

*Review Article***A Critical Review of Forestry Education**

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**Abstract**

*The forestry profession has traditionally believed in the application of technical knowledge to the solution of practical problems. However, growing public interest in the environment and concern for forests has led to demands for public involvement in the decision making process. Foresters are no longer trusted professionals but are expected to negotiate and then implement a workable consensus in a polarized political environment. A growing crisis of confidence in the ability of forestry professionals to do this has led to accusations that higher education is no longer providing career relevant forestry education. The response has been attempts by universities to increase either the breadth or the intellectual rigour of forestry degree courses on the assumption that it is a lack of knowledge that has caused this crisis. But this misses the point that the real failure in forestry education is the continuing dependence on technical knowledge and a failure to promote an ability to solve problems in situations of uncertainty and conflict where theory no longer provides the answers. Forestry may have much to learn from medical education where problem-based learning has provided a means for students to acquire professional skills.*

**Keywords** : professional knowledge, academic rigour, professional accreditation, problem-based learning.

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*Teach the three R's, and then proceed with a certain amount of technical instruction, in preparation for the coming job. D.H. Lawrence (1920) "Education of the People."*

**Educating professional foresters**

It is evident that a professional education comes not only from a detailed understanding of a specialised knowledge base but also from learning about how and when to apply this understanding through accumulated experience and through codes of professional conduct (Eraut, 1985). The knowledge base is not only academic knowledge but includes what Eraut (1992) has termed professional knowledge. This includes:

- Propositional knowledge ("knowing that") including academic knowledge and ideas derived from other professionals;
- Process knowledge ("knowing how") including skilled action and deliberative analysis in decision making, problem solving and planning;
- Personal knowledge including experiences, personal theories and memories;
- Ethical principles or socialisation into the professional approach, including gaining a sense of professional identity.

Most forestry degree courses aim to provide first a strong foundation in a number of core academic disciplines (principally biological sciences) and then training in the application of these in a professional context. Schön (1987) argued that professional schools in modern universities design their curricula around an implicit belief in technical rationality (that problems can be solved by the rigorous application of scientific knowledge). Thus they typically teach the basic science, then the applied science and finally the technical skills of day-to-day practice. However, most problems in real-world practice cannot be solved by the application of factual knowledge. They are uncertain, often unique and frequently involve value judgements rather than objective decision making.

Traditionally, foresters implicitly believed that as professionals they had the right to resolve value conflicts on behalf of, and often without reference to, society. However, the last two decades have seen a considerable shift in public attitudes to forests and forestry. There has been a growing public concern for the environment and accusations that forests have been managed more for state and private profit than for public good. The authority of forestry professionals is increasingly being questioned and demands made for public participation in decision-making processes that affect forests. This has changed the role of a forester from being an expert trusted by society to pass judgement to being someone who must negotiate and then implement a workable consensus in a polarised political environment. However, few forestry professionals have the skills to adapt to this new role, leading to what Schön (1987) has described as a “crisis of confidence in professional knowledge”.

*When professionals fail to recognize or respond to value conflicts...they are increasingly subject to expressions of disapproval and dissatisfaction...The most important areas of professional practice now lie beyond the conventional boundaries of professional competence. (Schön, 1987)*

There is a clear gap between what foresters are competent to do and the demands that society is placing on them. There have been two types of response, in Universities, to accusations that they are producing inadequately trained foresters; an increase in the academic rigour and an increase in the breadth of the curriculum.

### **Increasing rigour**

Schön (1987) described a major conflict in professional education. On the one hand, Universities and professional bodies, who set the standards in professional education, demand that it should have a rigorous theoretical foundation. On the other hand, the State and an increasingly dissatisfied public seek to increase the relevance of what is being taught to the practice of a profession. This Schön termed the rigour-or-relevance dilemma. The dilemma has been intensified by the growing concerns over professional competence, with the assumption being made by Universities and professional bodies alike that it must be low educational standards that lie at the root of the problem.

A profession is often defined by its foundation on an in-depth theoretical understanding of some field of learning. Although theoretical knowledge is a component of professional knowledge, the importance that has been given to

learning theory in professional education, often to the exclusion of other types of knowledge, owes more to its academic status than its relevance. Professions have been accused of creating theoretical knowledge thresholds which outsiders are unable to reach in order to maintain their exclusive rights to practice (Johnson, 1972). The more complex the knowledge base, the more difficult it is to challenge professional authority. Universities may have been complicit in promulgating the view that rigorous professionalism requires a substantial and complex theoretical foundation because it matches the prevailing belief in technical rationality and maintains their exclusive rights to train many professions. It is also important in maintaining the image of professional disciplines within the University. These motives are strongly reflected in the reasons given for abandoning forestry as an undergraduate degree in Oxford in 1968.

