Actuarial Examinations: What can be learnt from the students' perspective?

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Submitted in partial fulfilment of the requirements for the award of the degree of Doctor of Philosophy

Institute of Education
University of London
1997

Abstract

This thesis presents a detailed analysis of the student experience of qualifying as an actuary, and reflects upon what might be learnt from this. The actuarial profession is small and, outside the financial sector, little known. However, within the financial sector, actuaries are influential. Their professional examinations are seen as very demanding and the qualification is coveted. This exploration of the students' perspective, breaks new ground in research on the profession by: adopting principles of 'illuminative evaluation' (Parlett & Hamilton, 1972) and later developments in qualitative research; and using adult learning theory as the conceptual framework.

Themes which emerged from the study coalesce around three dominant concerns: adjusting to the learning milieu, the disjuncture between expectation and experience and, finding and decoding clues. These are elaborated separately, then integrated in a series of case studies which demonstrate the diversity of student experience. Dynamic Concept Analysis (Kontiainen, 1973, 1989) is employed to structure the case studies, and highlight the relational nature of influences upon the learning experience.

Kontiainen's model of adult learning (1991) is modified to improve its interpretive power in the context of distance learning, and to incorporate the findings of research into student approaches to learning.

Contributions are made to the discourses of actuarial education, professional education, distance education and adult learning. Attention is drawn to the pivotal role of the correspondence course tutor in supporting: adjustment to the learning milieu; and high quality learning. Overload is a recurrent theme, and is associated with perceptions of control and validity. Questioning of the validity of several aspects of the education and assessment processes by members of the profession, is discussed. A possible general model for the student experience of actuarial examinations is presented.

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Acknowledgements

There are many people without whom this thesis would never have completed its long gestation period, most importantly:

My miraculously uncomplaining husband **Simon Bloomfield,** who looked after me and our daughter **Rachael** so well during the evenings and weekends of writing.

My endlessly patient supervisor **Roy Cox**, whose gentle but tenacious questioning nudged me towards the finishing line.

My former Head of Department **Steven Haberman**, whose sustained interest in this work was vital.

Two friends who have supported and commiserated, in addition to reading and discussing, re-reading and arguing; striving to pull the work in opposite directions, consequently sharpening my ability to defend my position: **Maggi Savin-Baden**, who would have preferred the work to have been more qualitative; and **Mike Costello,** who would have preferred the work to have been more quantitative. Together, they kept the standard of the writing moving *ever onwards and upwards*, although they cannot be held responsible for where I decided to stop.

I am grateful for the assistance and advice I received from: my former colleagues in the Department of Actuarial Science and Statistics, City University; everyone who supplied data, particularly those who completed questionnaires, or agreed to be interviewed; Seppo Kontiainen and Jyri Manninen of the University of Helsinki, who will be mentioned again in Part III; Directors of Actuarial Education: Bill Truckle, then Ken Gardner, then Lis Goodwin, and their staff, particularly John Waugh and Pauline Simpson; Sally Grover and her staff; members of the Board of Examiners; Bernard Benjamin, Heather Fry, Paul Harwood, Jim Pegler, Guy Thomas.

This work is dedicated to actuarial students; past, present and future.

The information in the thesis was up to date in January 1997.

Part I: Setting the Scene

Chapter 1: The Context and the Research Questions

1.1 Introduction

" *Actuaries have the reputation of being about as interesting as the footnotes to a pension plan. This springs from the natural tendency of lesser mortals to deride what they do not understand and a failure on the part of actuaries — from their position of superior intelligence — to see any need to defend themselves.*

Being an actuary has nothing in common with pedestrian number crunching. It is wholly unjust, for example, that market researchers should enjoy a more glamorous image. Actuaries are to market research what brain surgeons are to foot massage.

What they do for their not inconsiderable livings is to apply scientific principle to what the rest of us consider the great imponderables in life, death and the likelihood of the garage being struck by lightening. ...

... The pass rates in the 10-subject examinations[1] set by the Institute of Actuaries are very seldom as high as 50 per cent.

Further, while some of the failures in the earlier parts may be attributed (even among actuarial students) to the usual youthful incidence of over-confidence, laziness and hang-overs, the pass rates for the later exams show no increase over the pass rates for the earlier sitters.

If this makes becoming an actuary sound as tough as becoming a doctor, the comparison is appropriate. Qualified actuaries might join insurance companies with billions of pounds of funds under management.

They may not be in the business of saving lives, but their calculations can significantly affect the quality of life for large chunks of the population. ...

