Transfer of Knowledge between Education and Workplace Settings
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Abstract

The first half of this chapter analyses the different knowledge cultures of higher education and the workplace, contrasting the kinds of knowledge that are valued and the manner in which they are acquired and used. In particular, performance in the workplace typically involves the integration of several different forms of knowledge and skill, under conditions that allow little time for the analytic / deliberative approach favoured in higher education. One consequence is greater reliance on tacit knowledge, including knowledge of how more formal, explicit knowledge is used in various practice settings. The second half focuses on transfer as a learning process, which requires both understanding and positive commitment from individual learners, formal education, employers and local workplace managers. Transfer is conceptualised in terms of five stages, whose distinctive characteristics and learning challenges are discussed in some detail. The neglect of transfer is attributed both to the cultural gap between formal education and the workplace and profound ignorance of the nature and amount of the learning involved.

Cultural Knowledge and Personal Knowledge

My starting assumption is that learning is significantly influenced by the context and setting in which it occurs. Contexts and settings are socially constructed. Even when only one person is present, cultural influence is strongly asserted through the physical environment for learning and cultural artefacts. From that perspective one can argue that all knowledge is cultural knowledge and socially situated. Understanding the significance of this cultural perspective involves locating knowledge in space and time; and determining its distribution, and possibly differential interpretation, across a range of cultural groups. Who has this knowledge? Who was involved in its construction over time? How has it developed from, and how is it now positioned in relation to other cultural knowledge? What different forms does it take? How is it evolving? These questions apply equally to education and workplace settings, and especially to the interactions and disconnections between the settings. Current approaches to professional and vocational learning are impossible to understand without knowledge of their various traditions, histories and cultures.

Part of that cultural knowledge has been codified, mainly in textual form, and made widely accessible through publication. That which passes the scrutiny of editors, publishers and referees and is thereafter collected and organised by the libraries of educational institutions can be described as Codified Academic Knowledge; and it is this knowledge which plays the dominant role in most education settings. Codified knowledge which is not academic can be found in nearly all workplaces, including those of educational organisations, in the form of textual material containing organisation-specific information, records, correspondence, manuals, plans, etc.

Cultural knowledge that has not been codified, plays a key role in most work-based practices and activities. There is considerable debate about the extent to which such knowledge can be made explicit or represented in any textual form; and the evidence gathered so far suggests that its amenability to codification has been greatly
exaggerated (Eraut 2000). What does appear to be generally acknowledged is that much uncodified cultural knowledge is acquired informally through participation in social activities; and much is often so “taken for granted” that people are unaware of its influence on their behaviour. This phenomenon is much broader in scope than the implicit learning normally associated with the concept of socialisation. It is a prominent feature of educational institutions in spite of the overt dominance of codified academic knowledge; and it occurs in both formal and informal settings.

As a counterpart to cultural knowledge, I define personal knowledge as what individual persons bring to situations that enables them to think, interact and perform. Codified versions of personal knowledge are associated with the concept of authorship; and provide the basis for assignments and assessments within educational programmes from which more than the replication of publicly available knowledge is expected. But my definition is intended to include non-codified personal knowledge and a far broader concept of knowledge than academic performance. For example, it includes not only personalised versions of public codified knowledge but also everyday knowledge of people and situations, know-how in the form of skills and practices, memories of episodes and events, self-knowledge, attitudes and emotions. Moreover, it focuses on the use value of knowledge rather than its exchange value in a world increasingly populated by qualifications. This implies a holistic rather than fragmented approach to knowledge; because, unless one stops to deliberate, the knowledge one uses is already available in an integrated form and ready for action.

While remaining a strong supporter of the concept of situated learning, I strongly dissent from those theorists, such as Lave and Wenger (1991), who attempt to eradicate the individual perspective on knowledge and learning. Their research, based mainly on fieldwork in stable communities, focuses selectively on common rather than differentiated features of people’s knowledge; and fails to recognise the need for an individual situated (as well as a socially situated) concept of knowledge in the complex, rapidly changing, post-modern world. Individuals belong to several social groups in which they both acquire and contribute knowledge, and their experiences of multiple group membership cannot be ring-fenced. Many of these groups have changing memberships and relatively short lifetimes. Thus members of a group acquire only part of the knowledge present in that group, and interpret it within a personal context and history that has been shaped by their experiences in other groups, both prior and contemporary. There will also be aspects of a person’s knowledge that have been constructed through lifelong learning and have become unique to them, i.e. outside the circle of shared cultural knowledge, because of the unique set of situations in which they have participated. For example, a single idea will acquire a distinct web of meaning for each individual user according to the sequence of situations in which they used it. The greater the range of usage, the more distinctive its personal meaning is likely to be (Eraut 2000).