*The present undergraduate course has sacrificed depth of study in order to train men who would be capable of managing forests in remote parts of the world and in isolation. This aim of producing at Oxford the "all-round" forester is now, in our view, mistaken.... (It) has led to the intrusion into the undergraduate course of material of low intellectual content that is not suitable for an Honour School in this University. We consider that this is in fact damaging to the scientific reputation of the department and is by no means conducive to the production of a genuine élite in forest science. (Oxford University Gazette, 14 March 1968).*

The convergence of views between Universities and professional bodies is best seen in the process of professional accreditation. Accreditation is intended to certify that an education programme provides some, or all of the competencies needed for professional practice. In principle, it should be an efficient mechanism for ensuring the relevance of academic qualifications and for this reason the Dearing Report promoted it:

*We welcome participation by professional bodies in establishing the standards appropriate to their discipline. We particularly urge them to be actively engaged in accrediting programmes and in working with the academic community to specify required outcomes. (National Committee of Inquiry into Higher Education, 1997)*

In practice, however, accreditation can be the means by which a profession sets knowledge thresholds for admission. It can be a powerful force acting against change. Professional bodies are traditionally very wary of innovative ways of teaching and examining, fearing that they are likely to result in a decline in professional standards (Burrage, 1994). In British forestry, the professional body charged with accreditation is the Institute of Chartered Foresters (ICF). Graduates of an accredited degree programme are exempt from taking some or all of the examinations required to become a Chartered Forester. However, the ICF promotes an entirely conservative and academic approach to professional knowledge. Its own membership examinations require candidates to take (or be exempted from) six two-hour written examinations in which they "must display a thorough knowledge of the theoretical background" to forestry. Candidates are warned that the examinations are hard and that they cannot expect to pass without putting in a great deal of time and effort in preparation (Institute of Chartered Foresters, 2000).

This approach to professional education is in stark contrast to recent attempts by the UK Government to promote vocationalism in universities. There is a widespread belief, outside academia, that the root cause of Britain's economic decline is a failure to provide adequate vocational and professional training due to the anti-entrepreneurial values in higher education (Burrage, 1994). At a political level there is considerable distrust of what is seen as "bogus and irrelevant theorizing" in professional training (Beecher, 1994). In forestry, this represents a considerable challenge to professional authority.

*The forestry schools crank students out managing to convince the public they have the only suitable body of forestry knowledge. I would argue that many other people have equally important forestry knowledge - people who have worked in the forest and who have seen the land change over a long period of time. (Keene, 1995).*

Universities are in danger of being seen, by both Government and public, as incapable of addressing the real problem of providing career-relevant education. A recent contributor to a forestry bulletin board wrote:

*The argument is made that university isn't supposed to be teaching you how to do it, only how to think at a sophisticated level - that's crazy- the real reason is that the professors have never done it so they can't teach it.*

The deep-seated tensions that are developing throughout higher education between the espousal of traditional academic pursuits and promotion of vocational curricula have heightened Schön's (1987) rigour – relevance dilemma. However, as Schön himself made clear, the dilemma is the result of a fundamental misunderstanding about the nature of learning. Neither the rigour nor relevance camps have seen that the failings of professional education are not a result of the subject matter that is being taught but of the approach to learning that both subscribe to. The challenge is to promote student learning that is both intellectually challenging *and* provides appropriate preparation for professional practice. Rigour and relevance need not be mutually exclusive. This combination can only be achieved, however, by abandoning a model in which the teaching of a substantial theoretical knowledge base (whether rigorous or relevant) is seen as the *sine qua non* of professional education.

### **Increasing breadth**

*In vain sedate reflections we would make,  
When half our knowledge we must snatch, not take.  
Alexander Pope (1732) Moral Essays. Epistle i. Line 39.*

The second type of reaction by forestry schools to the accusation that their graduates are not competent to practice has been to try to fill the holes in their education by expanding the amount students are taught. The assumption is made that insufficient knowledge rather than inappropriate types of learning cause the theory – practice gap. Luloff (1995) typified this approach when he proposed that student foresters should be taught how to be made more aware of public priorities by training them in social science theories and methodologies. Some Universities have attempted to *teach* an understanding of interpersonal skills and personality issues thought necessary to be an effective manager. There seems to be little recognition that such strategies are entirely counterproductive; that more theory can only widen, not close the

theory – practice gap. The consequence of this attitude is that even more subjects are loaded into the increasingly overcrowded forestry curriculum. Fisher (1996) stated that:

*“Future graduates of professional forestry schools must have a broad range of knowledge in the life sciences, including biology and ecology; the physical sciences: the computational and analytical sciences; economics and political science; the social and behavioural sciences; the humanities and communicative arts; and business and personnel management. In addition they must understand and be able to apply knowledge from each of the basic disciplines to specific forestry problems.”*

Fisher, who was the president of the US National Association of Professional Schools and Colleges, recognised that many foresters feel “disrespected and unneeded” by society. He argued that the remedy lies in better teaching and greater commitment from students so that more material can be covered in less time ensuring that forestry education is both broader and deeper.

