Establishing Competency-based Standards in the Professions
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Andrew Gonczi
Paul Hager
Liz Oliver
University of Technology, Sydney

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FOREWORD

I am pleased to be able to launch both this valuable discussion paper on establishing competency standards in the professions and simultaneously the Research Paper series to be produced by the National Office of Overseas Skills Recognition (NOOSR). Both initiatives indicate progress in the Government's migrant skills reform strategy.

I outlined the Government's strategy in my policy statement Migrant Skills: Improving Recognition Processes just over a year ago. NOOSR continues to have a central and catalytic role within that strategy. Part of NOOSR's role is to encourage, conduct, and disseminate relevant research, especially in the separate areas of competency standards and of comparative education. Both of these areas will be prominent within NOOSR's new Research Paper series. I am very pleased to launch the series with this first issue, Establishing Competency-based Standards in the Professions.

Another crucial part of NOOSR's role is encouraging the development of competency standards in the professions and maintaining a register of professional competency standards as they are developed. This paper by experts based at the University of Technology, Sydney, Mr Andrew Gonczi, Dr Paul Hager, and Ms Liz Oliver, will considerably facilitate the development of such standards. The paper offers those in or associated with the professions a number of possible methods for developing competency standards and some very helpful definitions of what are, for many, relatively new terms.

I have every confidence that this paper and its companion, Competency-based Assessment in the Professions, which is to be the second NOOSR Research Paper, will foster productive debate as well as assisting those working within individual professions to develop competency standards and associated assessment methodologies.

John Dawkins
Minister for Employment, Education and Training
December 1990
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INTRODUCTION

This paper was commissioned by the National Office of Overseas Skills Recognition (NOOSR) in May 1990. The purpose of the paper is to provide an introduction to the concept of competency-based standards and to explain how they may be developed by the professions. Hence the paper provides working definitions of 'competence','competency standards' and related terminology, explains the relationship between this and other systems of occupational analysis and description, and discusses various examples of professions and paraprofessions adopting this system. Because there are major differences between the actual nature of the work in various professions and paraprofessions, the paper discusses several ways of conceptualizing and identifying competencies and of setting standards. The range of examples considered will assist professional bodies to identify the sort of approach that is most likely to suit their own needs. A companion paper to this one, called *Competency-based Assessment in the Professions*, describes the various assessment issues and practicalities that face a professional group deciding to adopt competency-based standards.

The authors can be contacted at The School of Adult Vocational Education, Faculty of Education, University of Technology, Sydney, P.O. Box 123, Broadway 2007.

Note: If you are primarily concerned with the practicalities of establishing competency-based standards you can go straight to Section 6. The earlier sections cover the various issues that lie behind the advice and recommendations contained in Section 6.
EXECUTIVE SUMMARY

1. Competency-based standards have many uses. These include the potential for maintaining professional standards and for increasing labour market efficiency and equity, particularly during periods of labour market shortages. Such shortages have existed during the 1980s in a number of professions including engineering, some of the health professions and accounting. Competency-based standards offer a fairer method for testing overseas professionals and facilitate the recognition of those who attempt, but fail to obtain, professional qualifications. In addition, competency-based standards can potentially enhance career progression by providing a valid basis for promotion, and by removing artificial barriers between occupational levels. There are a number of other advantages for the professions including the potential for boosting morale, and providing the basis for initial and professional continuing education.

2. A competent professional can be defined as a person who has the attributes necessary for job performance to the appropriate standard. This definition focuses on three elements: attributes, performance and standards. Attributes such as knowledge, skills and attitudes, in combination, underlie competence. A competency is a combination of attributes underlying some aspect of successful professional performance. Competencies can be relatively specific (where, for example, they involve a single attribute) or relatively complex (where they involve combinations of attributes). Competencies are observed and tested via performance on tasks or on wider domains or areas of professional practice. Standards are the criteria against which performance is judged. Thus a competency-based standard is a level of achievement required for some area of professional practice. When such standards are specified for a selected range of areas the result is a set of competency-based standards for the profession.

3. There have been three broad approaches to analysing and unravelling the competencies required in professional work. The first divides professional work into roles (or, alternatively, domains), tasks and sub-tasks. This approach identifies major areas of practice and then divides them into the tasks required to perform these roles and the sub-tasks required to perform the tasks. The pharmacy profession has made use of this approach particularly for its pre-registration year. Nursing has also used this approach for registration purposes. This approach has some advantages: It is useful for course design particularly where practical tasks are to be emphasised, it enables different levels of competence to be easily identified, (e.g., entry level vs expert level) and it enables decisions to be made easily on essential tasks (minimum competence level) versus desirable tasks (greater than minimum competence). However it has serious disadvantages: lengthy checklists of competencies make assessment difficult and the atomization of areas of practice into discrete units ignores the holistic way in which complex professional practice is performed.

The second approach to analysing professional work focuses on the most general attributes of the practitioner that are crucial to effective professional
performance. This approach seeks to specify competence in terms of the
demonstration of these general attributes. Some attempt to divide the
practice of law into general attributes or competencies has been undertaken
in the United States, e.g. Antioch Law School divided legal practice into: oral
competency, written competency, legal analysis competency, problem
solving competency, professional responsibility competency and practice
management competency. Similar analyses have been undertaken in
medicine and teaching. Such an approach has a number of advantages. It
concentrates on a relatively small number of competencies that are essential
and allows for variety in performance of various areas of practice (or
teaching). However this approach also has some limitations. Apart from
the fact that specific competencies are neglected, the context of professional
practice is ignored, i.e., the general attributes assessed may not in fact
indicate ability to employ them in a given professional context.

The third approach seeks to integrate the roles and tasks of professional
practice with the attributes of the practitioner. An example is Burg, Lloyd
and Templeton's combining of eight major professional areas in clinical
medicine with the five basic attributes needed to perform them. A matrix
can be developed which has these areas on one axis and the attributes on the
other. A third dimension can be added to the matrix to represent different
contexts of clinical practice, e.g. essentially well patients versus ill patients,
adult patients versus children. Such an approach, while not yet highly
developed, has the potential for overcoming many of the problems of the
other approaches to competency analysis. This would require a judicious
selection from the three-dimensional matrix. Thus, the competency
analyses already undertaken in, e.g. nursing and pharmacy, could be
modified into this integrated schema. This approach has a number of
advantages. It provides a balance between specific and higher level
competencies and it enables manageable testing procedures to be developed.

4. Like any occupations, the professions need to establish criteria (standards)
against which an individual's performance can be judged. The nature of
professional work, however, means that standards can rarely be precise and
unambiguous. This does not mean that standards need be arbitrary. But the
issues that need to be considered in setting standards are complex. There is a
need to agree on the combinations of tasks and attributes (areas of
competency) for which standards need to be set, in addition to standards for
specific competencies. Then, there is a need to spell out minimum
competence in the determined areas. In doing this, it must be accepted that
there are different levels of competence for each area. In deciding what
level constitutes initial competence there is a need to balance factors which
might lead to the level being set too high against those which might lead to
it being set too low. Ultimately this means that professional judgement
must be exercised. It would seem that the best way of setting standards is to
develop a scale of competence. How this can be done and how it might be
assessed are outlined in the companion paper Competency-based
Assessment in the Professions.
5. Whatever broad approach is chosen for conceptualizing and analysing competence, the professions need to be aware of the range of techniques for establishing competency-based standards and of how to get started. Decisions about which technique to use will be guided by the sort of information required, the ways in which the profession wishes to use the information and by practical considerations such as costs, whether to hire consultants and so on. In planning a competency analysis aimed at establishing competency standards, the professions should be aware of the need to use a combination of techniques so that both tasks/roles and the professional attributes are analysed. Each of the techniques described has advantages and disadvantages and using a combination of them helps to maximise advantages so that the profession can gain the full benefits of the adoption of competency-based standards. The techniques described in this paper are: Dacum, Nominal Group technique, Search Conferences, Functional Analysis, Interviews, Competency Interviews, Critical Incident Technique, Surveys, Delphi CODAP, Observation and McBer. A chart which summarizes these techniques has been included along with a number of hypothetical examples illustrating how to choose between them.
1. WHY COMPETENCY-BASED STANDARDS ARE USEFUL

Competency-based standards offer a number of advantages to professions and paraprofessions whilst at the same time furthering important national objectives, particularly maintenance of professional standards, labour market efficiency and equity.

(a) Maintenance of professional standards
Competency-based standards provide explicit statements of what people need to be able to do to successfully practise as a professional. Having clear sets of standards helps to remove misunderstandings both inside and outside the profession. Competency-based standards offer a sound basis for judgements about entry to and progression within the profession.

(b) Labour market efficiency
There are a number of recent international developments which will significantly affect the market for professional services. The most important of these is the Uruguay round of GATT negotiations, a major object of which is the creation of an international framework for trade in services. Two key obstacles to achieving this objective are the need to reach agreement on rules ensuring non-discriminatory treatment of foreigners and uncertainty about professional standards. Competency-based standards would provide protection for national consumers of foreign supplied professional services and help to reduce discrimination.

Other interactive developments and forums such as the UNESCO convention on recognition of Studies, Degrees and Diplomas, the Universal Convention on Recognition of Studies and Qualifications in Higher Education, the Closer Economic Relationship with New Zealand, and the ASEAN Australian Forum are all moving towards international recognition of qualifications. At the very least competency-based standards would be a useful basis for negotiation in these arenas.

Recent microeconomic reform processes in Australia (industry restructuring, award restructuring, restructuring of education and training) all partly address the removal of unnecessary barriers to free movement of labour. Competency-based standards are of great assistance here because they encompass all forms of achievement of competence, rather than simply relying on formal indicators i.e. paper qualifications. But because the concept of competence can incorporate various levels of competence, from entry level through proficiency to expert level, a competency-based system would enable professionals to enter the profession at an appropriate level as, for example, in teaching or nursing or in public sector medicine. This allows maximum use of the skills present in the community. It would also provide a basis for professionals already in practice to have their higher competency levels recognized in an appropriate manner as for example the putative "master" teacher category proposed for primary and secondary teachers. It would also facilitate the recognition and subsequent employability in an allied field of those who attempt but fail to obtain professional qualifications.
Likewise competency-based standards are very suited to career structure development. The recently registered metals industry award, on which most other awards will be based, has shown it is possible to devise a career structure on the basis of levels of competence in association with formal qualifications. The metals career structure includes professional and paraprofessional levels. A competency-based system has the potential for facilitating progression from trade to paraprofessional to professional status in a number of broad occupational areas.

(c) Equity
By focussing on competence regardless of how it may have been developed, competency-based standards will help certain groups whose skills may not at present receive due recognition. Some overseas qualified professionals believe that Australia's current entry procedures rely too much on testing for knowledge. They may be right or they may be wrong. A move to competency-based testing would make for a more objective testing procedure. Addressing equity issues in education and training and skills recognition is really just another part of promoting labour market efficiency.

These issues are of particular importance during times of labour shortage. Shortages in a number of professions have occurred during the 1980's. These labour market shortages have been through a range of professions, including accounting specialisations, electrical and electronic engineers, and some of the health professions. Some of these shortages could have been lessened with a competency-based system to facilitate recognition of skills.

As well as helping professions and paraprofessions plan curricula, assessments and career structures, competency-based assessment offers a number of other advantages. The identification of competencies promotes discussion of professional practice within the profession. Drawing attention to the complexity and richness of professional knowledge has the potential to encourage excellence and boost morale. Facilitating the recognition of professionals with skills and experience gained overseas is of great value, given the expanding trade in services beyond national boundaries.
2. WHAT ARE COMPETENCY-BASED STANDARDS?

Terms such as 'competency' and 'skill' are used in a variety of ways in the literature. This section defines the way key terms are used in this paper, a way that seems to be best suited to the professions and paraprofessions.

A *competent* professional has the attributes necessary for job performance to the appropriate standards.

This definition includes three key elements:
(i) *attributes*, (ii) *performance*, and (iii) *standards*. The following sub-paragraphs explain these elements.

(i) The competence of professionals derives from their possessing a set of relevant *attributes* such as knowledge, abilities, skills and attitudes. These attributes which jointly underlie competence are often referred to as *competencies*. So a *competency* is a combination of attributes underlying some aspect of successful professional performance.

The combination of attributes involved in an aspect of professional performance can vary from the relatively specific to the relatively complex. The most highly specific combination would involve a single attribute such as knowledge (e.g. recalling the formula of sodium hydroxide) or skills (e.g. a manual operation such as filling a syringe). But even here things are not so simple - the professional has to know when and why the highly specific combination of attributes is being called for. These relatively specific combinations of attributes are *specific* (or *simple*) *competencies*. Relatively complex combinations would involve several attributes at once such as knowledge, abilities (e.g. judgement or posing questions), skills (e.g. interpersonal) and attitudes (e.g. patience or compassion). These highly complex combinations of attributes are *higher level* (or *complex*) *competencies*.