Types of Knowledge acquired in Education contexts

Teachers in secondary and post-compulsory education are organised according to the subjects they teach, each of which forms a distinctive sub-culture and provides a major part of their professional identity (Goodson 1983, Becher, 1989). Most learning pathways that precede full-time employment comprise mainly subjects, which have potential vocational relevance, but are taught primarily under the auspices of general
education. When subjects are claiming territory on the timetable, arguments based on vocational relevance are used with vigour, if not rigour. But, once their territory has been established, historical traditions, the prevailing assumptions of the subject culture and the expertise of the current teaching staff dominate the selection and treatment of academic content. The prime objective becomes progression within the discipline and increasing participation in its culture to first degree level and beyond, even though only a small minority of students follow that particular path. In many subjects applied aspects are given just a “walk on part” and an occasional mention.

Professional and vocational education programmes typically include three kinds of content: these derive from (1) disciplines which feature prominently in general education and form major components of honours degrees, e.g. Mathematics, Sciences, Social Sciences, Languages, (2) the applied field which sponsors the programme e.g. Business, Engineering, Education, Health Professions and (3) occupational practice itself. According to their background and orientation, individual teachers have a primary allegiance to one of these three types of content, but are sometimes also required to teach a second. In every case the treatment of the content and its relationship to practice are significantly influenced by the academic and vocational experience of those who teach it.

Most teaching within an applied field is also strongly influenced by an often quite recently constructed body of knowledge about that field, which thus becomes either a quasi-discipline like Education or Nursing or a constellation of quasi-disciplines like Business Studies or Engineering. Over time, teachers in the applied field are drawn from its own graduates and a cultural succession becomes possible whereby new teachers are recruited with little or no work experience in the relevant occupation. These may remain a minority, but the codified academic knowledge of the field, as represented in publications, begins to dominate knowledge derived from personal experience of occupational practice, both culturally and experientially, as the impact of early occupational experience recedes. Some of this theory of the applied field is concerned with the application of theories and concepts from scientific disciplines; some is based on empirical research and conceptual frameworks peculiar to the applied field; some is based on the elaboration of practitioner maxims and practical principles; some is based on what can best be described as a preferred view or ideology of the occupation, a theoretical justification of its purposes and practices in terms of moral principles, views of society and occupational beliefs about the effectiveness of various practices.

This last aspect of “applied field” theory is strongest in occupations based on personal interaction with clients, where there is a strong tendency to construct theories of practice which are ideologically attractive but almost impossible to implement. The main problem is that the professionals concerned are urged to adopt practices that involve much greater levels of time and effort than service users and/or the public purse can possibly finance. Hence, there is a significant gap between the theories of practice taught by former practitioners, based on how they would have liked to have practised, and the activities performed by current practitioners. This contrasts with the common workplace stance, in which current practice is uncritically accepted as an inevitable reality, and any impetus towards improving the service provided by an occupation is lost. Neither provides an adequate basis for a professional career. There are so many variants of problem-based learning curricula and staffing strategies that it is impossible
to discern the extent to which PBL even attempts to bridge this cultural gap between education and workplace settings.

The third type of course found in Education settings involves teaching occupational practice through skill workshops or simulations; or, if there is concurrent work experience, seminars linked to discussions that interpret that experience and introduce relevant theory in order to facilitate learning in the workplace. This last is commonly described as the “reflective practitioner” model. To be successful these skills sessions or reflective seminars require small student groups, good facilities and hyperactive staff who sustain close working links with practitioners. Recruiting and retaining such staff is often difficult; and in Higher Education the demands of such bicultural work tend to conflict with activities more likely to lead to promotion.