In my opinion, it is far from clear that broadening the curriculum is in the best interests of the students, the profession or society. For students, breadth comes at the cost of excessive workloads and insufficient time for them to develop understanding. Many forestry degrees offer little choice and require more hours of coursework than other science subjects. The inevitable result of an overloaded timetable is that students adopt “coping strategies” and may complete their course with little understanding of what they have studied (Ramsden, 1992). A broad curriculum places forestry schools under considerable stress too. Delivery of a wide range of subjects requires either an increase in the number of teaching staff or existing staff have to take on extra teaching commitments, often outside their field of expertise. Nor is there any evidence that foresters with a broader knowledge base will be better equipped to practice their profession. The crisis of confidence in forestry has not been caused by foresters’ ignorance of theoretical knowledge but by their inability to modify practice to meet heightened societal expectations.

In the preceding sections I have discussed two issues that have dogged the teaching of forestry at University level for over a decade: academic rigour versus professional relevance and breadth versus depth of study. I have sought to argue that both miss the point. Implicit in both these debates is the assumption that foresters are struggling to solve the problems of professional practice because they do not know enough. University education is failing to produce competent foresters but at the heart of the problem lies a culture of dependency on theoretical knowledge. Foresters need to learn how to solve problems in what Schön (1987) described as ‘situations of uncertainty, instability, uniqueness and conflict’ when rules and theories no longer provide the answers. Forestry is not unique in confronting these educational problems. In the following sections I shall examine solutions that have been proposed for professional education in other disciplines, particularly medicine, and review their relevance to forestry.

### **Learning to think like a forester**

Ramsden (1992) defined learning as applying and modifying one’s own ideas. It is, he maintained, not the passive receipt of authoritative knowledge.

Learning in a professional context may require a slightly broader definition because much of what is learned may not be consciously 'known'. When asked how to identify a particular species of tropical tree few experts will be able to produce a list of defining characters. Most will simply recognise a tree from its '*gestalt*'. This is an example of what Schön (1987) has termed 'knowing-in-action', one of the essential components of skilful professional practice. Knowing-in-action is revealed in the spontaneous, skilful execution of a complex task, but it can rarely be made explicit. It does not therefore constitute the conscious application of ideas or theories. This view of the way that professionals may work undermines the traditional epistemology of professional education. It suggests that professionals rarely 'solve' problems, but may simply recognize them and apply appropriate solutions. However, most problems in professional practice are not routine but are unusual, often unique. Standard actions produce unexpected results that the professional has to respond to. Schön (1987) claimed that the essential counterpart to 'knowing-in-action' is the capacity of the skilful practitioner to respond intelligently to the unexpected. Their actions are modified on the basis of reflection, leading to a revision of the personal ideas that underpinned the 'knowing-in-action'. A constant cycle of spontaneous action followed by reflection and modification of personal conceptions of the problem constitutes what Schön saw as professional artistry. There are obvious parallels between this view and Ramsden's (1992) description of learning as the application and modification of personal ideas.

Eraut (1992) described skilled action and deliberative analysis as important components of professional knowledge but he also included professional principles or socialisation into the professional approach. Professionals do not solve problems in the abstract but they do it within a social and institutional context. This is why the generic 'problem-solving' skills that are taught as part of many modern curricula are rarely transferable to professional practice. Part of the process of learning forestry is, therefore, to begin to think in the way that foresters do. Students have to learn what to notice and what interpretations to make from what they have seen. They have to learn to communicate their interpretations in the appropriate terms to their colleagues and clients.

How then might a University forestry course attempt to encourage students to think like a forester? Experience in medical education suggests that professional knowledge is acquired most effectively by solving real problems in context (Maudsley and Strivens, 2000). A number of medical schools both in the UK and elsewhere have radically revised their approach to teaching and adopted a problem-based learning (PBL) approach. The emphasis is on action and interpretation rather than on theory and memory. Students learn knowledge-in-action from solving problems under the guidance of experienced practitioners. They learn to reflect critically on the outcomes of their actions by being prompted to question what they are doing and to revise their preconceptions in the light of new professional knowledge. It is evident that this approach to learning *directly parallels* the process of professional practice. It contrasts with traditional pedagogy in that students develop a theoretical conceptualisation of a problem as the result of reflection on the

outcome of an action rather than theory being delivered 'up-front' and the student then taught how they might apply it.

