphasis on ambulatory services, day surgery and community hospital-based care, and uncertain employment opportunities for young anaesthetists. In this paper we argue that these changes provide us the opportunity to re-evaluate our curricula for anaesthesia education. We are not alone. Internal medicine is also facing a dichotomy between training and practice.[1] A recent issue of the Annals of Internal Medicine was entirely devoted to the need for curriculum reform.[2]

Can our residency training programmes respond effectively to these and other emerging demands? We believe that consideration of this question requires re-examination of three aspects of anaesthesia education: the traditional anaesthetic curriculum, the usual methods employed to educate anaesthesia residents and our concept of clinical competence. We will argue that the current approach to anaesthetic education, based upon traditional notions of an anaesthetic curriculum, is an obstacle to progress. We propose that it be replaced by an alternative curriculum model, the experiential curriculum. This, we believe, is more congruent with current postgraduate learning theory.

As a starting point we will propose a model of medical education upon which to develop our argument (Figure 1). In this model undergraduate and postgraduate medical education progress through four overlapping and successive stages of learning. At an undergraduate level, the initial stage is transfer of knowledge, followed by the initial exposure to clinical cases. This results in an integration of these two stages. Subsequent medical education focuses on problem-solving or problem-based learning.[3] Postgraduate medical education begins with the clinical experience to which is added problem-based learning. Based on the information available the student proceeds to evaluate evidence concerning a specific problem. This information is then applied to clinical practice.

The three pillars of post-graduate education are curriculum, instruction, and evaluation. For the purposes of this paper we will equate curriculum with an educational intention or plan.[4] We believe that a curriculum should also have practical application as a guide to an educational experience, otherwise it is merely a statement of good intent.

Harden[5] describes eight traditional approaches to curriculum planning. Each approach emphasizes a different

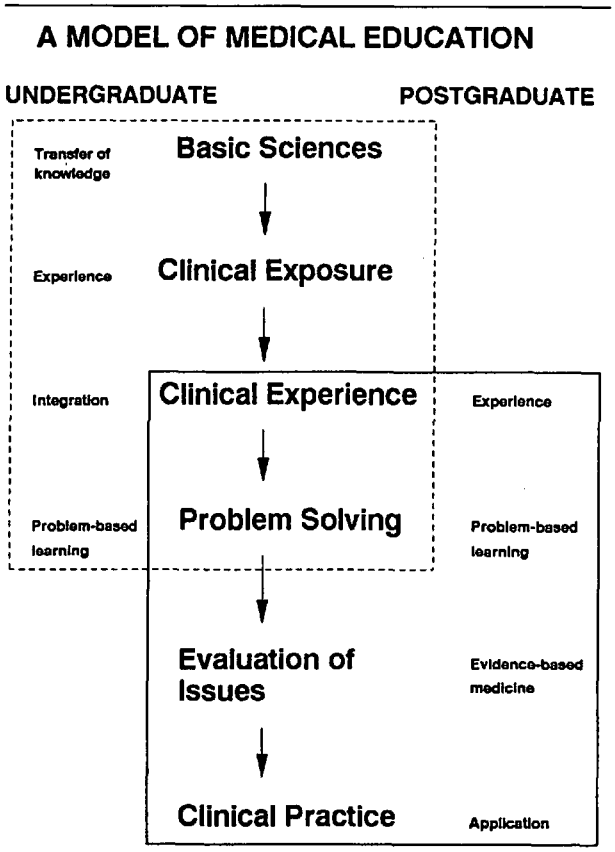


FIGURE 1 Proposed model of development of medical education.