To conclude this section, I shall briefly summarise the kinds of knowledge which Vocational and Professional Education Programmes claim to provide:

1. **Theoretical Knowledge** constructed in the context of either a subject discipline or an applied field. This introduces concepts and theories to help students to explain, understand, and critique occupational practices and arguments used to justify them; and to appreciate new thinking about the role of the occupation and proposed new forms of practice.

2. **Methodological Knowledge** about how evidence is collected, analysed and interpreted in academic contexts and in occupational contexts; and the procedural principles and theoretical justifications for skills and techniques used in the occupational field.

3. **Practical skills and techniques** acquired through skills workshops, laboratory work, studio work, project work etc.

4. **Generic Skills** claimed to be acquired during Further and/or Higher Education, either through direct teaching, or more often, as a side effect of academic work. These include:
   - basic skills in number, language and information technology
   - modes of interpersonal communications
   - skills associated with learning and thinking in an academic context
   - self-management skills

5. **General knowledge about the occupation**, its structure, modes of working, cultural values and career opportunities.

Although most of these types of knowledge are described as transferable, there is little evidence about the extent to which 2, 4 and 5 are acquired by students and about the chances of 1 and 3 being subsequently transferred (or not) into the workplace. There is even some doubt as to whether the phenomena described as “transferable skills” have sufficient affinity with workplace activities for the term “transfer” to be a valid description of any suggested connection.
Types of Knowledge used in the Workplace and the Conditions of its Use

My research into mid-career learning in a wide range of settings (Eraut et al 1998, 2000) led to a rough typology of knowledge found in the workplace, which contrasts with that found in Education settings. This is summarised below in a slightly modified form:

1) **Codified Knowledge** acquired during initial professional training and further episodes of formal learning; or in the workplace itself. The former includes codified academic knowledge of concepts, theories and methodology. The latter includes job-specific technical knowledge and knowledge of systems and procedures.

2) **Skills** needed for competence in a wide range of activities and for performing several work-related roles, including leadership and working collaboratively within a team. These can be grouped under four headings- technical, interpersonal, thinking and learning- and are acquired through practice with feedback. Progression is associated with increasing fluency, responsibility and complexity.

3) **Knowledge Resources** include a range of materials and on-line resources; but learning from other people is even more important in most work settings. These include immediate work colleagues and other members of one’s organisation; networks of clients/customers, suppliers and competitors; professional networks; and other personal contacts developed over time.

4) **Understanding** provides the basis for most action, although it is inevitably incomplete. It encompasses the understanding of other people- colleagues, clients, managers, etc.; the understanding of situations and contexts, including one’s own organisation and its environment; self-understanding and strategic understanding of a range of changes and developments. This includes both explicit and implicit theoretical perspectives and theories of action.

5) **Decision-making and Judgement** vary with the conditions in which they are exercised. Decisions may be rapid, with little time for analysis or consultation, or deliberative and consultative. When situations are complex or information is sparse, judgement becomes a critical aspect of decision-making: judgement of people; judgement of the quality of products, practices and processes; judgement of the relative significance of, and interaction between, different factors; judgement of priorities, options and strategies.

Unlike many typologies, this one gives considerable emphasis to working contexts and conditions. Not only is situational understanding context specific, but it requires knowledge acquired through experience; and the capability to decide and act requires both experience of working in the context, and adaptation to a range of local conditions. One cannot understand the knowledge needed for doing a job without a detailed description of what I like to call its **performance domain**. This comprises three types of variable:

1) The contexts and cultures in which the performer will have to operate, including likely locations and their salient features;

2) The conditions under which the performer will have to work, e.g., degree of collaboration and supervision, pressure of time, crowdedness, conflicting priorities, availability of resources;
3) The situations which the performer may encounter, covering such factors as client types and demands, tasks to be tackled, interpersonal events, emergencies, etc..

Like other typologies, however, mine has one very serious weakness. It cannot represent the knowledge that results when several different kinds of knowledge are combined to achieve a complex task or performance. Nor does it consider the problems of prioritisation or interference between tasks. For this purpose I developed a model of a **performance period** (Figure 1). This also allows for the possibility of interference between tasks, and draws attention to problems of prioritisation and deciding which task to do when.