(ii) Competence is focussed on *performance of a role* or set of *tasks*. Within professions there are typically various *roles* e.g. hospital pharmacist, design engineer, etc. Roles comprise a multitude of *tasks*, which can be further divided into sub-tasks. Some tasks are relatively general, others are relatively specific. Examples are:

A relatively general task:
A competent *professional engineer* is required to produce a mathematical model, using available experimental data and existing theories of material behaviour to predict the life of a cylindrical shaft operating under variable conditions of load and temperature. (Lloyd et al, 1989, p.151)

A relatively specific task:
A competent *pharmacist* is required to maintain a system of recording all dispensed prescriptions.
Alternatively, competence is focussed on performance within a domain where a domain is an area of professional practice which requires a high degree of professional performance. So the domain concept focusses selectively on the more challenging aspects of professional work, whereas the role concept attempts to be comprehensive. Benner (1984), e.g., conceptualized nursing into seven domains in which expert clinical competence is required. The domains include such things as the helping role, the teaching-coaching function and effective management of rapidly changing situations. Domains, like roles, can be divided into tasks and sub-tasks.

(iii) Since the performance of a role and its associated tasks can be judged competent or incompetent, competence requires that the performance be of an appropriate standards. Hence we need standards against which competence can be assessed and validated. Important issues concern the minimal level of performance that will be judged competent for a role or task and the criteria that will be used to judge whether this standard has been achieved.

From the above we arrive at a definition of competency-based standards:

A competency-based standard is a level of achievement required for competence in some areas of professional practice. Specifying the standard involves stating the kinds of tasks and contexts in which the required level of achievement is to be exhibited. Performance at the required level of achievement is indicative of the presence of the underlying competencies, i.e. the appropriate combinations of knowledge, abilities, skills and attitudes. When this is done for a range of areas of practice within a profession, the result is a set of competency-based standards for the profession. This paper is centrally about ways of establishing competency-based standards for professions and paraprofessions.

It is useful to compare our use of the key terms as defined above with the ways they have been used in competency-based analysis of trades and middle level occupations. This comparison will help to spell out the logic of our definitions of the key concepts and their aptness for analysing professional competence.

As it has been widely interpreted and implemented in trades and middle level occupations the competency-based movement has close ties to the more general behavioural objectives movement in education. That movement, which began in the 1950s and was popular in the 1960s and 1970s, promoted the detailed specification of the goals of educational courses as lists of observable behaviours that students are expected to demonstrate at the completion of a course. To facilitate the achievement of those objectives, educational programs were organised into discrete, sequenced modules and 'standard-based' or 'criterion-referenced' tests were used to establish whether or not students had mastered the objectives of each module. In a criterion-referenced test it is usual to match test questions to specific objectives and to treat success on an item (or on a fixed percentage of items relating to the same objective) as evidence that the objective has been 'mastered'.
So competency-based standards in trades and middle level occupations involve
• the analysis of workplace tasks or roles;
• the development of a list of tasks (sometimes called a competence schedule) and
• the construction of education/training/assessment programs based on this list.

Because the focus is on behavioural aspects of job performance rather than attributes of the practitioner, ‘tasks’ are described interchangeably as ‘competencies’ or ‘skills’. This approach to competency analysis is really little more than occupational analysis (see Section 6) and has distinct limitations even for work that is essentially manual. It leads to a ‘competency’ checklist that can rapidly become unwieldy and impractical. A further doubt concerns the validity of such an analysis. Competence in an occupation appears to require more than mastery of a large number of discrete ‘skills’. (These points are developed at length in Section 4.1). It is pleasing to find that the National Training Board (NTB) and the Commonwealth State Training Advisory Committee (COSTAC), although having slightly different emphases in their definitions from the ones in this paper, nevertheless show awareness of these problems for competency-based standards and assessment in the trades and middle level occupations. (National Training Board, 1990; COSTAC, 1989).

Identifying competencies alone doesn’t achieve a lot unless we move on to specify standards of performance. These can vary from novice through to expert. At each level, criteria are developed for the minimum acceptable level of performance. In addition, different levels of performance may be appropriate for different areas of the profession. Examples of these various aspects of standards setting will be discussed in Section Four.

The definitions given in this section are outlined in the glossary at the end of the paper.
3. THE VARIOUS USES OF COMPETENCY-BASED STANDARDS.

As the discussion so far has indicated, developing competency-based standards can be useful for professions in a variety of ways. The following diagram summarises the development of competency-based standards and their various uses:

![Diagram of Development and Application of Competency-Based Standards]

The first part of Figure 1 deals with the identification of professional competencies. Taking into account the nature of the profession as it is actually practised, as well as other factors such as ethical standards and legal constraints, suitable methodologies are applied to identify the competencies and set standards. Section 4 will describe a range of examples of professions undertaking this process using a variety of methodologies. Section 5 discusses the setting of standards. Section 6 describes the various methodologies and the factors that need to be considered in selecting a methodology.
The rest of Figure 1 indicates uses that can then be made of the competency analysis. The competencies that are crucial for various levels within the profession (e.g. entry level, specialist, etc) can be selected and suitable standards developed. This equips the profession with a sound basis to:

(i) Improve existing courses so that they better meet the needs of the profession;
(ii) Assess the competence of people with non-typical/non-formal/experience based qualifications, e.g. some migrants;
(iii) Develop a systematic career path within the profession, e.g. nursing has used competency analysis to think in these terms (Williams, 1989). In some cases, the career path may extend to the sub-professional level, e.g. some engineering associations have proposed a pathway from trade level to the professions (Lloyd et al., 1989)
(iv) Specify continuing professional education needs. It is important to realize that some of the competencies will change over time requiring continuing professional education for experienced practitioners as well as those who have spent some time out of the profession.

In addition the competency analysis will flow on to:

(v) Courses which prepare entrants for the profession becoming competency-based either wholly or in part, e.g. the internship or professional year at the end of courses could be competency-based;
(vi) Entry to and/or progression within the profession becoming competency-based.

Examples of these various uses of competency-based standards will be outlined in Section 4 and in the Appendix.
4. EXAMPLES OF COMPETENCY ANALYSIS OF PROFESSIONS.

In Section 2 we defined a competent professional as one having the attributes necessary for job performance to the appropriate standards. There have been three broad approaches to conceptualizing the competency analysis of professions. These are:

1. Analysing professional work in terms of roles, (or, alternatively, domains), and thence tasks and sub-tasks. This approach focuses on the performance aspect of our definition of a competent professional.

2. Analysis of the knowledge, skills and attitudes required by the individual professional. This approach focuses on the attributes aspect of our definition of a competent professional.

3. Analysis of professional knowledge, skills and attitudes in the context of the performance of realistic professional tasks. This approach integrates both attributes and performance into a single framework.

This section will describe in turn a range of examples of each of these three broad ways of conceptualizing professional competence. The discussion will focus on issues such as the advantages and limitations of the three approaches, the methodologies employed to identify the competencies, how standards were set and the reasons why the various groups decided to undertake the competency analysis in the first place.

4.1 ANALYSING PROFESSIONAL WORK INTO ROLES (OR ALTERNATIVELY DOMAINS), TASKS AND SUB-TASKS.

Using this approach, the profession is viewed as a series of roles (i.e. a comprehensive analysis of the professional work is attempted - see Section 2) or alternatively domains (i.e. a selective analysis focusing on the more challenging aspects of the professional work is attempted - see Section 2). The tasks that a practitioner is required to perform in each of these roles or domains are then identified. For each task a corresponding competency is posited. Since tasks can be further divided into sub-tasks, competencies and sub-competencies rapidly multiply. This approach is inspired by a view of competency analysis that has been popular at trades level and in less skilled work. On this view competencies can be assessed by a check list that can be ticked off by direct observation of an individual performing the various job tasks. This approach to competency analysis is seen as both convenient and scientific. It assumes (i) that the job performance is a sum of specific competencies and (ii) that specific competencies are directly observable units of behaviour. Both of these assumptions are dubious and underlie the main limitations of this approach.

Even at the trades level competence arguably involves more than a summation of specific competencies. So, e.g., a motor mechanic would appear to need some more general (or higher level) competencies, such as diagnostic problem-solving, in addition to specific competencies. These more general competencies can be
seen as underlying the specific competencies. The assumption that some people have made that specific competencies are directly observable units of behaviour encourages the identification of tasks with competencies. Under the influence of behaviourism, both the task and the competency can be viewed as the performance of some action, hence the two are equated. Once again it is worth noting that the National Training Board (1990) avoids this assumption. According to our definitions it is more accurate to say that successful performances of tasks are indicators that the performers possess the appropriate competencies.

It seems to be very reasonable to hold that professional work involves more than a set of specific competencies. It is not just a set of observable units of behaviour that can be ticked off on a list. Nevertheless the specific competency approach does have some value for competency analysis of professions, particularly where there is a desire to have a comprehensive list of roles and tasks. Some examples of this approach being applied by professions will illustrate its strengths and limitations.

4.1.1 Pharmacy

The following discussion of pharmacy is fairly detailed because it covers a number of issues that are important for the paper as a whole. These are:

(i) the problem of identifying large numbers of specific tasks;
(ii) how to conceptualize standards, especially when there are distinctly different roles within the profession; and
(iii) the problem of assessing a large number of specific competencies.

The pharmacy profession has made significant use of the approach of conceptualizing competence in terms of roles, tasks and sub-tasks, particularly for its pre-registration year. Before adoption of a competency-based scheme, pre-registration students typically worked for one year for a supervising pharmacist whose satisfaction with their progress was a condition for registration. As well students were required to attend lecture courses and satisfactorily complete assignments. Criticism of this sort of arrangement centred on its not paying enough attention to "performance in 'true to life' situations" (David et al., 1989 p. 850). Hence competency-based programs were gradually adopted in order to ensure that the pre-registration year focussed on the things that a competent professional pharmacist needs to be able to do.

New Zealand implemented a competency-based scheme in 1985, Western Australia (the only Australian state in which the local Pharmaceutical Society has the legal authority to register pharmacy graduates) followed suit in 1988 and Britain expects to do the same in 1991. How were the competencies (or, as this paper defines them, tasks) identified? In New Zealand a professional training consultant was employed to conduct a Dacum analysis. (Dacum is a highly structured procedure for eliciting detailed information about an occupation from a group of about twelve experienced practitioners. It is particularly suited to providing comprehensive information on the behavioural components of the
occupation. Dacum is described more fully in Section 6.) This resulted in a training programme of 197 competencies to be "attained or confirmed" during the pre-registration year. The 197 competencies are divided into 16 broader competency areas. For example, one such area is *Over the Counter Sales of Medicines* where the broad competency is "Be able to evaluate, supply and advise on a range of products available over the counter". This broad competency is divided into 19 more specific competencies. "Be able to produce clear and complete labels for dispensed medicines sold over the counter" is an example of the more specific competencies.

The New Zealand competencies were the main resource for the working party that developed the Western Australian equivalent for their pre-registration year. They also used a recent document from the Royal Pharmaceutical Society of Great Britain, submissions from interested Western Australian pharmacists and their own collective practical experience. This resulted in a scheme based on 12 clusters of specific competencies, e.g. cluster one in *Dispensing* consisting of twenty specific competencies. Some competencies have to be attained to a high degree, others to a basic degree.

The Western Australian example has apparently encouraged others to think of applying competency analysis to pharmacy beyond the pre-registration year. The Pharmaceutical Society of Australia in 1989 released *A Set of Competencies for Australian Community Pharmacy Practice*. The purpose of this document is "to provide a resource which can be used to plan pharmacy curricula at undergraduate, postgraduate and continuing education levels and as a guide for individual self-development". It lists 93 specific competencies for general community practice, 24 for hospital and institution practice and 61 for management of resources.

Despite the apparent popularity of this approach to competency analysis in pharmacy, it has encountered a number of problems. One of these, which is of significance for the professions generally, concerns the setting of standards. To the extent that the tasks are highly specific, setting standards is straightforward — you can either perform them satisfactorily or you can't. Examples abound in the trades. The standard set for measuring the thickness of a piece of wire with a micrometer screw gauge is 'to an accuracy of + or - .005 mm'. Such a standard sets a precise and unambiguous level of performance. However highly specific tasks are not central to professional work. Amongst the pharmacy competency lists, 'produce clear and complete labels' or 'systematically record all dispensed prescriptions' are about the most specific. Much less so are 'analyse own performance problems' or 'manage awkward, unpleasant or threatening situations arising with customers'. Most of the competencies on the Western Australian and New Zealand lists lie between these two extremes and are not suited to the standard specifying a precise and unambiguous level of performance as in the case of measuring wire thickness.

How did the pharmacy professional bodies set their standards? The New Zealand scheme has three levels of competence built into it as follows:
3 Can perform to standard of professional excellence required of a pharmacist.

2 Can perform but only with assistance and under supervision.

1 Has some knowledge of competency but cannot perform. Requires organised instruction and professional supervision.

These three levels are used to specify the differing levels of competence required of graduate interns in different roles. So for the 19 specific competencies comprising *Over the Counter Sales of Medicines*, the intern in community pharmacy is expected to attain all but one at level 3, whereas the hospital pharmacy intern has to attain nine of them at level 2 and ten at level 1.

In the Western Australian case, these levels are not so well established; some competencies are required to be attained to a *high* degree, others to a *basic* degree.

The idea that pre-registration graduates need to attain different levels of competence within different areas of professional practice is obviously a good one. However the standards in both cases above are fairly vague, especially so in the Western Australian scheme. They are examples of what *Competency-based Assessment in the Professions* (the companion paper to this one) calls “task statement standards”. Such standards typically use vague terms such as ‘adequately’, ‘effectively’ and ‘appropriately’. For a supervising pharmacist to be able to judge whether competence has been achieved, more details of what is required would need to be supplied. In the New Zealand case, at least, this is provided in a supplementary booklet.