aspect of the curriculum: content (cookbook approach), aims and objectives (engineering approach), teaching methods (mechanics approach), timetable (railway approach), problems (detective approach), one idea or strategy (religious approach) and a curriculum designed to attract sponsorship (public relations approach). To date we have relied upon the content-based or "cookbook" approach. Our last serious attempt to produce a Canadian "National Curriculum in Anaesthesia" introduced the concept of a "common core" of essential knowledge.[6,7] This and the Content Outline of the ABA-ASA Joint Council on In-Training Examinations[8] are both content-oriented, developed by a retrospective process in which existing assumptions are consolidated by the special expertise of the planners. These content lists have some merit; educators can, with relative ease, design a curriculum based on their own knowledge and experience. But the content based curriculum also had serious shortcomings. It is more applicable to the organization of a large body of knowledge and is difficult to apply to skills, attitudes and judgement. Also, it tends to focus on detail rather than on the broader overview and ignores any overall policy or strategy.

Some programmes have designed their anaesthetic curriculum to focus on aims and objectives rather than content.* Aims and objectives may be more or less specific but in general stipulate the expected capabilities on completion of training in the realms of knowledge, skills, attitudes and behaviours. Although this appears to be a rational approach to curriculum planning, it also has limitations. In a rapidly changing world it is presumptuous to pretend that we can specify precisely the capabilities required of tomorrow's specialists. If the aims and objectives are too general they serve as an indifferent guide to training, if they are too detailed they stifle innovation. A major problem with this curriculum is that, without regular revision and updating, it is rapidly obsolescent.

Stratification of learning objectives for each level of training is a refinement of the aims and objectives model. In a delightful monograph, "The Bench and Me,"[9] J. Willis Hurst advocates small learning groups (no more than five students), and interactive "Socratic" approach to teaching, and "graded objectives according to the educational level of the learners." He also stresses that the key element is a motivated and motivating "true teacher." His experience testifies that this has been a highly successful approach for teaching medicine, but its evaluation is anecdotal and its application to anaesthesia is still in the formative stages.† Yet, considering the clinical immaturity of future PGY1 residents, the need for stratified objectives is becoming apparent.

A practical curriculum should define the educational end point, the means to reach it and a way to determine when one has arrived. In more concrete terms the learning objectives outlined by the curriculum should be addressed by appropriate methods of instruction and the achievement of those objectives, both at the individual and programmatic level, by suitable means of evaluation. Although this sounds good in theory, it doesn't describe the current realities in anaesthesia education. We believe that the conventional anaesthesia curriculum is not a useful guide for learning nor is it commonly invoked by examiners to assess competence.

In most residency programmes, the content objectives of the curriculum are addressed by a set of lectures or tutorials. The effectiveness of this mode of instruction is questionable. Landers *et al.* surveyed lecture practices of 100 university-affiliated anaesthesia residency programmes in the United States.[10] They found that the aggregate pass rates on the American Board of Anesthesiology written examinations correlated only with morning lecture attendance; there was no correlation with afternoon lecture attendance, number of lecture days per week, or mandatory lecture attendance. Even the correlation with morning lecture attendance was very weak, and explained only 9% of residents' variability in pass rates. In an accompanying editorial, Willenkin offered his opinion that most of the 91% unexplained variability was probably due to individual study, reading, informal discussions, operating room experience, and one-to-one teaching.[11] Does this mean that lectures are ineffectual or that a confounding factor, such as motivation, influenced both lecture attendance and pass rates? Perhaps there are two messages: less structured formats may be more effective for resident education and more attention should be paid to the literature on individual learning styles.[12]

A number of authors have also suggested that evaluation, particularly of clinical competence, is only marginally related to curriculum objectives. In reported studies, character skills and personality attributes were determining factors in the rating of overall resident performance by faculty.[13,14] In one study personality test scores had 100% accuracy in predicting resident ratings.[15] The most desirable attributes are familiar to us all: good judgement, maturity, dependability, intellectual honesty, etc. In our personal experience simple congeniality is a major factor; residents who are pleasant to work with get high ratings.