**Figure 1: Activities During a Performance Period**

```plaintext
INITIATION
- Receiving new Information
- Reading the Situation
- Clarifying the Brief

THINKING

DOING
- Sensing

COMMUNICATING
- Listening

ENDING
- Products, Decisions, Records
- Reporting to Others
- Learning by Performer
- Learning by Others
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CHANGING CONDITIONS

DEVELOPING SITUATION
The period chosen for analysis will vary according to the focus and the occupation; for example one could consider a lesson, a clinic, a shift or a day. A major aspect of professional experience is that many tasks do not get completed during a performance period, so there is the constant problem of ‘picking up the threads’ at the beginning or receiving new information that will cause a change of plan; then a need to record progress at the end and/or to hand over clients to a colleague. This is reflected in the separate boxes for *Initiation* to indicate the initial briefing and reading of the situation when the period starts, and for *Ending* to indicate what has been achieved, or left undone, by the time the period ends.

One advantage of using a performance period is that situations often develop over time. So, instead of a static model in which all decisions and plans are made at the beginning of a period, one has a dynamic model in which a constantly changing environment provides a changing input that leads to the constant modification of plans. The input side is shown by placing the activities within a context characterised by changing conditions and a developing situation, with the opportunity for inputs prompted by sensing and listening. A great deal of competent behaviour depends not just on being able to do certain things (output) but also on the correct reading of the ongoing situation (input) so that the appropriate action can be taken. Nor is it only the external environment that changes of its own accord. The performer is an actor who affects that environment, not always in totally predictable ways. So another role of input is to provide feedback on the effect of one’s own performance. This applies whether one is making something and sensing it change, or talking to people while listening to their reply and observing their reaction.

The interpretation of this input is just one aspect of the cognitive element, indicated by a central column marked *Thinking*. Other aspects of thinking include planning and monitoring one’s activities and solving problems. People are constantly thinking and making decisions as they go along, even though they could probably tell you very little about it afterwards. Hence *Thinking* is shown in constant interaction with *Doing* and *Communicating*. These activities overlap to some extent, the main distinction being between acting on inanimate objects and interacting with other human beings.

**Factors Affecting Modes of Cognition in Workplace Performance**

The performance period approach introduces issues pertaining to the pace and pressure of the workplace; and, through emphasising the importance of cognition, raises the question of when and how workers find the time to think. This led to a model linking four types of professional activity to different amounts of thinking time, and hence, to examining the modes of cognition employed in professional work (Figure 2). The four types of activity were:

1) Assessing clients and situations (sometimes briefly, sometimes involving a long process of investigation) and continuing to monitor their condition;

2) Deciding what, if any, action to take, both immediately and over a longer period (either on one’s own or as a leader or member of a team);
3) Pursuing an agreed course of action, modifying, consulting and reassessing as and when necessary;

4) Managing oneself, one’s job and one’s continuing learning in a context of constrained time and resources, conflicting priorities and complex inter- and intra-professional relationships.

These activities can take many different forms according to the speed and context and the types of technical and personal expertise being deployed. Although analytically distinct, they may be combined into an integrated performance that does not follow a simple sequence of assessment, decision and then action. For example a health professional will often have to decide whether to take action and then reassess whether to continue with a further assessment of their client or whether to simply wait and see. There may be several assessments, decisions and actions within a single period of consultation and treatment. Indeed recording both the nature of these activities and the ways in which they are sequenced and combined is another very useful approach to describing professional practice.

In order to understand the nature of workplace performance, one has to examine the thinking entailed in carrying out these activities, which depends on both (1) the conditions and constraints on the performer, and (2) what the performer has learned to do, with or without stopping to think. Sometimes the situation itself demands a rapid response; sometimes rapid fluent action is the hallmark of the performer’s proficiency; sometimes the number of activities proceeding simultaneously limits the attention that can be given to any of them i.e. the workload is so heavy that there is little time to think. Thus the model assumes that time is the variable that most affects mode of cognition and divides the time-continuum into three sections, headed Instant, Rapid and Deliberative. These terms attempt to describe how the time-scale is perceived by the performer, and are interpreted differently according to the orientations of performers and the nature of their work. For example, in one context

**Figure 2: Interactions between Time, Mode of Cognition and Type of Process**

<table>
<thead>