What sort of further details would be needed for someone charged with judging whether professional competency standards have been achieved? As *Competency-based Assessment in the Professions* (p. 28) points out, the standards most suited to the assessment of professional competence are “described levels of performance”. Essentially such standards involve a detailed description of what the professional is expected to do to satisfy requirements for the particular competency together with “key examples” of the sorts of things typical of successful performance. Since such standards appear to be the ones most suited for the assessment of professional competencies, it is worth looking at an example.

Currently in Australia, some professions use the Australian Second Language Proficiency Ratings (ASLPR) as part of the entry test for overseas trained candidates. Candidates are assessed in four different areas of competence in English: Reading, Writing, Speaking and Listening. For each of these areas, the minimum required *level* of competence (i.e. standard) is defined as Level 3 of the ASLPR. The ASLPR describes a number of levels of competence in each of these four areas, beginning at Level 0 and working up to Level 5. For example, in Listening, Level 3 is described thus:

**LEVEL 3:** Able to comprehend sufficiently readily to be able to participate effectively in most formal and informal conversations with
native speakers on social topics and on those vocational topics relevant to own interests and experience. Can get the gist of most conversations between native speakers though may miss some details, especially where there is significant subsumed knowledge. Comprehension rarely affected by complex discourse patterns. Can generally understand at normal rates of utterance even if occasional words are unfamiliar, and rarely has to ask for an utterance to be repeated or paraphrased except where speech is heavily loaded with colloquial features.

This general description of ASLPR Level 3 is accompanied by examples of the kinds of utterances and conversations that a person operating at this level of Listening competence should be able to understand.

In the assessment process, candidates engage in a conversation with an expert assessor who judges their levels of listening competence in terms of the framework provided by the ASLPR levels. The question of interest is whether the candidate is performing at the standard (i.e., ASLPR Level 3). To make this judgement, the expert assessor must interpret the general description of Level 3 and apply it to the particulars of the conversation with the candidate. Clearly, the assessors will need appropriate training in order to ensure reliable judgements.

Hence if standards of this kind are the appropriate ones for professions and paraprofessions, the adoption of competency-based standards will require the training of assessors to make the above sorts of judgements. Making informed judgements of this sort is typical of professional practice, so there is no reason why competent professionals shouldn't become competent assessors. (More on standards will be found in Section 5 and also in the companion paper Competency-based Assessment in the Professions).

Returning to the discussion of pharmacy, we found that their analysis of professional competence in terms of roles and tasks included fairly vague standards. Developing these into the kinds of standards just outlined would be an enormous undertaking due to the sheer number of specific tasks. Certainly the present system has resulted in some practical dilemmas for the Pharmaceutical Council of Western Australia. Ideally they would like a staff pharmacist of the Council to observe each pre-registration graduate going about their normal work so as to assess whether the competencies are demonstrated to the required standards. However the costs of doing this are prohibitive. This in turn suggests that the supervising pharmacist should be more involved in the assessment. However research has shown that most of the pharmacy trainees believe that the supervisors need a training course to better understand how to use the programme.

So in the absence of better alternatives, the assessment has been carried out by a panel of practitioners using assignments throughout the year, a short answer exam in the middle of the year, and an oral exam just prior to registration. David et al. (1989, p.852) point out that this assessment scheme has proved to be far from ideal for a competency-based programme. A possible solution to these
assessment difficulties lies in the different way of conceptualizing competence outlined in Section 4.3. We will return to the pharmacy case there.

An important aspect of competency analysis of occupations is to remember that the competencies are likely to change over time. This is illustrated in the case of pharmacy by an increasing realization that there needs to be more emphasis on administration and management competencies whether in the pre-registration year or shortly after (McDonald et al, 1989).

4.1.2 Nursing

An interesting and instructive example of professional work being analysed into domains and tasks is provided by nursing. The division of an occupation into discrete tasks can fairly quickly produce a checklist that is very lengthy and rather impractical. To avoid the problem of too lengthy a list of tasks, Benner (1984) conceptualized nursing in terms of seven domains in which expert clinical performance is required. Hence Benner focussed on the most challenging aspects of nurses’ professional work. This resulted from research which sought to record and categorise the immense knowledge and expertise involved in the performance of expert clinical nursing. For each domain there was an associated set of competencies. Benner’s methodologies included surveys, interviews on critical incidents and participant observation. Critical incident interviews involve practitioners engaging in a detailed analysis of significant happenings in their professional life, while participant observation involves close scrutiny of the practitioner at work with the observer occasionally assisting with minor tasks to make the observation less obtrusive. (These methodologies are detailed in Section Five.) Benner’s work has been very influential in the nursing profession. Its results not only ennoble the profession, but they are seen as valid because they derive from an analysis of actual nursing performance rather than (say) the views of armchair experts.

In Australia the current shift of nurse education from hospitals to the higher education sector has led to an interest in new methods for assessing nursing competence for registration purposes. Not surprisingly some have turned to Benner’s work, e.g. the Queensland Board of Nursing Studies (Williams, 1989), using a similar mix of methods to Benner, found 9 domains for beginning level nurses. These were subdivided to produce 61 competencies (tasks) which were further divided into about 143 sub-competencies (sub-tasks).

It is interesting to note that while Benner argues that her approach “avoids the problem of endless lists of tasks, with no guidelines for determining which ones are most important” (1984, p.40), the Williams results are close to reproducing this problem. It requires significant training to produce skilled examiners and assessors who are committed to the use of such a competency analysis. These limitations will be further magnified if this approach is applied to the assessment of nursing skills acquired overseas.

The Australasian Nurse Registering Authorities’ Conference (ANRAC) in 1986 established a committee to develop a set of competencies which could be used by
the nurse registering authorities as the minimum standards for registration. The competencies were developed around concepts associated with the role of the newly registered nurse and of the newly enrolled nurse. These concepts were referred to as the integrated components of clinician, care co-ordinator, change agent, counsellor, health teacher, client advocate and clinical teacher/supervisor. The ANRAC competencies were prepared by a group of expert nurses, but the competency list is clearly influenced by Benner. ANRAC has subsequently adopted (May 1990) a national set of competencies for these groups. This consists of 18 areas of practice which divide into 75 competencies for registered nurses. For enrolled nurses there are 6 areas of practice forming 20 competencies. In both cases the competencies are expressed as 'behaviours'.

4.1.3 Advantages and limitations of conceptualizing competence in terms of roles, tasks and sub-tasks

Advantages

- Helpful for course design especially where the emphasis is on practical tasks e.g. in a professional or pre-registration year.
- Multiplicity of tasks enables some to be designated essential, other desirable.
- Multiplicity of tasks enables different levels of competence to be specified: entry level, expert, etc. This may be important for setting pay scales and the like.
- Enhances self-concepts of those in the profession to see the complex range of their competence.

Limitations

- Tends to either ignore or take for granted higher level competencies.
- Lengthy checklist of competencies hence expensive and time consuming for comprehensive testing.
- Unwieldy for testing overseas skills.
- Tends to assume that all people in a role would carry out a task in the same way. In professional work there may be a variety of ways to satisfactorily carry out the task.

These limitations point to a more general problem for this approach to professional competence. By concentrating on discrete pieces of knowledge and skill, there is a distinct danger of only dealing with fairly superficial aspects of professional practice, whilst ignoring the holistic way in which such knowledge and skill is integrated and coordinated in actual professional practice (The companion paper *Competency-based Assessment in the Professions* discusses this further.)
Section 4 is considering three broad ways of conceptualizing professional competence. So far we have considered the roles and tasks approach. We now turn to the attributes approach. This way of conceptualizing professional competence focuses on the most general attributes of the practitioner that are crucial to the effective performance of professional tasks. As we found in the last section, when professions are analysed into tasks and sub-tasks, these specific units can be grouped according to commonalities in the skills and other attributes required to perform them. This approach seeks to specify competence in terms of demonstration of these general attributes. The following examples will illustrate these points.

4.2.1 Law

There is significant evidence from the United States and Canada that professional education in law schools has failed to develop the competencies required in the practice of law. Some legal educators have investigated “lawyering skills” in order to develop mechanisms to ensure adequate professional competence is developed, or to develop ways of teaching law.

At the Antioch School of Law, a model of lawyer competence was developed. This model divides legal practice into 6 general competencies: (1) Oral competency - proper and effective use of language, skills of listening and persuading; (ii) written competency; (iii) legal analysis competency - analysing facts, law, and formulation of legal theory; (iv) problem solving competency - problem diagnosis, selection and implementation of strategy; (v) professional responsibility competency - identification of conflict with professional norms and values and acting consistently with decisions; (vi) practice management competency - proper use of time, working efficiently with others.

Similarly, the University of Montana Law School has divided competent lawyer performance into four major dimensions. The dimensions are Knowledge, Skills, Perspective and Character. Each dimension has an internal and external character, i.e. they each may be spoken of with reference to the lawyer or to the situation in which they function. The relationship may be represented schematically:

<table>
<thead>
<tr>
<th>The Lawyer</th>
<th>The Situation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Knowledge</td>
<td>Technical legal knowledge</td>
</tr>
<tr>
<td>Skills</td>
<td>Knowing/Analysis</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td>Perspective</td>
<td>Understanding role</td>
</tr>
<tr>
<td>Character</td>
<td>Personal attributes</td>
</tr>
</tbody>
</table>
The impact of this analysis of lawyering skills on the Montana curriculum has been to add to traditional courses in legal theory and doctrine in the introductory year, courses in jurisprudence, interpersonal skills, practical skills in drafting agreements and litigation. Subsequent years explore issues of both theory and practice in an integrated fashion.

These examples are typical of attempts to focus the course on the most general attributes needed by a competent lawyer. Note that teaching and assessing the general attributes as much as possible in the context of actual legal practice is important. So, e.g., a course in problem solving may not, by itself, make much difference. Students need the extra step of practising problem solving as it applies in the context of legal practice.

In Australia, Ayling and Constanzo (1984) see competence as consisting of three components: Knowledge, Skills and Attitude. Knowledge includes:

- The relevant basic concepts, principles and rules in a wide range of areas which enable the lawyer to classify facts thrown up by a client, into legal categories.
- The detailed body of principles which enable a practitioner to propose possible legal solutions.
- The knowledge of rules and procedures which enable the practitioner to implement the solutions.

Ayling and Constanzo identified 15 skills which were regarded as fundamental to competence in professional practice. These skills include: Three basic skills: organising information; using acceptable grammar & language; ability to listen, read, observe & investigate. Four legal decision making skills: design & implement a plan of action; analyse & select appropriate options; identify & evaluate legal issues efficiently; identify & evaluate relevant facts. Five interpersonal skills: respond & react skillfully to others; create conditions for effective communications; question effectively; analyse & interpret people's behaviour; explain, describe & instruct. Finally, three general cognitive skills: ability to manage; perform with insight and the capacity to deliver/produce.

These skills and knowledge combine with attitudes to produce professional competence. Attitudes include such things as knowledge of practice and ethical issues as well as a desire for self enhancement. This conceptualization of lawyers' competencies suggests that the criticism made of some practical training courses, that they emphasise too much the detailed procedures of particular tasks, at the expense of providing instruction in general legal techniques, need not apply.
**4.2.2 Medicine**

In its suggestions for medical education in the 90's and the twenty first century, the Association of American Medical Colleges, for example, undertook a three-year project to review and appraise the general professional education of the physician and college preparation for medicine. Based on the expert opinions of a range of physicians they found that colleges should concentrate on three areas:

**Essential knowledge, Fundamental skills and Attitudes:**

**Essential Knowledge**: This was defined as that body of information that students need to function successfully and independently at each stage of their education and to continue their development as physicians. It was not considered possible to determine once and for all the essential knowledge because of the rapid rate of increase in biomedical knowledge. They therefore focussed on the principle that continued learning is necessary for lifelong practice and that content should be restricted at each stage. In addition, the students must be encouraged to be active learners, need to have the opportunity to use individual learning styles and opportunities to work co-operatively with colleagues.

**Fundamental Skills**: The fundamental skills that a medical student must have acquired at the time of graduation were divided into six broad areas:

- Clinical
- Learning
- Critical Appraisal
- Medical Information Science
- Teamwork
- Personal Management

Each competency area was then subdivided into between three and seven sub-areas. For example, under the *Clinical* area, the student would need to show competency in the following areas.

* Data Gathering: which includes interpersonal competencies such as listening, questioning etc, empathy and understanding of the patient's mental state, and particular competencies associated with patient comfort and modesty during the physical examination, and ability to order information in a logical fashion in relation to testing.

* Diagnostic Formulation: which includes the ability to record information accurately and logically hypothesize about major patient problems and consider alternative diagnosis for each problem.

Other areas under the general Clinical competency are:

*Communicating Clinical Data* and *Life Support System*: these include their own sets of competencies but are not outlined here.
Attitudes: They 'should possess stamina, moral sensitivity and integrity, curiosity and creativity, the ability to cope with intellectual and emotional demands and a commitment to help and work with others. They should value intellectual growth, science and the scientific method, social responsibility and altruism. They should be respectful, modest and compassionate towards their patients and toward other health professionals'.