PBL does not exclude conventional didactic lectures, but most learning is self-directed or tutor-facilitated in small groups. Students are given a scenario from which they have to identify the nature of a problem. It is crucial that the problems are 'real' in the sense that they should be embedded in a relevant social context. With the tutor's help they identify what they need to learn in order to be able to solve the problem. They then embark on a period of individual research and information gathering before the group reconvenes to synthesize a solution. The final stage is to explore the likely outcomes and prepare a critical review of the proposed solution. This is often done by small groups presenting their proposals to the class and being given peer-review by other groups.

Problem-based learning may have a number of advantages in forestry education. One of the strengths of PBL is that it encourages a holistic approach to knowledge rather than an atomistic one. Inexperienced students may fail to see the relevance of important but unpopular areas of the curriculum when they are taught in abstraction and 'opt-out' of learning. When the same knowledge is placed in context students can see that concepts and methods in one area can complement and reinforce their learning in another. For example conservation biology is a subject for which students often have considerable enthusiasm. In contrast, population genetics can seem less appealing. When asked to address a question of the minimum critical population size for a rare species most students would soon realize the importance of developing an understanding of this area.

Learning is active and self-directed. This offers opportunities for students to adjust the depth with which they investigate a particular issue to match their own needs and aspirations. In a conventional instruction-based course, it is difficult to cater adequately for a range of different levels of interest and knowledge. Students can either do the course-work or drop the subject. The PBL approach may be particularly effective for a graduate course such as the Oxford forestry MSc. Graduate students have already acquired considerable factual knowledge, and can use the open structure of a PBL course for remedial learning in areas of weakness or in-depth specialisation in areas of strength. Graduates are far more capable of independent study and enjoy the autonomy of self-directed learning.

PBL can be carried out effectively through small group work. There has been limited discussion in the literature of the degree to which professional expertise is created by collaboration rather than being held by a single individual. The wry assertion that nowadays "behind every successful forester there is a sociologist, environmentalist, economist and lawyer" whilst made in jest does imply that pooling of specialist skills can be an effective way of addressing complex multi-disciplinary problems. In PBL, collective expertise allows individuals to pursue specialist interests whilst still maintaining an overview of the problem and making their contribution to its resolution. It also

gives students real experience of negotiation with others in the group who hold different perspectives and who may have different priorities.

PBL has been shown to be an effective way of increasing the professionalism of medical students. There is sound research evidence that it increases student understanding and their confidence in tackling unfamiliar problems. Forestry has little to lose and much to gain by a radical rethink of the ways that we educate our students.

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### References

Beecher, T. (1994) Freedom and accountability in professional curricula. In *Governments and Professional Education* ed Beecher, T. Buckingham, UK: Society for Research into Higher Education and Open University Press.

Burrage, M. (1994) Routine and discreet relationships: professional accreditation and the State in Britain. In *Governments and Professional Education* ed Beecher, T. Buckingham, UK: Society for Research into Higher Education and Open University Press.

Eraut, M. (1985) Knowledge creation and knowledge use in professional contexts. *Studies in Higher Education*, **10**(2),117-133.

Eraut, M. (1992) Developing the knowledge base: a process perspective on professional education. In *Learning to Effect* ed Barnett, R., pp 98-118. Buckingham, UK: Open University Press and the Society for Research into Higher Education.

Fisher, R.F. (1996) Broader and deeper: The challenge of forestry education in the late 20th century. *Journal of Forestry*, **94**(3), 4 - 8.

Institute of Chartered Foresters (2000) *Professional examination Part I: rules, guidelines and syllabus*. Edinburgh: ICF.

Johnson, T.J. (1972) *Professions and power*. London: Macmillan.

Keene, R. (1995) What Is a Healthy Forest? *Environmental Review Newsletter*, **2**(2).

Luloff, A.E. (1995) Regaining vitality in the forestry profession: a sociologist's perspective. *Journal of Forestry*, **91**(3),17 – 22.

Maudsley, G., Strivens, J. (2000) Promoting professional knowledge, experiential learning and critical thinking for medical students. *Medical Education*, **34**(7),535 – 544.

National Committee of Inquiry into Higher Education (1997) *Higher Education in the Learning Society (The Dearing Report)*. London: HMSO.

Ramsden, P. (1992) *Learning to Teach in Higher Education*. London: Routledge.

Schön, D. (1987) *Educating the reflective practitioner: toward a new design for teaching and learning in the professions*. San Francisco: Jossey-Bass.