<tr>
<th>Type of Process</th>
<th>Mode of Cognition</th>
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<tbody>
<tr>
<td></td>
<td>Instant/Reflex</td>
</tr>
<tr>
<td><strong>Reading of the situation</strong></td>
<td>Pattern recognition</td>
</tr>
<tr>
<td><strong>Decision-making</strong></td>
<td>Instant response</td>
</tr>
<tr>
<td><strong>Overt activity</strong></td>
<td>Routinised action</td>
</tr>
<tr>
<td><strong>Metacognitive</strong></td>
<td>Situational awareness</td>
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</table>
rapid might refer to any period less than a minute, while in another context it might include periods of up to ten minutes or even half an hour. The critical feature is that the performer has little time to think in an analytic mode.

The instant/reflex column describes routinised behaviour that, at most, is semi-conscious. The rapid/intuitive column indicates greater awareness of what one is doing, and is often characterised by rapid decision-making within a period of continuous, semi-routinised action. Typically it involves recognition of situations by comparison with similar situations previously encountered; then responding to them with already learned procedures. The time available affects the degree of mismatch that is tolerated, because rejection of action based on precedent leads to deliberative, problem-solving and hence to a more time-consuming approach. The deliberative / analytic column is characterised by explicit thinking about one’s actions in the past, present or future, possibly accompanied by consultation with others. It involves the conscious use of prior knowledge, sometimes in accustomed ways, sometimes in novel ways or in a more critical manner.

The interesting question arises as to whether performers are aware of the knowledge embedded in their practice when it is not explicitly used at the time. Four very different circumstances may pertain:

1) The practice was modelled on that of other professionals without understanding the reason for it or being aware of any underpinning knowledge.

2) The practice was developed with awareness of its rationale and underpinning theory, but that awareness dissipated over time and with it the ability to explain or justify it.

3) The practice can still be justified by citing underpinning theory, but cannot withstand any challenge because there has been no critical evaluation of the practice since it was first adopted.

4) The practice cannot only be justified but remains under the professional's critical control because it has been periodically re-evaluated.

The need for knowledge transfer during initial training and the period of workplace learning that follows it will largely be determined by whether the desired option is (1) or (4) above.

Two problems are likely when the use of underpinning knowledge is not under critical control. First, conflicts may arise in problematic cases between competing responses based on different practical principles – these cannot be resolved unless the underlying reasons for these principles are understood. Second, there is a danger that “scientific” knowledge will be replaced by unscientific knowledge – that which falls within the domain of a discipline but is regarded by leading professionals as either incorrect or alarmingly incomplete. The normal assumption is that being a competent professional implies keeping one’s practice under critical control; and therefore keeping up to date with relevant areas of theory and research. Reviews of practice may arise from individual reflection and consultation or, more officially, from the work of an
appointed group reviews the rationale for the practice, the evidence for its effectiveness, alternative approaches and recent research; and lead to a decision to retain the practice unchanged, modify it, or adopt an alternative But, in spite of the growing emphasis on audit and on evidence based practice, such reviews are far from frequent and are restricted by the limited, and often exaggerated, scope of research based evidence.

**Transfer as a Learning Process**

My own definition of transfer is “the learning process involved when a person learns to use previously acquired knowledge / skills / competence / expertise in a new situation”. This may be short and easy if the new situation is similar to some of those previously encountered; but long and very challenging if the new situation is complex and unfamiliar. At least four variables are important influences:

- The nature of what is being transferred
- Differences between the contexts
- The disposition of the transferee
- The time and effort devoted to facilitating the transfer process.

In the complex situations encountered by most professional workers, the transfer process typically involves five inter-related stages:

1) The extraction of potentially relevant knowledge from the context(s) of its acquisition and previous use;
2) Understanding the new situation, a process that often depends on informal social learning;
3) Recognising what knowledge and skills are relevant;
4) Transforming them to fit the new situation;
5) Integrating them with other knowledge and skills in order to think / act / communicate in the new situation.