The current approach essentially equates curriculum with a list of behaviours or areas of content which must be mastered by the end of a proscribed period of training.[4] Ende and Atkins have expressed concern that a complex subject such as medicine, in which competence depends on knowledge, skill and attitude, can be reduced to small well-defined units of instruction. A second area of concern is that issues such as clinical judgement, decision-making and ethics rarely appear in curricula (to their credit, the Royal College of Physicians and Surgeons of Canada has recognized this deficiency and is now including these in their criteria of in-training evaluation). Ende and Atkins also object to focusing on hypothetical end-points in the curriculum. As a result, they argue, the student and faculty tend to ignore "the rich and varied interaction between residents and their patients."

The Royal College certification process in anaesthesia is meant to establish the candidate's clinical competence as a specialist anaesthetist. There are three components to the process: a multiple-choice question examination

*Despite several years of discussion, ACUDA, the Association of Canadian Departments of Anaesthesia, has been unable to agree upon a national curriculum and each Canadian programme has developed its own. For an example of an Aims and Objectives based curriculum please write the authors.

†An outline for graded learning objectives has been prepared by one of the authors (N.D.) and can be obtained by a written request.

(MCQ), a Final In-training Evaluation Report (FITER) and an oral examination. Of these, it is our impression that MCQs may be the most efficient examination tool for a content-based curriculum. The FITER is prepared by the training programme and requires assessment of several elements of clinical competence in a standardized format. It is the only component of the process that is based on the trainees' actual performance in a clinical role. Compared with the MCQ examination, the FITER is more subjective and may be biased by differences in standards or educational objectives among the programmes. Because rating of the competence elements in the FITER is by rank-order scales at a particular training department, it is probably more a reflection of the candidates standing within a programme than a comparison with a national curriculum standard. The oral examinations attempt to measure clinical competence "judged on discussion of a selection of common, verbally presented clinical situations ... chosen to represent the breadth of anaesthetic practice, including both elective and emergency situations."[16] The elements of clinical competence that are evaluated by the oral examination are the integrative skills, that is problem-solving and decision-making, as well as knowledge and communication skills, but with emphasis on the integrative skills.

The only component of the certification process that is clearly based upon a national curriculum is the MCQ examination, which requires a consensus about a "common core" of knowledge. One might possibly argue that the Oral Examination Board has agreed upon curriculum objectives for clinical competence by defining the components of competence which are evaluated by the oral examination.[16] One might also argue that these objectives are too narrow to define the competencies required of future specialists in anaesthesia.

Some medical educators have begun to express serious reservations about the conventional approaches to curriculum design, particularly the value of the traditional curriculum as a guide to post-graduate education. Ende and Davidoff[17] object to the traditional or technological model for curriculum design where, "the curriculum maker determines first the knowledge and skills that learners are expected to acquire and then determines the knowledge and skills they already possess. The difference is parcelled into discrete learning objectives." They assert that, for graduate medical education, the technological curriculum simply doesn't fit and they advocate a different concept of curriculum, "that formally accepts the experiences that residents will have as basic building blocks ... The problem with the technological model is that it specifies the outcome but uncouples the outcome from the process, which is where the learning actually occurs." They call their approach an *experiential curriculum model* in which primary importance is assigned to the residents' clinical experiences. The model is based on the learning theory of Kolb which states that the ideal learning environment stems from experiential learning.[18] The basic tenets are that learning is a process and outcome that is more related to what the learner does than what the teacher does. Kolb describes a four-stage cycle of learning. Learning begins with an immediate concrete experience which provides the basis for observation and reflection. These observations are assimilated or integrated into an idea or theory upon which new or existing actions are executed. These actions in turn lead to new concrete experiences to be reflected upon and the cycle is repeated (Figure 2).