The course is tough, but the rewards are ample. Not simply in remunerative terms; actuaries speak of the satisfaction of applying their theoretical disciplines to everyday 'real' life. That more than compensates for the banter from those with lower foreheads."

(Pitcher, 1988, p32)

That witty extract from *The Observer*, designed to increase the knowledge of the already well educated, deftly captured the public image of the actuarial profession at the beginning of my research:

- actuaries were seen as intelligent, dull and aloof, commanding high salaries and potentially carrying heavy responsibilities

[1] This syllabus has been replaced, but the comments remain pertinent.

- actuarial practice was seen as essentially mathematical, beyond the comprehension of most people, but satisfying for those who enjoyed that kind of thing
- the professional examinations were thought to be very difficult

At that time, the rapid expansion of the financial sector in the 1980s was fuelling concern about a possible shortage of actuaries, with a consequent loss of the profession's influence within the sector. Thus, there was scrutiny of the public image of the profession and the time taken for actuarial students to qualify. However, the deliberations of the late 1980s were not new to the profession. Throughout living memory, qualifying as an actuary has been difficult:

> *"The present system has served us well and has produced a body of professional men whose ability and integrity are high. The foundation of this system has been the rigorous and impartial nature of our methods of training and examination. It has, however, had its price. Prolonged and concentrated effort over a long period of years has been demanded of the individual. Moreover, too many unfortunate students fell by the way. This system has been conducive to the sober virtues of reliability and industry rather than to the more lively ones of initiative and imagination."* (Phillips *et al*, 1945, p3)

This thesis comprises a detailed analysis of the student experience of qualifying as an actuary and considers what can be learnt from this. This chapter will set the scene by outlining the process by which my research foci emerged, describing the context and explaining the structure of the thesis.

1.2 The genesis of this research study

During the final year of my joint honours degree in Education and Mathematics, I considered statistical research as my next step. However, I was persuaded to make direct use of the Certificate in Education, which I had taken concurrently. In 1984 I began teaching mathematics to 13-18 year old pupils. Midway through my second year I was sure that I wanted to pursue research. I secured a research assistantship in the then, Actuarial Science Unit at City University, initially engaged in the statistical analysis of mortality data.

Thus, in 1986 I began working with members and potential members (undergraduates) of the actuarial profession, carrying my professional socialisation as a secondary school teacher with me.

I hardly knew anything about the actuarial profession. I was aware of the public image of highly paid financial professionals, who had to be very good at maths because they did the mathematical parts of pensions and insurance work. I was aware that qualifying as an actuary was difficult, entailing many years of study and examinations. I had heard the joke:

"Actuaries are people who would find accountancy too exciting!"

I suspect that my limited and inaccurate knowledge of the profession was not untypical of my generation of numerate graduates: the pool from which the profession then drew about 90% of its entrants.

My colleagues quickly educated me with respect to the nature of actuarial work and the process of initial qualification. I learnt that:

- the profession almost exclusively recruited good honours graduates from numerate disciplines or from economics
- just over half of all new recruits failed each examination taken in the first study year
- about half of those who commenced the professional examinations failed to complete them.[2]

At this time, the profession was actively tying to expand (Institute of Actuaries Futures Committee, 1987) and so there was institutional concern about this level of wastage. In addition, the majority of the actuarial students[3] whom I met in the course of my daily work

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[2] This was not peculiar to the UK, for example the Australian Institute reported wastage rates in excess of 50% for graduates of the Maquarie University Actuarial Science programme, and over 75% for those without an actuarial degree (Education Policy Committee, 1989a).

[3] **Definitions:** throughout this thesis, the term 'actuarial student' refers to a student member of one of the professional bodies, in the role of **learner**, preparing for the professional examinations. The term 'actuarial trainee' refers to a student member of one of the professional bodies, in the role of **employee**, with a commitment to prepare for the actuarial examinations. This distinction is somewhat artificial since the roles are inextricably linked. However, it is necessary to clarify the competing demands experienced by those contributing to this research.

were critical of the high failure rates (appendix H), given the prior educational success of the profession's recruits. There was a general air of cynicism about the process of initial qualification as an actuary. I was amazed and fascinated. The professional education and examination of student actuaries seemed to operate with a different set of axioms to the type of education and assessment that I had studied and been part of. Thus began my hobby of observing and reflecting upon the professional education of actuaries.

1.3 My initial questions

From curiosity, I began asking people:

"Why are actuarial examinations so difficult to pass?"

I discovered that everyone had a ready theory explaining why actuarial students found it so difficult to pass the professional examinations. These involved:

- student weaknesses
- weaknesses within the tuition system
- weaknesses within the assessment system
- inadequate support from employers
- gatekeeping by both employers and the professional body.