This attempt to define medical education in terms of the competencies required for competent professional practice, is a significant departure from traditional courses. Once again, identifying these general attributes is a first step. The hard part is to work out ways of teaching them in contexts that match as closely as possible actual professional practice.

The approach outlined in this section correctly attempts to ensure that important attributes required in professional performance are developed in courses. However it is a further step to require that the development of the attributes is assessed in the context of realistic professional practice according to appropriate performance standards or criteria. The companion paper Competency-Based Assessment in the Professions (Section 2.3) argues that unless this is done, we cannot validly infer that possession of the attributes will translate into competent professional performance. This leads us to the third approach.

4.2.3 Advantages and limitations of conceptualizing competency in terms of attributes of the practitioner

Advantages

• Concentrates on a relatively small number of key competencies that are essential for performance of appropriate standards.
• Allows for variety in ways of completing a given task via different combinations of higher level competencies.
• Suggests ways of improving professional degree courses.

Limitations

• Teaching and assessing general attributes in isolation from actual professional practice is fairly ineffective in terms of future professional performance.
• Tends to neglect specific competencies.

Other examples of this approach to conceptualising professional competence include teaching, dietetics and accountancy (see Appendix).

4.3 ANALYSIS OF PROFESSIONAL KNOWLEDGE, SKILLS AND ATTITUDES IN THE CONTEXT OF THE PERFORMANCE OF REALISTIC PROFESSIONAL TASKS

The analysis of professional work into roles and tasks was found to be useful for course design but its long lists of specific tasks were impractical for testing whilst
at the same time neglecting higher level competencies. On the other hand, analysis of professional work in terms of attributes required of the practitioner focuses on a relatively small number of higher level competencies but does so in isolation from the specifics of day to day professional practice. This third approach to conceptualizing professional competence seeks to integrate both previous approaches. The aim is to identify those areas of professional practice in which it is essential to demonstrate minimum competence. These are then analysed in terms of knowledge, abilities, skills and attitudes displayed in the context of realistic professional tasks. This third approach to conceptualizing professional competence will be referred to as the integrated approach. The following examples will illustrate this approach.

4.3.1. Applying the integrated approach to medicine

Burg, Lloyd and Templeton (1982) developed a conceptualization of clinical competence in medicine by adapting an earlier model that the National Board of Medical Examiners in the United States used as the basis for its Comprehensive Qualifying Evaluation Program at the end of medical school. According to them there are five abilities/behaviours (or, in the terminology of this paper, attributes) that are required to perform eight key tasks in clinical medicine. The abilities/behaviours are knowledge, problem solving, attitudes, interpersonal skills and technical skills. The eight key tasks or functions that a physician must perform include history taking; physical examination; use of laboratory tests, radiography and other investigative techniques; defining clinical problems; management; record keeping; employing special sources of information; and monitoring health status. The abilities/behaviours and key tasks can be conceived as a two-dimensional matrix. Burg, Lloyd and Templeton point out that a third dimension could be added to the matrix to represent different areas of medical practice, e.g. well patients and ill patients and within each of these different kinds of medical cases could be identified.

A similar three dimensional model for family medicine was adopted in 1984 by the Australian Family Medical program. (Fabb and Marshall, 1984). This model is shown in Figure 2. There are five basic attributes (knowledge, interpretive skills, problem solving skills, etc); five basic functions or roles in which the abilities are applied (understanding the individual, the family and the community; analysing and defining health problems, etc) and nine areas of medical practice (pregnant woman, neonate, infant, etc).

While it would be impractical to assess for every cell of these three-dimensional matrices, these two conceptualizations of clinical competence in medicine nevertheless offer a possible basis for competency analysis and assessment. The methodologies used to arrive at the conceptualizations are not clear from the literature, but they appear to be a mixture of expert opinion and curriculum analysis. In any case, the conceptualizations could be refined and validated by the methods discussed in Section 6.
To assess a candidate's competence, key clinical situations could be chosen so that a representative selection of tasks and attributes was thereby included, i.e. a manageable number of testing situations would be selected whilst at the same time ensuring that the major kinds of tasks and attributes are also represented. This sampling of both tasks and attributes would help to overcome the limitations of the earlier two approaches whilst at the same time retaining their advantages. A judicious sample could be expected to be feasible in both cost and time.

Having selected key clinical situations so as to representatively sample tasks and attributes, the next step would be to develop standards for each of the areas. Once the standard of practice for an area is specified, one or more assessment tasks would be developed. So, for example, referring to Figure 2 particular cells could be identified as providing key areas of performance. Suppose 'analysing and defining health problems' for an infant patient suffering measles is chosen. The next step would be to decide on the essential attributes required for competent performance in this area, i.e. the knowledge, interpretive skills, problem solving skills, etc, underlying competent performance. Then the level of achievement for minimum competence would be specified as performance criteria. These would be stated in terms of the attributes and their representation in performance. The final step is to select appropriate assessment techniques for deciding whether standards have been met. Typically this will involve a range of methods. In this way a manageable test of competence could be devised with key specific tasks being assessed as well more general attributes that underlie a range
of tasks that are not being directly assessed. (Section 5 and the companion paper Competency-based Assessment in the Professions deal with these issues).

4.3.2. Using the integrated approach to improve on the roles and tasks approach

In Section 4.1.1 it was found that while the pharmacy profession had derived benefits from competency analysis in terms of roles and tasks, assessment posed problems due to the sheer number of the roles and tasks. The discussion in the previous section suggests how the work done so far in pharmacy might be further developed to solve these problems.

In the case of pharmacy there is already a working list of the most general attributes required by the professional. The New Zealand material includes a foldout DACUM chart showing the 197 competencies. To try to bring some order to the bewildering complexity of this chart, the competencies are classified into five groupings: information retrieval skills, manipulative skills, problem solving skills, interpersonal communication skills and attitudes. No other use, beyond clarifying the DACUM chart, appears to be made of this classification. If these five general attributes, or something like them, are valid then the way to improve the pharmacy scheme is clear.

The first step would be to identify the most important tasks that pharmacy graduates must be able to carry out for registration. These would then be linked to relevant attributes in a table as shown in Figure 3.

In this figure, the x's indicate which general attributes are central to the competent performance of the various tasks. Obviously not all of the general attributes are required to perform every task. For example if the task is to "be able to evaluate the quality and efficacy of medicines sold over the counter" then information retrieval skills and problem solving skills are required for its competent performance. However the really important thing about Figure 3 is the pattern of the x's on the grid. This pattern indicates whether the selected tasks adequately test the higher level competencies enabling the list of tasks to be reduced or expanded as appropriate.

Based on this, a pharmacy assessment scheme could be developed in which performance on a range of important tasks would also indicate level of proficiency in the general attributes required of a competent pharmacist.

The result would be a manageable number of tasks to be assessed including the most essential tasks for the profession. Note, that proficiency in higher level competencies as well as specific competencies is being assessed. The conclusion would be that a satisfactory performance in all of this would be prima facie evidence of all round proficiency since the higher level competencies underlie most of the tasks not assessed. Needless to say, a variety of assessment methods could be used with this approach. Those who fear that successful candidates might not be able to perform some of the tasks not assessed should remember
that traditional exams don’t test everything in the course. To pass such exams you typically only need to know half of what is tested.

### FIGURE 3
APPLICATION OF THE INTEGRATED APPROACH TO PHARMACY

<table>
<thead>
<tr>
<th>GENERAL ATTRIBUTES</th>
<th>INFORMATION RETRIEVAL SKILLS</th>
<th>MANIPULATIVE SKILLS</th>
<th>PROBLEM SOLVING SKILLS</th>
<th>INTERPERSONAL COMMUNICATION SKILLS</th>
<th>ATTITUDES</th>
</tr>
</thead>
<tbody>
<tr>
<td>TASKS</td>
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<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>x</td>
<td></td>
<td>x</td>
<td></td>
<td></td>
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<tr>
<td>2</td>
<td></td>
<td></td>
<td>x</td>
<td>x</td>
<td>x</td>
</tr>
<tr>
<td>3</td>
<td></td>
<td>x</td>
<td>x</td>
<td></td>
<td>x</td>
</tr>
<tr>
<td>4</td>
<td>x</td>
<td></td>
<td>x</td>
<td></td>
<td>x</td>
</tr>
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<td>5</td>
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<td>6</td>
<td>x</td>
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<td>x</td>
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<td>7</td>
<td></td>
<td></td>
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<td>x</td>
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<tr>
<td>8</td>
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<tr>
<td>etc</td>
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</tbody>
</table>

This version of the integrated approach is flexible in that standards of performance required to pass it could be set at higher or lower levels. It also looks to be suited to assessment of skills acquired overseas since it offers the possibility of a system that is neither too complicated nor too costly to be feasible. Also it would have the advantage of identifying the main deficiencies of overseas trained people who fell just short of meeting Australian requirements for the profession. This would point the way to appropriate short courses to remedy the deficiencies.

The above approach could be used in other professions.

#### 4.3.3 Application of the integrated approach to a career path in engineering

In Section Three it was pointed out that competency analysis provides the basis for developing career paths from sub-professional through to professional levels. The integrated approach is very helpful in this respect as the work of Lloyd and his colleagues in the articulation of engineering education shows.
In *New Pathways in Engineering Education* (1989), Lloyd and his colleagues provide a detailed outline of the general principles for a new articulated system of engineering education. In effect the major general attributes needed at the different levels of engineering are identified and minimum standards for these at the various career levels are suggested. This can be represented as in Figure 4. As you move up each column higher levels of each attribute are required.

(\textit{Lloyd et al, 1989, provide details for each of the cells in this table. The mathematics examples are abbreviated}).

It should be emphasised that there is no intention to impose uniform course design or structure on educational providers. Within the general principles it is accepted that there will be a diversity of ways of developing (say) the different levels of design skills. Further details of the engineering restructuring are given in the Appendix.

<table>
<thead>
<tr>
<th>COURSE LEVELS</th>
<th>GENERAL ATTRIBUTE AREAS</th>
<th>MATHEMATICS (ENGINEERING PLUS BASIC)</th>
<th>DESIGN</th>
<th>MANAGEMENT, BUSINESS AND SOCIAL RESPONSIBILITY</th>
<th>ATTITUDES</th>
</tr>
</thead>
<tbody>
<tr>
<td>PROFESSIONAL ENGINEER</td>
<td>MANAGEMENT, SCIENCE, BUSINESS AREAS</td>
<td>Advanced calculus and differential equations</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ENGINEERING TECHNOLOGIST</td>
<td>MATHEMATICS</td>
<td>Differential and integral calculus</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ENGINEERING ASSOCIATE</td>
<td>SCIENCE (ENGINEERING PLUS BASIC)</td>
<td>Introductory calculus and differential equations</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>TECHNICIAN</td>
<td>ENGINEERING TECHNOLOGIST</td>
<td>Algebraic manipulation, equations and formulae</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>TRADES</td>
<td>TRADES</td>
<td>Introductory algebra</td>
<td></td>
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</tbody>
</table>
4.3.4 Application of the integrated approach to curriculum improvement

In Section Three it was pointed out that one of the uses of competency analysis is to improve current curricula. A variant of the integrated approach suggests one way of doing this.

Most people would agree that professional education is impoverished if it merely consists of mastering a body of knowledge, such mastery being demonstrated by regurgitation of the knowledge in a pen and paper exam. It is usually maintained, that while content-specific knowledge is forgotten fairly quickly what endures is a disciplined way of thinking about the field. If necessary the content-specific knowledge can be retrieved from books. So the claim is that at least high level cognitive competencies endure. A similar case can be made for other types of higher level competencies being the major outcomes of education for the professions. A variant of the integrated approach involves taking these educational outcomes more seriously than has usually been the case. If higher level competencies really are the major outcomes, why not focus on how to systematically develop them better rather than leave them to develop incidentally?

An example of this kind of thinking is provided by Alverno College, Milwaukee, which has undergraduate degrees in nursing, teaching and business. The staff of Alverno in 1973 identified the most general abilities that they thought all of their graduates should have developed during their courses and set about redesigning their courses to ensure that these abilities were in fact developed. The eight abilities are communication, analysis, problem solving, valuing, social interaction, taking environmental responsibility, involvement in the contemporary world, and aesthetic response. (Loacker et al., 1984)

The practical implementation of this innovation involved each Department choosing from the list of eight abilities the ones on which their subject could suitably focus. They then structured their teaching/learning activities so as to emphasise the development of these abilities. In this way a balance is achieved between specific subject competencies and higher level competencies. For example, from the list of eight abilities, the Education Faculty developed five broad competencies designated as essential for teaching. These are conceptualization, diagnosis, co-ordination, communication and interaction. The content, delivery and assessment of all subjects in the Faculty were modified so that there was a developmental process leading to proficiency in the five competencies by the end of the course. Under this approach, students still learn the traditional subjects but with quite different emphases.

4.3.5 Summary of the integrated approach

Advantages

• Provides a balance between specific and higher level competencies.
• Enables manageable testing procedures in terms of both time and cost.
• Suited to designing courses in which higher level competencies are emphasised.
Helpful for articulation between different occupational levels leading up to professional.

- Allows simultaneous focus on both essential tasks and essential competencies.
- Adaptable to both entry level assessment and outstanding performance assessment.
- Amenable to setting of different standards.