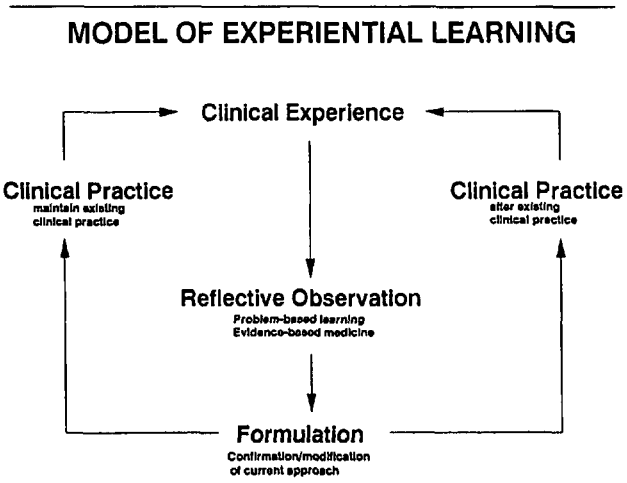


FIGURE 2 Model of experiential learning. Modified from Kolb.[18]

Ende *et al.* view the experiential curriculum as embracing the total educational environment and includes both educational and service activities.[4,17] The implications are that learning and the curriculum are based on the practical and realistic experiences of the resident. It will allow programme directors to develop curricula suited to the local situation as well as encourage residents to expand their clinical experience and exposure. In educational terms, before the introduction of such a curriculum, one needs to resolve a variety of issues. These include (a) the programme's philosophy to postgraduate medical education; (b) how the learner will be taught to learn, i.e., the approach to instruction; (c) the types of learning experiences the programme intends to provide; and (d) the methods used to assess the impact of the curriculum on the resident, on standards of practice and on the community at large.

Clinical competence in anaesthesia, as in most other specialties, requires a variety of clinical encounters. Sheer volume of clinical experience and monotonous repetition are not sufficient. The clinical experience is the stimulus

to learning and the lessons that are learned seldom start from predefined objectives; they are adventures in discovery afforded by the wide diversity of patient, surgical and anaesthetic factors, modulated by environmental and interpersonal influences. We believe the richness of the learning experience is directly proportional to the learner's curiosity, motivation and insight. This is the process for developing clinical decision-making ability, intuition and judgement, the attributes that the oral examiners attempt to assess.

We are advocating that the main purpose of a curriculum is as a guide to experiential learning. A curriculum should express the current value system of the profession by defining the competencies that are considered important for today's practitioner. Residency programmes should provide trainees with the clinical experiences and stimulation that will help them to develop those competencies. Periodically, the curriculum should be consulted to determine whether sufficient experience has been acquired in the relevant areas. As our values change, both the curriculum and educational programmes should be flexible enough to inculcate rapidly the new values: the curriculum by expressing them lucidly, the programmes by implementing them through appropriate clinical exposures.

The Royal College requirements for residency training in anaesthesia[19] would necessarily serve as the starting point for an experiential curriculum. This document expresses the current and relative (in terms of time commitment) values placed on anaesthesia, medicine, pain management etc. in anaesthesia education. The process of producing an experiential curriculum would require amplification of the educational values underlying these requirements and their stratification for different levels of training. In order to make the processes of education and examination coherent stratification should be based upon the competencies tested by the FITER and the oral examinations.[16]

An experiential curriculum demands a new approach to instruction. The basic methodology of experiential learning is problem-based (sometimes called student-centred), self-directed learning, guided by expert tutors. It is curious that this important concept, which has made such an impact on under-graduate education,[20] is rarely mentioned in relation to post-graduate learning.[21] In problem-based learning the specific clinical problem becomes the basis for identifying the gap between the current capabilities of the trainee and what is necessary to manage the problem. This is not the same as "problem solving," which brings a body of previously learned information to bear on finding the solution to a problem.[22] Both are important in anaesthesia.