Nobody denied that passing actuarial examinations was difficult, and not just because of their technical difficulty.

In 1987, I resolved to study the initial qualification of actuaries more systematically, although the research study recorded here did not begin for another year. Initially, I felt that the best place to begin unravelling why actuarial students experienced so much difficulty in passing the professional examinations was to look at the examination papers themselves. I wanted to try to discover what the examinations required of students, before going on to consider why people who had previously had virtually unblemished examination records, so often failed to satisfy the assessment demands. I could not do this because I was denied access to the confidential examiners' marking schemes. Although it was very frustrating at the time, I am now grateful to the gatekeepers who stood in my way. I believe that this research, which arose from the blocking of my first plan, has grown into a more interesting and valuable research study than the one that I originally envisaged.

Sweet (1990) has since been awarded his PhD for 'An Enquiry into the Examination Procedures of the Professional Institutes in Business and Finance with Particular Reference to the Chartered Institute of Bankers'. The major part of his work was the analysis of examination questions, examination scripts and assessment procedures. His conclusions emphasised that high failure rates within the professional examinations which he studied, could not be ascribed to:

- excessive difficulty of the questions; nor
- reluctance of examiners to award high marks; nor
- the calibre of the students;

but was simply due to the poor quality of a large proportion of examination scripts. This seems to beg more questions than it answers. Why should people with a good track record in school and university examinations, produce such poor answers to relatively easy questions? My research study goes some way to illuminating this, not only for the actuarial students who were studied, but for other embryonic professionals grappling with similar systems of professional qualification.

The months of trying to gain access to the examiners' marking schedules, in the hope of pursuing my original plan, involved conversations with several of the actuarial profession's policy-makers in the field of initial qualification. There were some strenuous attempts to discourage me from looking into actuarial education, for example:

> *"There has been outside work done on actuarial education before and it did not tell us very much that we didn't know already. Perhaps you should just look at that."* 614 Obs[4]

Others were more encouraging because, at the time, there was discussion about developing an aptitude test that could be used to select new entrants to the profession and to reduce wastage.[5] These people desired the identification of factors that influenced the probability of success in the actuarial examinations. They saw that my professed interest in the initial

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[4] Codes which follow quotations from my primary data are explained in Appendix IV.

[5] Some people are still attracted to this, hence the interest in the work of Mary Patrick when she visited London in late 1993 (Patrick, 1993, 1994). This explored interest patterns of male and female actuaries in North America, using the Strong Interest Inventory, which is based on Holland's theory of vocational behaviour.

qualification of actuaries as an opportunity to test some of their hypotheses regarding influential factors.

The idea of an aptitude test, which it was envisaged would identify people who shared key characteristics with those who had previously been successful in the profession's examinations, appalled me. Particularly because of the simplistic nature of the factors that were being suggested to me as worthy of investigation, for example, 'A level' subjects, 'A level' points scores, type of educational establishment. The narrowness of this view of human potential angered me.

By then I knew that analysing past experience and trying to predict future events, was at the heart of actuarial practice. However, even in the unlikely event of it being possible, it would not have been helpful to the profession to identify simple, easily measured factors that had previously been correlated with success in actuarial examinations. The profession was then expanding and moving into new fields of activity. Traditional fields of work were changing rapidly. There was also competition from other financial professions. These were good reasons for not striving for a mechanism enabling efficient identification of more of the same.

Then I realised that my preoccupation with the question; 'Why are actuarial examinations so difficult to pass?' was, at root, concern for the **people** being buffeted by the system. What purposes did their experiences relating to initial education serve? Were these experiences necessary and fit for purpose?

My earlier study and professional experience had led me to believe that students' success in examinations was affected by so much more than a readily definable combination of easily quantified or categorised factors. Further, this type of correlational research, which had been pursed so enthusiastically in the field of education during the 1970s, had been recognised as of rather limited usefulness (Elton & Laurillard, 1979; Entwistle, 1981b; Richardson *et al*, 1987). Instead, I wanted to develop and present a 'second-order perspective' (Marton & Svensson, 1979) understanding of actuarial students' learning; that is, an analysis of learning in the context of actuarial examinations **from the students' perspective**.