Limitations

- No major limitations not shared by the other approaches

Summary of Section 4

In this section three different approaches to thinking about competency analysis of professions and paraprofessions have been considered. The first approach focussed on roles and tasks performed in professional work. The second approach focussed on the knowledge, skills, abilities and attitudes that the competent professional is required to possess. Each of these approaches had its value but was found to have serious limitations for employing competency-based standards to their full potential. The third approach, by focussing on both roles/tasks and the various attributes required of the competent professional, looks to be the best approach. It promises to do justice to the full complexity of professional work while at the same time enabling efficient and valid assessment procedures.
5. ISSUES IN SETTING STANDARDS

Our definition of competence includes three elements: attributes of the professional, performance and standards. This section outlines the major issues to consider when setting standards.

In order to be able to judge whether a professional is competent there is a need to establish both what are the competencies in the profession and a set of criteria against which to judge the individual's performance.

In this the professions are no different to any occupation. However the nature of these standards is significantly different. In most occupations, standards (or "performance criteria" as they are often called) can be relatively precise e.g. in the trades the standard for measuring wire thickness with a micrometer can be ± .005 mm. It is true that certain specific competencies in the professions can have precise standards, e.g. in medicine, reading an ECG, and in engineering calculating the load bearing capacity of a girder, can be done to 100% accuracy. The essence of professional work, however, does not lend itself to this precision, e.g. the interpersonal competence of a lawyer, the capacity of a doctor to hypothesize about his/her patients. Clearly in these examples there can be no unambiguous precise standard.

It does not follow, however, that professional standards need be arbitrary or capricious. While the aim - setting minimum standards of competence as precisely and clearly as possible - is the same in all occupations, the professions face different issues when setting standards than do other occupations.

(i) Given the complex and dynamic nature of professional work, a decision must be made as to what combinations of tasks, attributes and contexts need to be examined to arrive at overall competence. Check lists of individual tasks where a person can demonstrate a skill, will be appropriate to some occupations but not to the professions. A doctor's competence in patient management, for example, consists of various competencies such as conducting physical examinations, ordering laboratory tests, prescribing medication. While it is true that doctors have to perform each of these activities competently, it would not be appropriate to determine competence in patient management on the ability to perform isolated tasks of this kind. Underlying these activities is a complex process of formulating hypotheses, responding to changes in a patient's condition and so on. Thus competence in patient management will be determined by a professional assessor exercising judgement in a holistic way in the competency area. Thus, standards must be set for areas of competency in addition to specific competencies.

(ii) Once the competency areas have been identified, the professions need to spell out what is minimum competence in them. Where there is a discrete simple skill involved, the minimum level of competence is the ability to demonstrate that the skill can be undertaken. It is almost always an absolute level. In the complex areas of professional competency, however, there can be no absolute level. It must be accepted that there will be different levels of
professional competence. To continue an earlier example, some doctors will be better at hypothesizing about patients' problems than others. A decision about what is good enough must be made. The professions must try to ensure that the standard is not too low since this would allow people to practise who are not competent, nor too high, since this would bar competent people from practice. In arriving at this standard a number of things will need to be considered.

- It should rest on direct observation of what has been achievable in actual practical situations rather than on theoretical or idealized notions, i.e. there is a need to overcome the tendency of experts to forget that experience and continuing education are needed to reach high professional levels.

- There will be a need to maintain professional standards and public confidence in the profession.

- There is a need to consider issues of equity, i.e. it would be unfair to set standards so high that there are significant numbers who are competent, but barred from practice.

Obviously the decision on minimal standards will be a matter of judgement where many and possibly conflicting principles need to be balanced. The most satisfactory way of achieving this aim (of setting minimal levels of competence as explicitly as possible) is to develop a scale of competence such as the ASLPR or that of the New Zealand Pharmacy Society (see pp 16-18). Such scales measure the different levels of competence which exist in complex work. Once the scale has been developed the profession will determine, on the basis of the sort of considerations outlined above, what level is minimal competence.

The importance of this approach is that it:

- articulates the standard(s) by describing them more fully

- allows flexibility beyond minimum

- provides guidance or the basis of guidance on
  - how to assess
  - what should be in the assessment

How to go about developing such a scale and the issues involved in assessing and interpreting the standards is outlined in the accompanying paper on Assessing Competency-based Standards.
6. TECHNIQUES FOR ESTABLISHING COMPETENCY STANDARDS

The first step in establishing competency-based standards is to exploit the information that already exists about the tasks or competencies of a profession.

For example,

• Many professions will have access to government reports on their profession or studies commissioned by the profession itself. Examples are the Pearce report on Legal Education and the Doherty report on Medical Education. These shed light on the current discussion of the roles of the professions and the principles underlying educational methodologies.

• Certain professions, e.g., engineering, have, as a result of award restructuring, already begun to analyse differences between various levels within the industry. (Lloyd et al, 1989).

• Studies conducted overseas, e.g. in nursing, medicine and law, can provide an excellent starting point for comparison with Australian practice.

• All professions will have access to curriculum documents from higher education institutions. These represent the distilled experience of academics and the professions' representatives; from them it might be possible to infer professional competencies.

Following the initial information search, it will generally be necessary to undertake an analysis of a professional's task and roles (occupational analysis) and/or an analysis of the attributes required of a professional (competency analysis). Even when overseas data appears to be adequate it will be necessary to validate it for use in this country.

Occupational analysis involves the identification of the current and likely future jobs within an occupation, and the duties and tasks which comprise each job. This analysis of professional practice includes:

• identification of the major areas or fields of practice within the profession

• specification of the duties and responsibilities of those employed in each area within the profession

• listing the major tasks of the profession

Competency analysis involves the identification of the various attributes which an individual brings to the job performance, including the knowledge, skills and attitudes.

It should be emphasised that the aim of the occupational and competency analysis must be to establish a competency standard. This has been defined in section two as a level of achievement required for competence in some areas of professional practice. Specifying the standard involves stating the kinds of tasks
and contexts in which the required level of achievement is to be exhibited. When this is done for a range of areas of practice within a profession, the result is a set of competency-based standards for the profession.

A number of techniques have been developed which are useful aids in the process of identifying professional tasks and competencies. They vary in important ways and choosing the most appropriate depends on an understanding of for what they can and cannot be used. This section briefly describes each technique and summarises its main features. The descriptions are not intended to be comprehensive and readers will be referred to sources which discuss the techniques in further detail. However, enough information is provided to enable you to make preliminary decisions about which technique or combination of techniques best suits your purpose.

6.1 CHOICE OF TECHNIQUE

The choice of technique should be guided by:

- the sort of information which is required - e.g. A small profession may wish to identify the competencies of a group of paraprofessionals in their industry who want to enhance their career prospects. The level and depth of information required would be different to, say, a large profession which is just beginning to be affected by technological and social changes and who need competency-based standards to guide professional curricula in Universities, help fill labour shortages from the overseas trained and facilitate registration across States.

- the ways in which the profession will use the results of the analyses, e.g. designing a continuing education program for accountants compared to developing a career path for engineers.

- practical considerations.

If we refer back to Figure 1 (page 12), we can see that competency-based standards can be of value in:

- developing curriculum
- identification of training needs
- specifying career paths
- promoting safe practice
- selection of personnel
- providing a competency-based job description
- job evaluation (setting standards, levels, new awards etc)
- admitting overseas qualified professionals

Irrespective of what information is sought however, there will be a number of practical questions such as the ones outlined below.
6.1.1 What are the main practical considerations?

Is the technique readily available and developed enough to be used 'off the shelf' or must it be redesigned for the task in hand? To what extent can studies already undertaken overseas be adapted by the profession here? The work undertaken by Williams in Nursing is a good example of how an overseas study can be successfully used as the basis of local competency analysis. The amount of work, time taken and cost was less than it would have been had the study not been informed by previous work.

Is the data collection method likely to be acceptable to the respondents? For example if observation is to be used would there be problems of breaches of confidentiality? An instance might be where a lawyer is in consultation with a client. If the data is to be gathered by self completion questionnaire, would the respondents be motivated enough to reply?

Is it possible to carry out the analysis using in-house 'researchers' or does application of the technique require extensive training? Is the training available? Is there a need to use specialized consultants? As some of the techniques involve complex procedures it will probably be necessary to employ consultants for at least part of the analysis.

From whom is the information to be obtained? For example, the person doing the job, supervisors, technical experts, clients of the profession? How many respondents is it necessary to speak to/canvass in order to be sure that the data is adequate?

Who will carry out the analysis? The main options are:
- do the study yourself
- do part of the study yourself & hire consultants to do the rest
- hire consultants to do it all

What is the estimated cost of the method? Costs to be taken into account include materials, development time, training of researchers, consultancy fees, salary for job analysts, respondents and clerical staff, hire of conference facilities,

Will the outcomes be of high enough quality to permit the development of valid examinations, effective training programs, be legally defensible, etc?

How long will it take to collect the data and produce a final written report?

How sensitive are the issues? How much disagreement might there be about the outcomes?

How is agreement to be achieved?

How rapidly is the area under investigation changing?

Whoever does the research, it is important that those who want the research to be done are clear in their intentions and requirements and communicate these to
those who are hired to undertake the study. It is advisable that the commissioners of the research undertake some of the preliminary research so that they are able to guide the consultants and also evaluate the proposals of the consultants about techniques to be adopted. Exploratory research involves overviewing the profession and should be broadly based and should involve some of the following:

- open ended discussion with some key informants
- reflection on the significance of information obtained
- plan for a more systematic study using appropriate methods.

Enough time should be allowed for the preliminary investigations as insufficient attention to the definition of the problem and to planning the study could result in a study being undertaken which fails to gather information on crucial matters.

6.2 MAJOR TECHNIQUES

In addition to the practical considerations outlined above, the professions will need to be familiar with the major features of the techniques. The main techniques which could be used either singly or in combination are outlined below. It is strongly recommended that a combination of techniques be used so that both tasks/roles and the attributes which produce professional competence are analysed. Research on occupational competency analysis suggests this greatly increases the validity of the results.(Gael, 1988). The chart below indicates whether the techniques are most suitable for the analysis of tasks/roles or competencies or both. A more detailed chart indicating which technique might be used in what circumstances is included on page 58.

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6.2.1. DACUM (Developing a curriculum)

Information which can be gained: This technique was originally developed in the 1960s by the Canadian Dept. of Manpower and the General Learning Corporation of New York, and was quickly adapted as a rapid and effective way to develop curriculum. It has been widely used in Australian further education. DACUM
can be used to identify areas of practice, tasks and competencies, and is a generally useful technique.

**Procedure:** A group of about 12 carefully selected individuals from the occupation under analysis works with a skilled facilitator who is employed to elicit and record all the relevant information the group can provide. In the initial stages the data collection is focussed fairly broadly on the duties of an occupation. The duties are subsequently analysed into component tasks, which may be further analysed into the skills, knowledge and attitudes necessary to perform the tasks.

Briefly, the facilitator requests ideas from the group about the duties of the occupation. These duties are listed on cards which are arranged on available wall space. When all the duties are listed, the facilitator gathers information about the tasks associated with each duty in turn. The tasks are also listed on cards and added to the wall display. The analysis could stop here if so desired or could go further to determine the knowledge, skills and attitudes (competencies) on which performance of the task depends. Whether or not this occurs depends to some extent on the purpose of conducting the DACUM.

As well as the collection of lists of tasks and competencies, participants in a DACUM can be required to rate the tasks/competencies on an number of dimensions. For example, the participants may be asked which of the tasks are frequently performed and which less frequently, which are essential and which non-essential. For example, an airline pilot must land a plane frequently, and it is an essential task. However, landing a plane which is missing half a wing would be (hopefully) a less frequently performed task. However, it is essential that the emergency procedures are known even if not often used.

Using this general process it would be possible to gain information about the tasks in which competence is essential to allow entry to the profession, or to a restricted part of the profession.

It may also be possible to set entry level standards at this stage - by asking the question of a task: "If this is an essential task, how well would an entry level candidate need to perform it?". Experience has shown that setting of standards will be more contentious and time consuming than analysis of occupational tasks. This should be considered when planning the DACUM.

**Steps in setting up and conducting a DACUM**

1. Choose expert facilitator.
2. Select participants according to predetermined criteria. Such criteria must include a profound knowledge of the occupations being analysed, and should include representatives of various occupational interests, (educators, unionists, etc) and practitioners from various levels of the occupations.
3. Contact participants and arrange suitable venue at convenient time. Provide rationale for workshop. Enhance motivation.
4. Conduct pre-DACUM session to explain process.
5. Conduct DACUM session.
6. Collate results.
7. Prepare report.

Conducting a DACUM Session

1. General introduction and orientation.
2. Review of occupational area.
3. Identification of the duties.
4. Identification of tasks, sub tasks and competencies associated with each duty.
5. Reviewing and refining the outcome so far.
6. Establishing importance of each task and/or competency by rating on frequency of performance, essentialness etc.
7. Final structuring.
8. Recording of final results.

Main Advantages of DACUM

- Fast
- Systematic
- Moderate expense
- Thorough

Further Information is available from the following sources:


6.2.2 Nominal Group Technique

Information which can be gained: The nominal group technique was developed by Andre L Delbecq and associates and has been widely employed to solve problems in education, health and social services. A group of experts are convened to attempt to provide the answer to a carefully framed research question. In order to gather information about tasks and competencies, it would be necessary to choose the questions with care and it is not felt to be a particularly useful method for mapping the professional areas of activity, duties, etc. However it may be possible to use the technique to provide the answer to a more restricted type of question. For example, the question might be put to the group "What are the essential competencies a teacher must demonstrate before being required to teach their first class?"