Transferring a particular concept or idea from an education setting to a workplace setting is particularly difficult, because of the considerable differences in context, culture and modes of learning. One major justification for teaching theory in an education setting is its transferability and generalisability, but to what extent is this true in practice and for whom is it true? Within higher education settings, the prevalent but not universal view of an ideal student is a person who has taken ownership of a repertoire of theoretical ideas and used them in essays and projects in novel ways. This is reflected in degree classification schemes that use criteria which include a student’s use of ideas in a manner that goes beyond one specific knowledge source. My own experience is that significantly independent use of ideas, which transcends reasonable comprehension and good organisation of material, is associated with an Upper Second class of degree, a level reached by about half the candidates. For sub-degree awards, the proportion of students demonstrating or even getting an opportunity to demonstrate, independent ownership of ideas is significantly lower. Not surprisingly, there is a contrast between the “preferred view” of lecturers and research into students’ learning orientations.
The distinction between deep and surface approaches to learning derives from research by Marton et al (1984). They defined a deep approach to learning in terms of trying to understand the underlying purpose and meaning of the information encountered, to make a critical assessment of it and to reach a personal viewpoint; whereas a surface approach is demonstrating acquaintance with and comprehension of information without actively seeking to restructure it or develop any personal perspective. Most authors assume, not always explicitly, that a deep approach is desirable; but its accomplishment is treated in different ways. For example Perry (1970) regards it as a result of intellectual and ethical development in the higher education context, while others have treated it more like a sophisticated skill or threshold competence. Yet others interpret it as being dependent on interest in the subject, an indicator of intrinsic motivation. Ideologically, the notion of deep learning is well-attuned to the academic psyche; but those who see the purpose of undergraduate education as getting qualified and acquiring useful competence will tend to regard it as a luxury.

While Marton’s work was based on research into how students learn from texts, more sociologically oriented research has focussed on the effect of the academic context on students’ levels and direction of effort. Becker et al (1968), Snyder (1970) and Miller and Parlett (1974) present accounts of students seeking to survive and succeed by maximising their return on their academic effort. They learn to recognise what the system rewards, set their own goals and try to achieve them economically at minimum risk. Thus students’ approaches to learning are determined primarily by the teaching and assessment regime and students’ strategies for negotiating it. They observe what teachers reward not what goals they espouse. Academics, who have only limited control over their teaching and assessment regimes, do not find this line of research attractive, and are generally reluctant to see themselves as task masters rather than role models, and students as pursuing grades rather than learning for its own sake.

There is substantial evidence from psychologists (Entwistle 1992) to suggest that most teaching and assessment regimes encourage surface approaches to learning; so the two research themes are intimately connected. Moreover, research into professional education, in particular, suggests that one effect of occupational socialisation is that most aspiring professionals come to value practical experience more highly than academic courses. For most students, codified academic knowledge has not been liberated from its original academic source; and is unlikely to be ready for transfer unless there is special provision through problem based learning or seminars whose prime purpose is to link prior theoretical knowledge with reflections on personal experience in the workplace.

Situational understanding in the workplace is highly dependent on experience. Dreyfus and Dreyfus (1986) describe advanced beginners as having limited situational perception, and using guidelines for action based on the perceived attributes or aspects of each situation. Aspects are global characteristics of situations, recognisable only after some prior experience; and, at this stage, all attributes are treated separately and given equal importance. In contrast, proficient workers see situations holistically rather than in terms of aspects and see what is most important in a situation. They perceive deviations from the normal pattern and use maxims for guidance, whose meaning varies according to the situation. Related learning often entails a combination of the unconscious aggregation in memory of experiences with
cases and episodes of activity, incidental learning from other people about the salient aspects of situations and reflection on one’s more memorable experiences.

Such processes, however, are not theory free; and the Dreyfus brothers give little attention to the role of theory in situational understanding. Knowledge of theories taught in Education settings may alert workers to the implications of particular aspects of situations, e.g. fluid balance in a hospital patient, electrical hazards, or theories of motivation, provided their relevance is recognised. But personal theories are also constructed out of experience as part of the natural human process of looking for patterns and meanings and trying to make sense of one’s experience. These ways of construing and thinking about the world have been called “schemes of experience” (Schutz 1967), “personal constructs” (Kelly 1955) or “schemas” (Bartlett, 1932). The use of scientific theories is further discussed below; while the problem of making personal theories explicit and bringing them under critical control is discussed by Argyris and Schon (1974) and Eraut (2000).