1.4 Focusing on the students' perspective

Reflecting upon what was being said to me, asking searching questions and reading systematically, revealed an absence of institutional reflection upon the student experience of the professional examinations. This seemed illogical. The profession had stated its desire to reduce the time to qualification and to reduce student wastage (e g. Institute of Actuaries Futures Committee, 1987; Kennedy *et al*, 1984). Thus it followed that the students' evident, but poorly understood difficulty in passing the examinations was a problem to the profession, not just to the failing students. If the profession did not desire the degree of gatekeeping which the many-staged barrier of the examinations provided (possibly by default rather than design) there should have been institutional interest in understanding just what tripped up so many students so often. The calibre of the students could not be blamed, since the profession only recruited those with a long history of success in examinations.

I was told repeatedly that nothing would be revealed by considering the student experience of actuarial examinations. Actuarial students failed examinations because they did not properly prepare for them. As to why they did not prepare properly, it was important to remember that actuarial examinations were different from university examinations.[6] Actuarial examinations had to verify competence, not differentiate between grades of performance. They also required diligence, self-discipline, self-organisation and self-motivation to a much greater degree than university examinations. Therefore, further to the lack of value in considering the student experience, it was not felt that educational theory developed in relation to school and university examinations, was likely to be relevant in the actuarial context.[7]

Undaunted, I felt that there was much to be learnt from the students' experience of actuarial examinations. Established theory was pertinent to the actuarial context. Unravelling and

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[6] That actuarial examinations are, in several respects, different from university examinations was to become a critical theme in this research (chapters 5, 6 and 8), but I did not understand the significance of it at this stage.

[7] The stance against the value of theoretical insights from the social sciences, has softened since I began this research.

illuminating the student experience of actuarial examinations would deepen understanding of

- student success and how it was achieved
- student failure, how it was precipitated and its consequences
- the hidden curriculum, intentional and unintentional
- the nature of assessment in the context of actuarial examinations
- the role of tuition
- the roles of various stakeholders
- the complexity of the student experience.

The presentation of an analysis of the student experience of actuarial examinations would provide the profession with an opportunity to consider whether that experience was what the profession required and desired. Further, studying a muted group can produce insights into the wider profession (Atkinson & Delamont, 1990).

Following reflection upon the data I then possessed, the research questions were defined as:

- **What are the pervasive themes in actuarial students' perceptions and experiences of the professional examinations?**
- **How do these dominant concerns help or hinder the process of passing the examinations?**
- **How do these dominant concerns interact with actuarial students' perceptions of the profession?**
- **What can be learnt from different types of student experience?**

Before addressing these questions I will describe the context of my research a little more.

1.5 Describing the context

1.5.1 What is an actuary?

This is one of those questions that does not have a simple, one sentence answer. I find that over the years of this research study I have collected more than a score of definitions. This one is more informative than most:

> *"Our training and experience leads us to be part statistician, part economist and part financier, with generous helpings of law, marketing and the art of management thrown in for good measure. We apply a combination of these skills to solving problems, particularly those associated with risk. The theory of probability underlies much of our work, with the emphasis on those probabilities connected with living, dying, he ..." and sickness as well as those concerned with all forms of insurance."* (Taylor, 1993, p60)

Concise descriptions of actuaries or actuarial work often emphasise the technical, mathematical aspects; 'mathematical mandarin', 'financial engineer'. Part II shows that this is the image of the profession upon which many new entrants focus. However, the succinct description of actuarial practice that seems closest to the general view of the qualified actuaries who have contributed to this research is:

> *"... intelligent statistical analysis practically applied with an understanding of the business"* (Lunnon, 1995, p3)

Their emphasis is on practical (= pragmatic) and business.

Strictly, an actuary is a Fellow of a recognised professional body. There are two professional bodies for actuaries in the United Kingdom, the Institute of Actuaries (based in London and Oxford) and the Faculty of Actuaries (based in Edinburgh). These admit members as Fellows after completion of their joint professional examinations (and for the Institute, a period of approved work experience)[8]. However, those who have not completed the requirements for admission as Fellows are still very much members of the actuarial profession. Their numbers dictate that this would be so. In 1988, at the beginning of this research, the Institute of Actuaries had 2142 'home'[9] student members and 1870 active home Fellows. Similarly, the Faculty of Actuaries had 312 home student members and 403 active home fellows, (Grosvenor & Parkin, 1988, Parkin & Webb, 1989). The proportion of the profession's membership that is within the student category has fallen during the course of this research. For example, in 1994 the Institute of Actuaries had 2490 student

[8] There is also recognition of actuarial qualifications from overseas. For example, Fellows of the Australian Institute of Actuaries can be admitted as Fellows of the Institute of Actuaries after they have practised in the UK for a year.