Procedure: The group convened to participate in a Nominal Group is a group in name only as communication is restricted by a facilitator to the generation of
answers to the research question, and to clarification of those answers. The process is one where individuals 'brainstorm' in a group context. Such a group has been found to generate more ideas than in a normal group where discussion is allowed, and also to be more productive than individuals working alone.

Eight to ten participants is considered to be an appropriate number to convene. The process begins with the leader presenting the question which the group will attempt to answer. This is followed by participants silently and independently listing answers or ideas. The facilitator requests one idea from each participant in turn which is listed on a large sheet of paper. Overlapping ideas are integrated, resulting in a list of discrete ideas. When the list is complete, a ranking procedure is applied to establish priorities and consensus.

Main steps in setting up and conducting a Nominal Group

1. Choose skilled facilitator.
2. Select participants.
3. Contact participants and arrange venue.
4. Choose the Nominal Group Technique questions.

Conducting a Nominal Group Technique Session

1. General introduction.
2. Facilitator to present the question.
3. Participants silently and independently list answers.
4. Facilitator seeks an answer from each participant in turn.
5. Ideas/answers are listed on large sheets of butchers paper.
6. Overlapping ideas are eliminated, clarification of ideas take place.
7. Ranking of answers takes place.

Main Advantages

• Fast - takes about 2 hours to answer each question.
• Avoids conflict between participants
• Allows equality of participation among different status group members
• Generates many ideas
• Allows ideas to be ranked/evaluated after generation of all ideas

Further Information can be obtained from

6.2.3 Search Conference

Information which can be gained: The Search Conference has been used widely in Australia in the government and private sectors to explore desirable future environments and strategies for achieving future goals.

Such a technique could be adapted to developing competency standards in the professions particularly in relation to future educational needs - both initial and continuing.

In adapting the search conference procedure to the professions, participants would concentrate on determining likely and desirable futures for the profession, taking into account wider government policy, changing technology and changing social attitudes. From this general analysis it is possible to infer the new competencies needed to implement these futures. Similar techniques have been used to infer competencies needed for the teachers and doctors of the twenty first century (See pp 23-24 of the text). This technique will be useful for professions undergoing considerable change. However it should be used in association with other techniques like surveys which provide more reliable data.

Procedure: In its basic structure the process moves from the generation of information and ideas (brainstorming, divergent thinking) through synthesis and analysis of these towards action planning.

The Conference begins and ends with whole group sessions. The initial session aims to build up group cohesion and then engages in a brainstorm on forces shaping the future environment.

Small groups are then formed which record ideas generated. The final plenary session is for reporting from small groups on priorities and strategies and for collection action planning.

While Search Conferences will vary according to the nature of the task there will be a number of typical steps.

Future Scan: Brainstorming session in plenary session to generate data and value perspectives on the trends, forces, events that are shaping the future environment.

Desirable and Probable Futures: The product of the future scan is taken as a starting point by small groups, formulating from it the most desirable future and the most probable.

Prioritizing: As an alternative to the above, the group may be asked to identify the 6-10 trends or change that they consider will be of most importance, and to spell out the influences that can be expected.
Internal Scan: In some cases it might be appropriate to run a brainstorming session in the plenary session on changes and trends that are occurring inside the organisation or school or college and shaping its future.

Historical Reconstruction: In some cases a rewinding of the clock to see ‘where have we come from?’ can be useful. This leads naturally to a consideration of what should be preserved, and what should be modified or dropped.

Issues and Priorities: While most of the key issues and options will have been identified in one or other of the preceding sessions the task here is to consolidate the issues that confront the group, and place priorities on them.

Action Planning: Final report on action plans, and consolidation of these. Discussion of implementation procedures.

Planning and Conducting
- Select appropriate venue
- Select appropriate participants
  - 15-35 ideally
  - major stakeholders included
  - ensure participants have relevant experience, knowledge and interest
- During the workshop
  - Move from general to particular e.g. consider some futures for government policy (i.e. context in which the profession will develop)
  - Evolution of the profession - how it will be affected by technology for example
  - Desirable futures for the profession
  - Constraints e.g. changing social attitudes
  - Issues

Advantages/Disadvantages
- Duration. Takes about four weeks including preparation conduct and reporting
- Cost Low to Medium Cost. Mainly time to organise and cost of the number of participants.
- Involves all major shareholders leading to acceptability of the findings.
- Future oriented. This is obviously important given accelerating changes in knowledge in most professions.
- Highly speculative, can ignore the realities of professional practice. The competencies developed can be too general to translate into realistic professional curricula. For example, the method relies on the participants’ capacity to comprehend the philosophy of the method and to have expert knowledge of the profession. In addition, it needs a skilled facilitator.
Further information


6.2.4 Functional Analysis

This technique has been widely used recently, in the U.K. to establish occupational standards in a variety of industries. The competency standards have been used by government bodies in the UK to guide the development of curricula in Further Education and in the granting of awards in trade and middle level occupations. The British version of Functional Analysis is different from the version used in the United States, the latter being a questionnaire method which is not appropriate for use by the professions.

**Procedures:** Typically functional analysis is carried out by the "lead bodies" in an industry facilitated by a consultant.

Functional analysis is intended to cut through traditional views of individual jobs and base standards on functions within the wider context of the team, firm or industry. The process begins with a consideration of the key purpose of jobs and roles in the whole occupational sector - the function of the sector in outcome terms.

The question which guides the subsequent analysis is: What needs to happen for this (the key purpose) to be achieved? Answering this question is a process of disaggregation whereby the key purpose is broken into smaller and smaller components (or competencies). At each stage of the analysis, care is taken to delineate whole work roles - technical skills, contingency management, task management and interaction with the role environment. The process of disaggregation continues until units and elements of the competence are reached. The 'stop rule' for ceasing analysis into smaller and smaller elements is when you are sure that informed persons reading the description have the same understanding of what carrying out the activity would be. For example, maintain patient health is a competency required of doctors. This presents a confused picture to the mind and must therefore be broken down further. On the other hand "read an ECG" presents a clear picture and need not be broken down further.
Advantages/Disadvantages

Functional analysis relies on participants' capacities to identify occupational competence. Their experience and knowledge of their industry is translated into simple descriptions of tasks, e.g. an automotive mechanic can remove and replace fuel pump without damage to petrol tank. In addition performance criteria are developed for each task. Given the complexity of most professional work it is unlikely that this method is suitable for establishing professional competence. In fact it has recently been under attack as under-representing the complexity of trade and similar occupations. For this reason it has not been felt necessary to provide details of how to use this technique. (A detailed account of how to use it, is given in the Training Agency documents cited below.)

It should be said, however, that the Institute of Chartered Accountants in England and Wales are currently just beginning (July 1990) the process of analysing their profession. They have chosen to work with the National Training Agency and a consultant who will be using functional analysis as the first stage of setting competency standards.


National Training Board (1990) Setting national skill standards: A discussion paper. Canberra: AGPS.

6.2.5 Interview Methods

Interviews are widely used in social science research and can be useful in occupational and competency analysis. Two types of interview can be distinguished according to the amount of structure provided for the interviewer by the researcher.

Unstructured/semistructured interviews are most valuable during the early stages of analysis as wide ranging questioning ensures that issues are not overlooked, and enables the development of an interview schedule (or questionnaire) which draws on the expertise of the early interviewees. The initial sample should therefore be as representative as possible of the occupation under review. Unstructured interviews generally utilise a few open ended questions which focus the interview, but their direction is partly guided by the responses of the interviewee. Unstructured interviews can be challenging for the interviewer who therefore needs to be highly skilled and fully aware not only of the purpose of the interview, but also of the broader research purpose. This is important so that interesting avenues of discussion can be identified and followed up.
Structured interviews are usually developed following analysis of unstructured interviews and are of great value when the responses of large numbers of interviewees are being sought. They consist of carefully worded questions which must be asked by the interviewer in a set order. Answers must be faithfully recorded and interviewer prompting is restricted. The structure represents an attempt to guarantee that a systematic procedure is followed and thus to increase objectivity.

Information which can be gained: Through face to face interviewing, it is possible to gather detailed and in-depth information about the duties and tasks which make up an occupation, and about the competencies which lead to effective performance.

Procedures:

Unstructured/semi-structured interviews

1. Prepare a number of stimulus questions
2. Select and contact a representative sample of respondents
3. If researchers are unable to conduct interviews themselves, select and train interviewers

Structured interview

1. Prepare interview schedule based on results of unstructured interviews
2. Pilot the interview schedule on a small sample of respondents
3. Select and contact a representative sample of respondents
4. Select and train interviewers
5. Conduct and analyse interviews

Conduct of the Interview

- Ensure respondents are relaxed and assure confidentiality
- Explain purpose of the study/interview and the advantages to the individual/occupation/profession
- Listen carefully - only prompt where necessary
- Don’t get sidetracked
- Read back lengthy answers and corroborate answers
- Thank participants and indicate how feedback will be provided.

Main Advantage of Interviewing

Quality in-depth information can be gathered directly from job incumbents.
Main Disadvantage of Interviewing

Interviewing can be time consuming and therefore expensive, especially if respondents are widely dispersed geographically.

Further Information

Any general book on social science research.

6.2.6 Competencies Interview

Information which can be gained: The 'competencies interview' is a term coined by Hermann (1989) to distinguish it from more general types of interview. Use of the competencies interview is restricted to those individuals in the position under investigation and/or immediate supervisors and its aim is to identify and list competencies of workers in particular positions.

Procedure: The interviewer asks the question of the respondent 'Would you please describe what you do in your job?'

Prompts are used when the respondent has finished their initial description. These are 'Are there any other major activities that you perform in your job? - could you please describe them?'

Having obtained as much information as possible from the respondent, the interviewer changes tack and requests information on the main duties of the job. The exact questions suggested are "In most jobs, there are about 4 to 6 major job duties. For example: A pharmacist in charge of a Chemist shop: - dispenses medications, serves customers, manages stock, performs clerical procedures, manages staff, undertakes care of the shop. Would you please tell me your major job duties?" Then "Are there any other major job duties?" The respondent is then asked to describe exactly what is done for each major job duty, and prompted accordingly when no further information is offered. Further investigation of the work activities of respondents concentrates on making distinctions between activities. The suggested question is "How is Job Duty 1 different to Job Duty 2?". It is suggested that this is asked of each pair of job duties.

Following the questioning described above, the interviewer then changes tack again and suggests certain competencies which are important but which may have been omitted. A card is given to the respondent which says, "Some occupational areas involve procedures, communications, interacting with other, management/supervision, planning, thinking and problem solving, and safety. Are any of these performed by you in Job Duty 1?" The question is repeated for each Job Duty. The interviewer then reviews the description of the job in order to check that the listing of competencies is complete. If not, then further questioning takes place.
Finally any confusion in the description of competencies should be clarified and when this has been done to satisfaction, the interview concluded. On completion
of all the interviews, the competencies should be reviewed, duplications removed and the competencies assigned to 8 to 12 general areas, and named.

**Advantages**

Simple procedure

Thorough investigation of tasks and competencies

**Disadvantages**

Time consuming

Can be expensive

**Further Information**


6.2.7 Critical Incident Technique

**Information which can be gained:** Critical Incident Technique has a specialised application in occupational analysis. Through its use, it is possible to reveal those attributes of individuals which enable successful professional performance. Hence, it is a highly suitable technique to use to identify competencies. It is ideally used in combination with a technique such as the DACUM, as routine competencies are not readily revealed (because they are not requested) and although some information may be gathered about duties and tasks, the main focus is on individual characteristics. Further, the focus is on those attributes which characterise successful resolution of professional situations. One of its applications is in distinguishing competencies which characterise outstanding professional performance.

**Procedure:** The procedure requires that respondents (who in our case would be professionals in a specified area of practice) be asked to recall incidents from their work which were of particular significance to them and which had an outcome which was clearly either successful or unsuccessful. The researcher seeks detailed information about events leading up to the situation and factors which, in the respondent's view, were critical in determining the outcome. Any factor which the respondent believes to be important is noted, including things as vague as various types of thought processes. Hence, the critical incident technique has the potential to go beyond descriptions of readily observable sequences of behaviour and gather data about factors on which successful performance depends (competencies). A typical request from the researcher might be as follows:

"Think of some difficult work situations (incidents) that you have handled successfully or unsuccessfully during the past 6 months."

"Describe the incident and the outcome."

"What training did you have which contributed to that result?"
"What specific attitudes, knowledge or skills contribute to a successful outcome?"

In her study of Nursing Practice, Benner used the critical incident interview with 21 pairs of beginning and expert nurses. Each member of the pair was interviewed separately about patient care situations, they had in common and which stood out for them. Both were asked for the critical knowledge they found to be particularly difficult to teach or to learn. The aim of the interviews was to discover if there were distinguishable differences in the novices' and experts' descriptions of the critical incident and how their differences might be accounted for.

In addition, critical incident interviews were conducted with 51 experienced nurses, 11 newly graduated nurses and 5 senior students to further delineate and describe nurse performance at different stages of skill acquisition. Prior to the interviews the participants were given a written outline of what the researchers were interested in. This outline consisted of 7 parts: A) What constituted a critical incident, B) what to include in the description, C) personal data D) & E) asking nurses to describe a critical incident F) & G) asking nurses to outline a typical and unusual day at work.