The experiential curriculum can also serve as the framework for a complimentary learning methodology; portfolio-based or evidential learning (see Figure 1).[23] This is a technique of personal learning in which a "portfolio" of evidence, related to a specific clinical problem, is accumulated. The portfolio is evidence for the sources of learning and for the accomplishment of the learning objectives arising from the clinical problem. Portfolio-based learning requires that the resident critically evaluate the evidence available for a particular approach with respect to investigation and case management, so-called evidence-based medicine.[24] Thus training in critical appraisal is a prerequisite.

An experiential curriculum, a problem-based approach, and a portfolio or evidential learning strategy can be considered as three dimensions of the learning process. The clinical experience provides the milieu in which learning problems are defined. Articulation of the problem and collecting the evidence to fill in the learning needs are essential steps in the process.

Two personal skills are required for self-directed learning: self-evaluation and the ability to plan an efficient learning strategy. Self-evaluation involves two steps: the first identifies the gap between current and required capabilities relative to a given problem, the second assesses when the gap has been bridged. When self-evaluation, perhaps aided by a "true teacher," uncovers a deficiency in knowledge or skills, the trainee should be able to formulate an efficient learning strategy to correct that deficiency. The strategy may be to seek an expert opinion, consult a textbook, conduct a literature search, or explore new applications of previous knowledge to complete the learning portfolio. Efficiency, that is selection of the most time-effective learning strategy, should increase with experience and each resident should have access to learning resources that match his/her learning style preferences.[25] At the level of senior resident, it is reasonable to expect that virtually all learning will proceed in this manner.

We believe that both further faculty development and new learning tools will be needed if we are to move away from the conventional curriculum-based, didactic approach to teaching toward a more flexible experiential approach to learning. To help trainees become efficient self-directed learners the faculty must be able to assess their level of knowledge and understanding, and must be comfortable with a variety of learning strategies and methods in order to assist students to develop the "learning to learn" skills.[26] Rosenberg and Polonsky have described the successful integration of a non-physician consultant educator into the postgraduate anaesthesia training programme at Hahnemann University in Philadelphia to assist faculty and residents.[27]

Most of the current teaching tools (lectures, journal clubs, etc.) would be discarded, with the possible excep-

tion of the daily evaluation. This is a recent innovation meant to serve two purposes: a record of experience (log-book) and a tool for evaluation of clinical competence. Although its superiority to the log book has yet to be demonstrated,[28] initial studies suggest that it may be more valid than periodic assessments for clinical competence assessment.[29] The weakness of the daily evaluation is that it is teacher-oriented and authoritative, more useful for evaluation than as an aid to learning. One possible approach would be to redesign it to function as a case study guide as well as an evaluative tool. It could then serve as a learning guide in an experiential model of learning. A case study guide could serve several purposes:

(a) as a record of clinical experiences and of fulfilment of curriculum objectives;
(b) as a prompter to identify the learning "problem" arising from each case, and the self-directed learning strategies employed;
(c) as confirmation, by the tutor, of satisfactory completion of the learning portfolio for that problem.

We propose a new look at the anaesthetic curriculum, the methods of learning, and the competencies required of a specialist anaesthetist. The current paradigm for anaesthesia education is the technological approach, which defines some of the desired competencies of an anaesthetist but provides scant guidance for instruction, evaluation or continuing education. We believe that the experiential curriculum is better suited to the educational needs of today. Will it make a difference? If so, what kind of difference? The answers to these questions are not immediately obvious. However, in the experiential paradigm the curriculum is a statement of educational values, that is, a description of the personal and professional competencies expected in a specialist anaesthetist. Learning starts with a clinical problem and is mainly self-directed, guided by self-evaluation. The experiential approach puts more emphasis on the process of learning, what Harden calls a "methods" approach, but without a fixation on any one "ultimate" method. This fits closer to the dynamic process of personal life-long continuing education where educational values are self-imposed and learning is self-directed. The required competencies include identifying and defining learning needs, searching out and evaluating information, and applying new information to one's practice. The readiness to learn from experience, to adapt to change, and to explore new ideas will better equip us to lead the process of change, instead of following reluctantly in its wake.

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