[9] United Kingdom and Ireland

members and 2588 active home Fellows[10] (Institute and Faculty of Actuaries, 1994). This has largely been due to the effects of rapid expansion followed by retrenchment in the financial services sector of employment, through the late 1980s and early 1990s. Although business in this sector continues to expand, increased efficiency and changing roles mean that the demand for actuaries in their traditional areas of work is falling. The proportion of student members has also been reduced by improvements in the traditionally low qualification rate and long average time to qualification (Clark, 1994).

1.5.2 How do you become an actuary?

To become an actuary in the UK, it is necessary to pass or gain exemption from examinations which since 1994, have been common to the Institute of Actuaries and Faculty of Actuaries. Prior to this the Institute and Faculty had separate, and markedly different, examinations.

The current examinations fall into three categories: a group which cover the profession's theoretical knowledge base; a group that represent the main spheres of traditional actuarial activity; and a 'Fellowship Paper'.[11] The first group comprises actuarial mathematics, economics, finance, accounting, probability and statistics. Certain university courses can lead to exemption from some or all of these subjects. The second group comprises Investment and Asset Management, Life Insurance, General Insurance and Pensions. Finally, the Fellowship Paper is:

> "... *aimed at testing students' skills such as analysis, synthesis, judgement and communication rather than simply acquisition of knowledge. ... the student will have to demonstrate an ability to communicate technical ideas to a non-professional audience.*" (Goodwin, 1993, p66)

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[10] For completeness, it should be noted that their were also 243 home Associate members. This designation indicates either; that the member has completed all the professional examinations but not the period of approved work experience; or that the individual joined the profession before June 1975 and has since passed the 'theoretical subjects' (see section 1.5.2).

[11] Each examination subject has two papers, focused on different aspects of the syllabus. Since the introduction of the current syllabus, the professional body has recognised the enormity of clearing each double-paper examination hurdle. To alleviate the problems which this has caused, where a single paper has been failed, it is now permissible to retake it singly.

However, most of the data collection for this research occurred under the previous examination system and most of it relates to the Institute of Actuaries. This body used to examine in ten subjects, the first six being theoretical and equivalent to the current subjects A-D. Excepting the paper that included the economics part of the syllabus, these examinations were predominantly numerical. The remaining four subjects were more applied in nature, relating to the main spheres of actuarial employment. The material examined was prose-based. There was no equivalent of the Fellowship Paper.

The subjects examined by the Institute of Actuaries during this research are listed in Appendix I. Throughout this thesis I shall refer to subjects which are equivalent to those that the Institute of Actuaries used to examine as 1-6 and now examines as A-D, as the 'theoretical subjects'. I will refer to subjects which the Institute of Actuaries used to examine as 7-10 and now examines as E-H, as the 'applied subjects'. This distinction is helpful and widely recognised within the profession, but it is not literally true. The 'theoretical subjects', which students almost always study first although they are not compelled to do so, do involve a small degree of application of theory to practical issues. To a much greater extent, the 'applied subjects' contain theoretical material.[12] Three of the current 'theoretical subjects' are numerical in nature, a familiar type of course material for most entrants. The 'theoretical subject' covering economics and finance, and all the subjects from E onwards, have course material that is largely prose-based.

1.5.3 Who joins the actuarial profession?

Entrants to the actuarial profession are predominantly good honours graduates in mathematics, statistics or economics, from pre-1992 universities. For example, during 1992, 317 home students enrolled with the Institute of Actuaries, 84% of them with first or second class degrees. Only 13 of the new entrants did not come from higher education. More than a third of the new students came from just four universities: Cambridge (29), Oxford (29), Warwick (26) and City (23). Similarly, Heriot-Watt and Glasgow universities dominate entrance to the Faculty of Actuaries, (Institute & Faculty of Actuaries, 1994).

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[12] Since subjects A-D are almost invariably studied before subjects E-H, subjects A-D are often called the 'early subjects', while E-H are termed the 'later subjects'. Additionally, memories of the pre-1978 syllabus, still cause the 'theoretical subjects' to be termed the 'A subjects', and the 'applied subjects' to be known as the 'B subjects'.

Thus, **those who join the actuarial profession have previously experienced high levels of examination success**. This has an important effect on the student experience of actuarial examinations. The failure rates in the professional examinations are high (appendix II) and, for the Institute of Actuaries, the average time to qualification remains stubbornly high at around six years. This is despite concerted institutional efforts to improve pass rates and reduce the time to qualification (Daykin *et al*, 1987; Education Strategy Working Party, 1990; Kennedy, 1984).