Part A and B of the outline are included to make clearer how the technique was used.

A. **What Constitutes a Critical Incident**
   - An incident in which you feel your intervention really made a difference in patient outcome, either directly or indirectly (by helping other staff members)
   - An incident that went unusually well
   - An incident in which there was a breakdown (i.e., things did not go as planned)
   - An incident that is very ordinary and typical
   - An incident that you think captures the quintessence of what nursing is all about
   - An incident that was particularly demanding

B. **What to Include in Your Description of a Critical Incident**
   - The context of the incident (e.g., shift, time of day, staff resources)
   - A detailed description of what happened
   - Why the incident is "critical" to you
   - What your concerns were at the time
   - What you were thinking about as it was taking place
   - What you were feeling during and after the incident
   - What, if anything, you found most demanding about the situation


All interviews were read by the researchers and interpretations of the data compared and validated. Each interpretation was accepted only if there was agreement in labelling and interpreting the competency demonstrated and only
where it was effective in describing some performance. From these interviews (and observations) the seven domains and competencies within each domain were identified (see earlier p. 19). It is important to note that great care was taken to ensure multiple descriptions of each competency. If using critical incidents, it is important to ensure that not too much weight should be placed on a single episode and it should be used in association with other techniques e.g., observation of practice.

Main Advantages

- Can reveal the underlying attributes which enable successful performance. Potentially a source of rich real life data, i.e. increase validity of analysis.

Disadvantages

- Misses the routine attributes necessary for non-critical incident performance.
- Expensive
- Subjective interpretation of data, i.e. less reliable than other techniques

Further information can be obtained from the following sources


6.2.8 Surveys

The term 'survey' typically refers to the large scale collection of data through the distribution of questionnaires, either by mail or face to face for self completion, or by interview. The main advantages of survey methodology is that it is possible to solicit the opinion of large numbers of people and quantify the results. However, in order to simplify the data collection and interpretation, it is usually necessary to construct questionnaires consisting of fixed choice questions, thereby restricting the depth and level of detail. This is particularly the case in the self completion mode.
Although conducting a survey may appeal because of its apparently straightforward nature (ask questions of large numbers of the people who know the answers), the latter feature combined with a generally low response rate casts doubt on the validity of the findings. Thus, surveys should be used with caution in occupational analysis as there is uncertainty about their value in providing an accurate picture of complex work functions. Some research indicates that a few subject matter experts can generate essentially the same information as thousands of people who are employed in the job. (Ash, Levine et al). If this is the case, it would appear sensible to use this technique with small samples and in association with one of the group techniques outlined. Survey methods are described in detail in any book on basic social science research. For this reason, plus the fact that these techniques are not recommended, this technique is not described here in any detail.

6.2.9 DELPHI

Information which can be gained: The Delphi methodology was developed by Dalkey and Helmer at the Rand Corporation in the 1960s and its use, originally restricted to technological forecasting has broadened into many areas of planning and problem solving. Delphi in its original form is essentially a specialised sort of survey which was designed to be used in situations of uncertainty and where much change is taking place. The sort of data which can be gathered using a Delphi will be very much related to the sort of questions which are asked. However, in the self completion format, it is difficult to see how it could be used to collect detailed or in depth information on competencies. It has, however, recently been used successfully by the Task Force for Accounting Education in Australia.

Procedure: Experts from the profession are selected according to the sampling criteria, and participate in the Delphi process through their responses to a series of questionnaires distributed to them by mail. It is hoped to reach a consensus of opinion by repeatedly summarising responses and incorporating these into subsequent questionnaires. In this way, participants learn of the opinions of each other but discussion, debate and open conflict are not possible.

There are three critical conditions necessary to complete a successful Delphi. These are:

1) adequate time - it is not normally possible to conduct a survey Delphi in less than 45 days
2) participant skill in written communication
3) high level of participant motivation

In 1989 the Institute of Chartered Accountants, as discussed in earlier sections, undertook a study headed by Professor W. Birkett of University of NSW to elicit opinions about the demand for and supply of accounting education for the future. The study focussed on the educational needs of persons aspiring to be professional accountants and the continuing education needs of professional accountants.
Before undertaking the study, Birkett reviewed previous studies on demand and supply of accountants. What he found was that while there was some quantitative data there was no data linking emerging skill needs, educational needs and projections about demand for accountants.

Birkett chose the Delphi methodology because he sought consensus about future trends amongst experts in the field. Although it was recognized that the methodology has some weaknesses (see below) in his opinion the strengths - the ability to explore and reach consensus on the future needs - more than compensate.

A specific model was developed to guide the study which required the:
1. Developing of a profile of trainee graduate professional accountants.
2. Estimating future numerical requirements.
3. Elaborating future skill requirements.
4. From the above, addressing future educational requirements.

The study was designed in the following way;
1. Two rounds of questionnaires were sent to 50 experts drawn from universities and the public and private sectors.
2. There was an attempt to consider size of organization, geography and types of higher educational institutions in electing the experts. Additionally only persons with involvement, knowledge and interest in the educational issues were chosen as experts.
3. Questionnaire one, concentrated on past trends in the demand and supply for professional accountants, factors likely to affect future supply, qualitative needs in skills and educational needs of accountants. There was a mixture of structured and unstructured questions.
4. Questionnaire two, was entirely structured. It concentrated on: Dissemination of key ideas of the profession to the experts, establishing levels of agreement about these ideas, seeking to establish consensus after provision of feedback about first round questionnaires
5. Responses were sought in three categories: Direct estimate (e.g. of salary levels), agree/disagree statements, ranking on a five point scale.

The study was conducted and analysed in the following way:
1. Questionnaires were mailed with a covering letter and follow up telephone calls were made a month later. A reminder letter followed.
2. Responses were analysed by subgroup, i.e., public sector, private sector etc, then aggregated. Various statistical techniques were used to reduce the complexity of the results.
3. The final report included:
   - Profile of Trainee/Graduate/Professional accountants
   - Future Skills Needs for Professional accountants
   - Future Educational Needs for Professional accountants
   - Future demand and supply situations
   - Institutional Issues in Accountancy Education
Steps in setting up and conducting a DELPHI

1. Develop the Delphi questions.
2. Select and contact likely respondents.
3. Select sample size.
4. Develop and test first questionnaire.
5. Analyse questionnaire.
6. Develop and test second questionnaire.
7. Analyse questionnaire.
8. Develop and test third questionnaire.
9. Analyse questionnaire.
10. Prepare and send out report.

Advantages of DELPHI

• Useful in an occupation undergoing change as predictions about futures can be made but arguments are avoided.

• Useful where experts are likely to disagree about future outcomes.

• Useful where it would be difficult to convene respondents who normally work in geographically widely spread locations.

Further information can be obtained from


6.2.10 CODAP

Information which can be gained: The CODAP system is a set of computer programs designed to input, quantify, organize, summarize and report data collected with job-task inventories. This system was developed by the U.S. Air Force Human Resources Laboratory. Versions of CODAP are available for Sperry (UNIVAC) CDC and IBM compatible equipment.

Procedure: The job inventory analysis is the key to the CODAP system. This is a method of collecting job information from workers and supervisors. A job-task inventory is basically a questionnaire which consists of two sections.
  • background information (name, sex, years of service or educational level, attitude to the job, etc)
  • Task inventory (list of work tasks organized under broad duty headings)
The background section helps managers identify characteristics of workers. The Task Inventory Section is filled in by workers who indicate the amount of time they spend on each task.

This information is supplemented by supervisors who provide details on the stability of the tasks (whether they are likely to change) on entry level training and learning difficulties associated with the tasks.

Clearly this sort of information is easier to quantify than other methods of job analysis. However the use of this job task inventory appears to be more suitable to managers wishing to plan and evaluate work performance in their organisation than it does to analysing the work of the professions. The CODAP system has been used extensively by the Armed forces to standardize and organize routine tasks carried out by very large numbers of individuals. While it has also been used successfully for various lower to middle level occupations it does not appear to have much value for the complex work carried out by the professions. This is so because it concentrates on developing lists of tasks which are divided into increasing simpler units and ignores higher level competencies altogether.

Advantages/Disadvantages

Advantages

• it is a well established and well documented occupational analysis method;
• aspects of CODAP methodology have been refined and validated by many years of research;
• through its cluster analysis program it is capable of systematic classification of job types;
• it is useful for large and diverse populations;
• the computer printout format is designed for occupational analysis reports.

The main weaknesses for CODAP methodology are:

• like other tasks inventory methods of occupational analysis, CODAP is based on the concept of dividing jobs into tasks, and for some jobs this may be an imperfect representation of the job;
• CODAP studies require a moderate to large amount of time;
• moderately to very expensive to conduct, relative to studies using other methodologies;
• the CODAP programs require a main frame computer and an expert to run the programs;
• the data is virtually inaccessible to the client;
• lack of future orientation.

Further Information

6.2.11 Observation

Observation is a general research technique used in a wide variety of fields. It can be applied to analysis of work at all occupation levels including the professions. The essence of the technique is direct observation of what people do in their jobs.

Information which can be gained: Observation has been used by many occupational analysts to delineate the sorts of tasks undertaken in various jobs. It is also possible to ascertain competencies through using observation, though this can only be done indirectly.

Procedure: The difficulties associated with this technique are widely known to researchers in the social sciences. The major problems concern the possible lack of objectivity and the fact that the observers presence affects the behaviour of those being observed.

Neither of the problems is insuperable. It is possible to develop rating scales which increase objectivity and reliability of observation, to train observers to be aware of their subjectivity and compensate for it, and to undertake a large number of observations over a long period of time. In addition, participant observers can assist minimally those undertaking the jobs being observed and thus make their observation less intrusive and awkward. Observation can be useful in establishing competency standards in the profession when it is used in association with other techniques as a way of validating other findings.

In her analysis of nursing, for example, Benner used participant observation in association with interviews and critical incident techniques. The participation was minimal consisting of transporting patients and other minor tasks. Of the 51 experienced and novice nurses interviewed, half were also observed. The data gained from these observations was analysed and interpreted alongside the interview transcripts to produce a more reliable and valid picture of nursing tasks and competencies.

In the Queensland study of nurses carried out in 1989 (Williams), observation was one of two methods of data collection used. Like Benner, Williams used largely participant observation. Data was collected by two nurses with a detailed knowledge of quantitative research methods. They observed participants over a full 8 hour shift.

Because of the importance of capturing the context in which nursing care was provided the observers kept as many details of observed events as possible. This included notes about the participants assigned position on the shift, pattern of care delivery, number of patients, numbers of other staff and so on. The observers questioned participants on notations on flow charts and nursing care plans. After the observation participants and observers discussed and checked
the accuracy of the results. All observations were typed and transcripts checked for accuracy.

Advantage/Disadvantages

Advantages

First hand direct knowledge of what actually occurs in practice as distinct from reporting of expert employees (and others) views about what occurs in practice.

Disadvantages

- Possible lack of reliability
- Need to train researchers in qualitative technique

Further Information


Any basic text on research methods in the social sciences.

6.2.12 An Example Combining Various Techniques: McBer

The McBer consulting firm in the U.S. has used an interesting combination of techniques to carry out competency assessment. They base it on the work of the Harvard academic, David McClelland and some refinements by others. [Pottinger (1979), Klemp (1982), Spencer, (1983)]. The main use of their techniques (which they have called Job Competence Assessment) has been in predicting performance in managerial and public sector/service occupations.

The focus of this technique is to identify successful performers in an occupation, to study what these people do that distinguishes them from moderate performers and then to identify the attributes and/or skills which are responsible for the difference.

This method has 8 steps.
1) Define criteria for effectiveness
   (Here a number of criteria are used, e.g. hard data such as products, sales profits plus such things as superiors ratings and peer-ratings.)
2) Identify sample of superior and moderate performers on the above criteria.
3) Undertake functional analysis to identify job tasks.
4) Develop hypothesis about people who are superior performers.
5) Undertake critical incident interviews with both groups identified in 2).
6) Engage in direct observation to verify 3), 4), 5).
7) Interpretation of data by 2 or more raters leading to a competency model.
8) Validation of 7) by critical incidents on a second sample and/or using tests to measure competencies derived in the model. This is administered to a second sample.

Thus this method uses Observation, Critical Incident techniques, functional analysis, expert panels.

Advantages/Disadvantages

The main strengths claimed for this method is that it overcomes the limitations of traditional job analysis. These limitations include:

- a concentration on knowledge rather than on actual performance
- a tendency to identify general rather than specific skills or attributes
- a tendency to understate the complexity of job performance
- a tendency to be too detailed to be practical

The JCA technique by comparison concentrates on performance of the person. It can identify specific attributes. For example, when assessing the competencies of diplomats JCA identified the ability to write with sensitivity on political issues rather than the more general "communication skills". That is, it was able to distinguish expert from moderate performance and to document this so that others could be trained to develop the same skills and attributes.

The major weakness would seem to be the long list of steps which obviously make JCA very time consuming and expensive.