**Recognising what knowledge and skills are relevant** is not as simple as it seems. When teachers in education settings spend time discussing how their theoretical contributions relate to practice, a large collection of potentially relevant theory is quickly assembled. But who uses which parts of it, why and when? Our earlier section on modes of cognition noted that time to consider theory is at a premium in the workplace; and suggested that most theory was more likely to be embedded in practice than explicitly used in daily decision making. There is a marked contrast between the very large number of knowledge areas deemed relevant by those who teach them and the very limited number of knowledge areas that can be taken into account at any one time by a busy practitioner with a high caseload. The practitioner has to assess the priority to be accorded to each particular area of knowledge in each particular situation; but in practice patterns of attention will soon be developed and only some knowledge areas will even be considered.

Recognising what theory you need in any particular situation is mainly learned through participation in practice and getting feedback on your actions; and most components of a practitioner’s theoretical repertoire remain dormant until triggered by a very specific aspect of the situation. In healthcare contexts the nature of the client(s) is the main factor determining what knowledge and skills are relevant; but time-scale is also important. Figure 3 presents a useful framework for discussing and deciding not just which areas of theory are relevant to a particular case but also their respective priority. It can be supported by an appropriate checklist of areas of theory.

The two rows allow a distinction to be made between (1) knowledge embedded in practice through routines or protocols but which remains essential for the justification of that practice and (2) knowledge which needs to be explicitly considered at the time. Such knowledge may influence how the client is assessed, what decisions are made and/or how the practitioner interacts with the client.

The column headings reflect the assumption that priorities will vary according to the time scale. For example, the knowledge used to treat a patient in hospital with a stable condition will not necessarily be given priority in an emergency; and yet other kinds of knowledge may become important when longer term issues are being considered.
Figure 3: Framework for Deciding Priority Areas of Knowledge

<table>
<thead>
<tr>
<th>Status of Knowledge</th>
<th>Emergency</th>
<th>Short-term Action</th>
<th>Medium to Long-term Future</th>
<th>Review of Practice</th>
</tr>
</thead>
<tbody>
<tr>
<td>Embedded in Assessment Decisions Behaviour</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Explicit influence on Assessment Decisions Behaviour</td>
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The fourth column, headed *Review of Practice*, has been added for two reasons. First to ensure that embedded knowledge is reviewed at some time; and second to enable contextual factors constraining practice to be identified and addressed in a way which would not normally be possible when an individual client was the focus of attention. Such reviews of practice might occur in the context of audit, continuing professional development, a formal evaluation or funded research.

The framework presented in Figure 3 can be used both to find out what practitioners currently do, in which case embedded knowledge may be difficult to elicit without using special methods of inquiry (Eraut 2000, Fessey 2002) and to discuss what they ought to do. Repeated use on a case by case basis would reveal common patterns of practice, differentiation between clients and concerns about the efficacy of practice, including the cumulative effect of neglecting longer term issues. Using this framework to broaden the scope of cases used in problem based learning could also play an important role in orienting students towards the significance of a wider range of theory without inducing cognitive overload.

In order to consider the problems entailed in **transforming and resituating theoretical knowledge**, I shall focus attention on the use of scientific knowledge by health care professionals, using a broad definition of scientific knowledge to include the social sciences as well as the natural science disciplines and theoretical knowledge from the practice-oriented literature of individual professions. The knowledge maps I use as heuristics for eliciting and discussing practitioner knowledge were developed during research into the use of scientific knowledge by nurses and midwives (Eraut et al, 1995, 1996). Our approach was to interview experienced practitioners, engaged in mentoring students, about recent cases involving the use of particular areas of scientific knowledge and to use a matrix to summarise the information we gathered.

Figure 4 below is the first half of a map depicting aspects of knowledge about Acute Pain used by Surgical Nurses, and when and how they are used. The rows cover relevant topics of codified knowledge within the area of Acute Pain, while the column
headings describe the range of activities that constitute the practice of Surgical Nurses. The missing half contains a further fourteen columns under the headings of *Alternative Methods, Drugs* and *Assess Response*. The use of knowledge from a particular topic (row) during a particular activity (column) is indicated by making an entry in the appropriate box. Our research found significant differences in the headings of the matrix between specialisms, and some variation according to the type of clinical setting. Relatively few differences were noted between respondents from similar settings, but samples were not large enough for that to be a definitive finding.