1.6 The thesis: aims and structure

1.6.1 Aims

Earlier, I stated my aim of presenting an analysis of the student experience of actuarial examinations in order to provide the profession with an opportunity to consider whether that experience was appropriate and effective. I wanted to achieve more than this and often found myself returning to a sentence from another thesis:

> *"I wanted to describe the experience of the unemployed adolescent in a way which made it 'penetrable' for outsiders; and I wanted an audience for that description which went beyond those directly involved."* (Fiddy, 1987, p15)

This encapsulated my further aims:

- an analysis that renders an unusual and little-known phenomenon penetrable for outsiders
- an analysis of relevance to people beyond the immediate context.

The structure adopted for the thesis flowed from consideration of these three aims.

1.6.2 Structure

This thesis is arranged in four parts. In Part I the scene is set by describing the research context and formulation of research questions, discussing the research methodology and reviewing pertinent literature. Part II is devoted to a thematic consideration of the student experience of becoming an actuary. The interwoven presentation and discussion of critical themes in the students' experience is split into three strands: 'Becoming a Part-time Distance Learner' (chapter 4), 'Unprofessional Examinations?: The disjuncture of expectation and experience' (chapter 5), and 'Finding and Decoding the Clues' (chapter 6). This is

complemented in Part III, by a series of case studies which show some of the diversity of student experiences and show how different aspects of the learning experience interact. Here, the methodology of Dynamic Concept Analysis (Kontiainen, 1973, 1989) is employed to structure and deepen understanding of students' experiences. Kontiainen's model of adult learning (1991) is modified to improve its interpretive power. Finally, Part IV considers what can be learnt from this analysis of the student experience of actuarial education and assessment. Several issues for discussion within the profession are identified, as are contributions to other discourses.

1.7 Summary

I have described the development of my research questions and explained the decision to focus on the students' perspective. My four research questions were set out at the end of section 1.4. To make what follows penetrable for those unfamiliar with the actuarial profession, the context was illustrated by considering what an actuary does, the pre-qualification requirements, and the educational background of those joining the actuarial profession. I stressed that those who join the actuarial profession have previously experienced high levels of examination success. Finally, I outlined the aims and structure of the thesis.

Chapter 2: Methodology

2.1 Introduction

My background in statistical science had a strong influence upon my approach to this research. I was acutely aware of the limitations of quantitative methods. Put crudely, statistics can be very powerful in answering "what?" questions, without shedding much light upon the associated "how?" and "why?" questions. In formulating the research questions listed in section 1.4 I was very much concerned with "how?" and "why?". This directed me towards the qualitative approach to research in which I lacked both experience and confidence. However, because:

- I enjoyed statistics more than the unfamiliar interviewing, observation and analysis of text; and
- I was impressed by hearing Julia Brannen (1991) speak about the ability of quantitative and qualitative data to tell different stories;

I remained alert to opportunities to 'mix methods' Brannen (1992), despite the potential pitfalls of this (Bogdan & Biklen, 1992).

I will not rehearse the quantitative *versus* qualitative debate. It can be found in any number of places (e.g. Fielding & Fielding, 1986; Lofland, 1976; Reason & Rowan, 1981). My view is that general or abstract arguments designed to establish the superiority of one research perspective over another, or one methodology over another, are *passé*. Further, such sterile debate can hamper progress (Bryman, 1988; Potter, 1996; Silverman, 1993). Research is always located in a particular context and subject to a particular array of constraints. Research methods and approaches can be regarded as similar to an artisan's array of tools and equipment. A combination of 'knowing-in-action' and 'reflection-in-action' (Schön, 1983, 1987) leads the artisan to employ tools and equipment, appropriately and creatively in the light of the artisan's objectives and the situation's constraints. So it should be with researchers. Hence, my affinity with the emergent and opportunistic design of 'illuminative evaluation' (Parlett & Hamilton, 1972; Parlett & Dearden, 1977).

The following sections review the methodological decisions taken during this research study, their rationale and implications. However, in chapter 7 one research method will be discussed in depth. The methodology of Dynamic Concept Analysis (Kontiainen, 1973, 1989) is not yet well known in the UK and, as a relatively new technique, it is still evolving fairly rapidly. Therefore, more careful consideration of its potential, applicability and limitations is required. It is most convenient to place this in Part III near the case studies for which the method was employed.

2.2 Illuminative Evaluation

When I began studying the professional education of actuaries I wanted to carry out an 'illuminative evaluation' (Parlett & Hamilton, 1972, Parlett & Dearden, 1977). I hoped this would be a contribution to the ongoing improvement of this activity.