Further Reading

CONCLUSION

This paper has (i) emphasised the relevance and importance of competency-based standards for professions and paraprofessions;

(ii) explained what competency-based standards are in the context of professions and paraprofessions;

(iii) suggested ways competency-based standards can be used for the benefit of professions and paraprofessions;

(iv) considered the advantages and limitations of various approaches to competency analysis of professions and paraprofessions; and

(v) outlined available techniques for establishing competency-based standards and the kinds of considerations that will enable a profession or paraprofession to choose techniques best suited to their own needs. A comparison of these techniques is outlined in the chart below. How the chart might be used is illustrated in the hypothetical examples which follow it.

This chart is a general guide only. It is meant to indicate the relative suitability of each technique used by itself given a constant factor. It does not mean that interviewing is always more costly than a DACUM – that would depend on the interaction of all the factors influencing the decision, e.g. interviewing only a few people (where it was appropriate) would be cheaper than a DACUM on a large profession.

Also it does not mean, for example, interviews should not be used when analyzing the whole profession – only that by themselves they would not be suitable.
### A GUIDE TO SELECTION OF TECHNIQUES

<table>
<thead>
<tr>
<th>Factors Affecting Choice of Technique</th>
<th>Interview Methods</th>
<th>Surveys</th>
<th>Convened Group Techniques</th>
<th>Miscellaneous Techniques</th>
</tr>
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<tbody>
<tr>
<td></td>
<td>Interview</td>
<td>Competencies Interview</td>
<td>Critical Incident Technique</td>
<td>General Survey</td>
</tr>
<tr>
<td>Amount of money</td>
<td>Unlimited - enough to choose any technique</td>
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<td>***</td>
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<td>Low budget</td>
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<td>Length of available time</td>
<td>Unrestricted</td>
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<td>available</td>
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<tr>
<td>Sample size</td>
<td>Large</td>
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<td>Medium</td>
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<tr>
<td>Population size</td>
<td>Small</td>
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<tr>
<td>Scope of the analysis</td>
<td>Whole profession</td>
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<tr>
<td>Confidentiality of procedures</td>
<td>Confidential</td>
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<tr>
<td>Likelihood of Conflict</td>
<td>Conflict</td>
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<tr>
<td>Profession is undergoing change</td>
<td>Fast</td>
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<tr>
<td>Desire to do in-house</td>
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#### Key

- 

- Most suitable
- Suitable
- Unsuitable
- Most unsuitable

- TRC = Tasks/Roles/Competences
The following examples show how the chart can guide the choice of technique.

Example I

A small profession wishes to investigate quickly the competencies of a smaller group of paraprofessionals in their industry who obtained their qualifications through the TAFE/CAE system a decade or more ago. This group of 60 or so, want the profession to provide a bridging course which will enhance their career prospects. The profession has recently undertaken a study of its university educated members and has developed a set of competency-based standards. The profession has a small amount of money (say $2000) available for the study. Because there are industrial relations issues involved, the study needs to be confidential in the first instance.

From the chart it is possible to see that

1. Money available is low, therefore group processes seem most suitable.
2. Group processes are indicated by the length of time available.
3. However given the small numbers involved it might be possible to use interview.
4. As for three
5. Group processes are lacking in confidentiality, this indicates interview and other techniques.
6. As it is likely some conflicting interests are involved Delphi is indicated.
7. Not relevant.
8. Needs to be done in-house since money is very limited therefore group processes which need a facilitator are probably excluded.

Given that some factors indicate group processes and others don’t, a decision needs to be made as to which factors are most important. This will be a matter of judgement for the profession. In this case it may be best to use interviews/critical incidents with a relatively small sample rather than group processes which are likely to cause conflict and are not confidential.

Example II

A medium sized profession (6000 in number) has decided to establish competency-based standards. There is a limited number of contexts in which practice is undertaken. These standards are to form the basis of new continuing-education programs and the professional year necessary to be undertaken before admission. Social and technical changes have had some impact in the past but it
appears that there will be few major changes in the near future. There is a considerable amount of money available to undertake the study (say $50,000). The time frame is 6 months and the profession is prepared to appoint a consultant.

From the chart it is possible to see that

1. Money is available. Therefore any of the techniques can be used. Given the rich real life information provided by interview and observation techniques these are indicated.

2. Time available is moderate therefore interview methods are doubtful on their own.

3. Numbers are moderate. This seems to disqualify interview methods being used on their own. Indicates survey technique.

4. As for three.

5. Not relevant.


7. Not relevant.

8. Not relevant.

It is obvious that interview techniques alone are not possible. Given the moderate to large numbers a survey technique like Delphi might be used. Given the advantage of interview methods and the fact that money is available interview/critical incidents/McBer could be used in association with it.

Example III

A large profession has just begun to be affected by major technological and social changes. They see the need to establish competency-based standards which will guide professional curriculum in the universities, provide a career path for members, help fill labour shortages through the overseas trained and facilitate registration across states.

Practice in this profession takes place in a variety of contexts. The profession has a large amount of money available and the study can be conducted over a full year.

From the chart it is possible to see that

1. The amount of money available enables any of the methods to be used. Combination of interview and observation could be used due to the rich real life data they provide.
2. Time available allows any of the methods to be used - as for 1.

3. & 4. Given the population size and scope of the study a number of methods would need to be used. A survey method of some kind seems to be indicated.

5. Not relevant.

6. Given the future orientation it would be useful to start with a search conference.

7. Not relevant.

8. Not relevant.

For a study of this scope it might be advisable to start with a search conference then use a survey technique supplement by some critical incident interview and observation on a smaller sample.
GLOSSARY

Abilities : Capacities, such as making judgements, asking questions and posing problems, which are important in successful performance of some professional tasks.

Attitudes : Personal qualities or dispositions, such as patience, persistence and compassion, which are important in successful performance of some professional tasks.

Attributes : The knowledge, abilities, skills and attitudes that together underlie competent professional performance.

Competence : Possessing the attributes enabling performance of a range of professional tasks to the appropriate standards.

Competency : A combination of attributes underlying some aspect of successful professional performance. Competencies vary from specific to complex (or higher level).

Competency-Based Standards : Levels of achievement required for competence in key areas of professional practice.

Competent : A competent professional has the attributes necessary for job performance to the appropriate standards.

Domain : An area of professional practice which required a high degree of professional performance.

Knowledge : Theoretical and practical understanding of a profession which is an important requisite for competence. Competency-based standards draw attention to the fact that much more then understanding is needed for successful professional performance.

Occupational Analysis : Analysis of a profession into domains or roles and tasks. To move beyond this to competency analysis, the attributes underlying professional performance need to be considered.

Performance : What professionals do as they go about their work.

Role : A distinct area of practice within a profession.

Skill : Behavioural aspect of successful professional performance in which practised facility is required. Ranges from manual to interpersonal skills.

Standards : Levels of achievement required for performance to be judged competent.
Task: A fairly discrete unit of professional work. Tasks usually can be further divided into sub-tasks.
APPENDIX

Included in this appendix are a number of examples of how competency-based standards have been or are being developed in the professions.
Teaching

Teaching is a profession in which there has been in the last decade worldwide interest in monitoring and improving the quality of performance and the setting of standards for entry. Schemes and instruments for the evaluation of teacher performance have proliferated and met with varying levels of success and criticism. (Lokan and Mackenzie, 1989 and Haney W. et al, 1987).

In this context, the Queensland Board of Teacher Education undertook a major review of teacher education and registration in Queensland. Their 1987 report Project 21: Teachers for the Twenty-First Century sought to identify the major competencies that will be required by teachers into the next century. The competencies fall under four domains or dimensions:

- change,
- knowledge and values,
- communication and
- decision-making.

Thirty four general attributes that teachers will need to display emerge from the four domains, e.g. under the domain of decision-making one attribute is that "the teacher is able to make confident and responsible decisions relevant to the students' well-being". Lengthy lists are then provided of what would serve as evidence of someone possessing the various attributes. Amongst thirteen indicators for the attribute just quoted are "making appropriate curriculum choices", "using positive discipline" and "providing pastoral care". The development of these competencies to an appropriate level is viewed as a career-long process. Accordingly the Queensland Board of Teacher Education uses this competency analysis to make recommendations about how teachers should be selected, the goals and practices of teacher education and the organization and delivery of in-service professional development.

How was this competency analysis of teaching done? The sixteen member board which mainly consists of prominent educators plus a parents' representative, drew "upon all available sources" including a document "An Agenda for Excellence" produced by the Queensland Secondary State School Principals' Association. So in general the competency analysis reflects the considered views of a group of experts who have risen to prominent positions in education.

Dietetics

The Dietitians Association of Australia in May 1990 adopted an interim document setting out "Minimum Standards for Professional Training". In fact the document doesn't set out standards in the sense already discussed. What it does do is specify five broad competency areas required for entry level to the professions: Organization and Management, Assessment and Planning, Implementation, Evaluation and Professional Practice and Personal Development. These broad competency areas cover 30 reasonably general attributes, e.g. "demonstrates basic skills in problem solving". The document also included detailed recommendations for curriculum content and guidelines.
for training courses. It will be interesting to watch the further development of this initiative.

Accountancy

A substantial analysis of continuing education needs for the profession in Australia was recently undertaken by Birkett (1989). While this study did not use a framework which established competencies as such, its findings identified skills and knowledge which accountants need currently and those they will need in the future. Birkett identified a number of general attributes accountants need such as communication and interpersonal skills and thinking skills. This study could be the basis of further work to identify competencies required in the profession. Birkett's methodology for the analysis of current strengths and deficiencies in accountancy education was the Delphi. Delphi is essentially a specialised type of survey. It has been used in many areas of planning and problem solving and is particularly suited to occupations undergoing change. Delphi is discussed in detail in Section Six.

Birkett's study found a number of deficiencies including too little emphasis on the development of necessary skills such as "communication skills, judgement skills, analytic and problem solving skills, critical and evaluative skills, interpretive skills and design skills" and recommended that teaching should be structured so that these and other skills are actively developed during courses. (Birkett, 1990, pp. 77-81).
Engineering and Award Restructuring

The Institution of Engineers has developed the following concept of orderly career paths in Engineering:

<table>
<thead>
<tr>
<th>The engineering workforce and associated qualifications</th>
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</thead>
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<tr>
<td><strong>PROFESSIONAL ENGINEER</strong> (Four years' full-time or equivalent tertiary qualification): applies advanced knowledge and skills in analysis, science, technology and engineering, management and social responsibility, to problem solving and synthesis in new and existing fields in research, development, advanced design, systems, manufacturing and field engineering and, with further formation, to specialist practice or supervision and management.</td>
</tr>
<tr>
<td><strong>ENGINEERING TECHNOLOGIST</strong> (Three years' full-time or equivalent tertiary qualification): applies knowledge and skills in analysis, scientific and technological principles, management and social responsibility, to new and existing technologies in standard design, testing, inspection, plant operation, manufacturing or field work and, with further formation, supervises and manages such work.</td>
</tr>
<tr>
<td><strong>ENGINEERING ASSOCIATE</strong> (Associate Diploma): as a technical or design drafting officer, applies practical techniques of analysis and technical principles, standards and practices, and human relations, to new and existing technologies in standard design, testing, inspection, plant operation, manufacturing or field work and, with further formation, supervises and manages such work.</td>
</tr>
<tr>
<td><strong>TECHNICIAN</strong> (Advanced Certificate): applies technical principles, practices, techniques and human relations skills, to activities which include for example: high-level manual skills, fault diagnosis and related tasks, in a workshop, laboratory, office, field or operations function and, with further formation, supervise such activities.</td>
</tr>
<tr>
<td><strong>TRADESPERSON (OR EQUIVALENT)</strong> (Certificate): applies theory, practice and human relations skills to the practical activities of a trade or an equivalent occupation in a workshop, laboratory, field or operations function, and, with further formation, supervises such activities.</td>
</tr>
</tbody>
</table>

(The Institution of Engineers, Australia, 1990)

If this scheme is implemented Engineering Technologists and Engineering Associates will be eligible for membership of the Institution of Engineers. Whether this proposal is ultimately accepted by all the relevant players will depend upon processes and outcomes of award restructuring in the metals industries.

It is noteworthy that at each level the Institution of Engineers proposal for the engineering workforce includes both a brief description of the attributes that the practitioner will apply and roles and tasks to which they will be applied. Lloyd and his colleagues are currently engaged in the next step of identifying detailed competencies for professional levels. This will include the development of standards. It will be very interesting to watch this work unfold.
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Doherty R.L. (Chair) (1988) Australian Committee into Medical Education and Medical Workforce. *Australian Medical Education and Workforce into the 21st Century*. Canberra: AGPS.


McDonald C., David B, Saddik S., Khan A. & Fox D. (1989) “Pre-registration practical training in Pharmacy administration - the contribution of the


Other Noosr Research Projects:

Research Paper No 1: Establishing Competency-based Standards in the Professions
Research Paper No 2: Competency-based Assessment in the Professions
Research Paper No 3: Studies in Comparative Education: The Philippines
The Assessment of Chinese Qualifications—July 1990

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Skills Recognition in Australia Volume 2—A Guide to Professional and Related Occupations
Technical Qualifications: A Summary of Guidelines for the Assessment of Overseas Qualifications

PROFESSION LEAFLETS ON:

Accountancy
Architecture
Computing
Dentistry
Dietetics
Engineering
Nursing
Occupational Therapy
Pharmacy
Physiotherapy
Podiatry
Radiography
Social Welfare
Teaching
Technical Occupations
Veterinary