**Figure 4: Knowledge of Acute Pain Used by Surgical Nurses**

The entries in the boxes indicate different kinds of knowledge use, codified for brevity. The R coding indicates that Recognition is all that is required, very little further interpretation is needed, and the transfer problem is mainly that of spotting when it is relevant; whereas the U coding indicates that significant Understanding of the knowledge is required, and probably some transformation. The knowledge has to be reinterpreted in order to be resituated. The numerical headings relate to the mode of cognition and correspond to the Instant, Rapid and Deliberative modes of response portrayed in Figure 2.

1) **Simple application**, for which recognising that some specific piece of knowledge was relevant was virtually all that was needed in order to take appropriate action;

2) **Situational adaptation**, where the appropriate response from an established repertoire was selected according to how the situation was understood, usually by matching one's model of the situation with situations previously encountered (described by Klein (1989) as Recognition Primed Decision Making); and

3) **Problem solving**, where the appropriate course of action had to be worked out from first principles.

Only with this third category was scientific knowledge explicitly used during the relevant episode of practice. In categories (1) and (2) any scientific knowledge used was embedded in already familiar understandings and actions. Since category (2) depends on the knowledge user having sufficient prior experience of similar situations, those lacking such experience have either to consult more experienced colleagues or engage in a slower, problem-solving approach that makes more explicit use of scientific knowledge. Resorting to consultation is quicker, but usually leads to new practices being acquired without any theoretical justification.

Parboteeah (2001) found that the use of knowledge maps is best taught to student nurses in practice settings, and in “real time” as and when relevant events occur. But, after an initiation period of “on the spot” tutoring, students become able to use knowledge maps on their own with consultative access to ‘experts’ and even to create new maps as part of a group project. Newly qualified practitioners will need a similar induction, before they can begin to use knowledge maps as a guide to the kinds of knowledge that need to be fed into their decision-making processes, for the identification of their learning needs and for the debriefing of experts who find it hard to explain their apparently intuitive decisions. We have found them to be especially
useful in initiating discussions about knowledge use and the more hidden aspects of practice during Continuing Professional Development.

The final stage in transfer involves combining the various relevant aspects of knowledge and skill into an **integrated, holistic, performance**. It will probably interact with those aspects of the previous stage that are relatively new; and will cease to be distinguishable as a separate stage when sufficient practice has created a rapid response. In practice reviews, prior attention should be given to the selection of the most relevant aspects of knowledge (see Figure 3), before using knowledge maps as aids to probe more deeply.

**Conclusion**

To discuss the implications of this analysis of transfer, let me introduce the metaphor of an iceberg. The learning of codified knowledge for assessment in an examination can be represented by that part of the iceberg that appears above the surface. This learning is explicit and well supported by textbooks and formal teaching. The further learning required to convert that codified knowledge into personal knowledge that is ready for use in a range of possible situations can be represented by that part of the iceberg which is hidden below the surface. Some books shed a little light in some areas, but the terrain is mainly obscure. Knowing how to use theoretical knowledge is largely tacit knowledge. Support for such learning is minimal and little time is set aside for it. The very existence of ice below the surface is symbolically denied. So when students find such learning difficult (which it usually is) they are likely either to blame themselves for being inadequate or to reject the theoretical knowledge as irrelevant. This raises the important further question of how much further learning is required in order to transfer theoretical knowledge from an academic setting into occupational practice. The analysis of this chapter suggests, in accordance with the metaphor of the iceberg, most of which resides below the surface, that the transfer process may entail considerably more learning than the original acquisition of the academic knowledge, i.e. that traditional thinking about transfer underestimates the learning involved by an order of magnitude.

Although professional preparation programmes include both theory and practice, few of them give serious attention to the issues discussed above; and in some professions the separation of theory and practice components over time and space militates against their integration. In vocational programmes we now have qualification frameworks that separately specify knowledge and competence, without giving any attention to the linkage between them or to how knowledge use might be assessed. These are areas where the intelligent development of more integrated programmes and more appropriate staffing could make a real difference. In particular, the introduction should be considered of a practice development role that incorporates responsibility for both students and new staff, and the facilitation of continuing learning in the workplace by experienced staff. Until the nature and importance of transfer is recognised and supported in this way, the impact of education on the workplace will continue to be lower than expected and the quality of work will suffer from the limited use of relevant knowledge. Surely it is time that government policies for qualifications and lifelong learning began to address this problem?

**REFERENCES**