Patton (1990) regarded illuminative evaluation as an example of the 'transactional model' of qualitative evaluation, which:

> *"... places prime emphasis on perception and knowing as a transactional process."*
>
> (Patton, 1990, p119)

He argued that it is based upon assumptions that underpin qualitative research as a whole:

- stressing the importance of understanding people, programmes and other phenomena **in context**
- a commitment to studying phenomena without introducing external controls or manipulation
- *"the assumption that understanding emerges most meaningfully from an inductive analysis of open-ended, detailed, descriptive data gathered through direct contact with the program and its participants."*

  (Patton, 1990, p119)

My ambition was to describe and interpret the pervasive influences at work within actuarial education, including the perspectives of different groups of stakeholders. Since there was virtually no earlier work to build upon, it was appropriate that I should take a broad view of the situation (Stake, 1967). My vantage point as an outsider, in a job that brought me

into daily contact with the profession (albeit outside the mainstream of actuarial practice), was ideal for such a research study (Ruddock, 1993). However, at that time (1987-88) carrying out an illuminative evaluation was not possible because key gatekeepers within the Institute of Actuaries had no desire to have an outsider study the profession's education and examination systems (section 1.3). A pragmatic change of plan was required.

In 1988 I began working with the aspects of the system to which I could gain access: students, their employers and their teachers. In the cycles of analysis and further data collection that followed, the resistance to my work gradually subsided. Latterly, I have been grateful to receive genuine interest, support and encouragement from a number of important gatekeepers. In addition, those who will always disapprove of my work now dismiss it in good-natured terms.

Although the research presented in the following pages is not an illuminative evaluation of the education and assessment of actuarial students, it shares many of the characteristics of that approach to research. These are:

- heuristic design, informed by emerging themes and capitalising on available resources and opportunities
- the intention to interpret institutional procedures and participants' experiences in a way that provides *"information and insight for a wide audience of interested parties"* (Parlett & Dearden, 1977, p46)
- the assumption that the student experience of actuarial examinations cannot be understood in isolation from its wider contexts, for example the concurrent roles (employment and private) of actuarial students, the institutional perspective, the influence of higher education practices
- the search for pervasive influences, intended and unintended consequences; those expressed by the participants and the unexpressed. In the latter case, perhaps unexpressed because of their sensitive nature or their taken-for-granted status
- the belief *"that there is no one absolute and agreed upon 'reality' that has an objective 'truth'. Rather, there are numerous different perspectives, many of which — in uncontentious realms — enjoy consensual validity, but others which are not shared at all widely."* (Parlett, 1981, p224)

- the belief that with respect to the process of qualification as an actuary, actuarial students *"not only have insights that are worth knowing about, but also have a right to be heard."* (Parlett, 1981, p224)

This research study differs from an illuminative evaluation in

- not being desired (initially) by decision-makers
- not attempting to present the perspectives of all the various stakeholders

The latter was impossible without their cooperation and anyway, beyond my resources as a lone, part-time researcher. Nevertheless, over the years, representatives of all the various stakeholders have expressed interest in this research. Perhaps if I were beginning today I would be able to conduct the type of 'multi-perspective illumination' described by Melton & Zimmer (1987).

Illuminative evaluation was strongly criticised by Atkinson and Delamont (1986, p249) who suggested that such studies are:

> *"... doomed to remain isolated one-off affairs, with no sense of cumulative knowledge or developing theoretical insight. ... This is particularly noticeable in the extent to which their focus remains fixed on the particular research setting, with little attention to other educational settings, and practically none to settings of other sorts."*

This is valid criticism where the analysis of data or drawing of inferences is cursory. As such, it is simply a criticism of poor qualitative research and does not cast doubt on the validity of the methodology.

2.3 Four phases of the research

This research study had discernable phases common with an illuminative evaluation (Parlett, 1981, pp 221-223):

- intensive **familiarisation** with the issues and character of the situation being studied
- the formulation of **thematic lines of enquiry** emerging from an expanding knowledge base

- successive **transformation of themes** as new data were sought, analysed and integrated with that already collected
- **progressive focusing** on critical themes, and the elaboration and checking of these

I will now consider each of these phases in turn (sections 2.3.1 to 2.3.4), although it should be noted that in practice they overlapped.

2.3.1 Familiarisation

The previous chapter describes much of this phase. Starting to work among actuaries provided the necessity for a certain level of familiarisation with the views, procedures and concerns of the profession. Then in 1987 I began a research journal (Lincoln & Guba, 1985) of interesting, puzzling or apparently important things that I was told, or I observed. This now runs to more than a thousand pages, improving in quality and becoming more focused as it progresses. Simultaneously, I began a collection of documents relating to actuarial education, which has been important in various ways. The documents helped to identify potentially fruitful lines of investigation; informed the analysis of my primary data by situating it within the wider context; and served as a means of triangulation.

Particularly at the beginning, but continuing throughout the research, I tried not to miss an opportunity to hear members of the actuarial profession talk about its education and assessment system. Sometimes I listened and reflected, unwilling to disturb the balance of what was being said by contributing to it. Sometimes I engaged people in discussion of education and assessment. This was an unsettling and challenging aspect of the research methodology for me. For example, very early in my work one such discussion appeared to result in a senior policy-maker changing his mind on an issue that was then attracting a great deal of debate. My positivist background made this worrying. It felt like contaminating my data. I was suffering from the 'fallacy of objectivism' described by Denzin (1989) in his critique of the values of traditional scientific enquiry. I was seeking to illuminate a situation that I perceived to be problematic, but trying to avoid changing it because of the premium placed on objectivity within the positivist paradigm of my undergraduate education. This stance now seems irrational. I started this research because I wanted to contribute to the improvement of actuarial education and assessment, and in influencing a key person I had properly made such a contribution. As Carr & Kemmis (1986, pp 144-150) argue, 'critical

educational science' demands the *"organization of action"* in addition to the *"formation and extension of critical theorems"* and the *"organization of the processes of enlightenment"*

2.3.2 Formulating thematic lines of enquiry

During the familiarisation phase I had encountered a rich array of lay-theories about professional education and examinations. These amounted to the 'personal knowledge' or 'impressions' discussed by Eraut (1985, 1992a). I wanted to explore the recurrent ideas within the lay-theories and unearth any additional themes. This led to the cross-sectional survey (section 2.4.1), which was a postal questionnaire containing a mixture of open and closed questions. The latter were of two sorts: those eliciting biographical information to set the other data in context; and those expected to test tentative hypotheses. The more open questions were intended to extend my knowledge base in areas where I perceived it to be lacking. I expected this to identify further thematic lines of enquiry and my expectations were confirmed, but with unexpected magnitude. The majority of the actuarial students who contributed to that part of the research had a **great** deal that they wanted to tell me about actuarial education and assessment.

In retrospect it might have been better to design from the outset a qualitative, collaborative research study in the 'New Paradigm' described by Reason & Rowan (1981). However, my positivist background and inexperience with qualitative approaches prevented this.[13] My research at this stage had a hypothesis-testing orientation, largely because that was the kind of research I knew how to do and defend. My undergraduate education had emphasised works such as Cohen & Manion (1980), Bynner & Stribley (1979), and Moser & Kalton (1971). Systematically teasing out and testing other people's theories about initial qualification as an actuary was the emotionally and intellectually safe option. Later I would find the courage to abandon the approach for this research study. This grew from necessity and from increasing conviction as I read successively, Bogdan & Taylor (1975), Denzin (1989), Strauss (1987), Lather (1986a & b), and Bogden & Biklen (1992).

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[13] I think that the overwhelmingly positivist orientation of members of the actuarial profession may have prevented this, even if I had then possessed the confidence to attempt that approach.

In wrestling with different approaches to research I became a more versatile and flexible researcher. I am still happiest with quantitative work. I like large, random samples and statistical significance. However, these things are not always possible. More important, they are not always appropriate. They were neither possible nor appropriate for this work.

2.3.3 Successive transformation of themes

The themes identified during the familiarisation phase, and those that emerged from the cross-sectional survey were tentatively organised into a **description** of principal aspects of the student experience of actuarial examinations. This was informed and placed in context by my ongoing participant observation of the profession's education and assessment systems, and reflection upon my growing archive of documents.

I tested the adequacy of the tentative description with two new aspects of the research design: the longitudinal survey described in section 2.4.2 and a series of semi-structured interviews (section 2.4.3). These methods of data collection also permitted the exploration of areas in which I felt I needed more information. The interviews were split into four groups spanning four years (1991-94), while the longitudinal survey had three phases over thirteen months (1990-91). After each round of data collection and testing of the analyses to date, effort was made to integrate the new material with the old. Gradually, description of the student experience of actuarial examinations gave way to **understanding** that experience from the students' perspective. Simultaneously, I was reading and thinking about phenomenology (e.g. Atkinson, 1988; Heap & Roth, 1973; Schutz, 1970), the social construction of reality (Berger & Luckman, 1966), ethnography (e.g. Hammersley & Atkinson, 1983; Hammersley, 1992; Van Maanen, 1988), and responsive evaluation (Stake, 1975).

Having gained an understanding of many students' perspectives of actuarial examinations, I worked towards **organising** and **presenting** the students' views in a manner that **illuminated** their experience for themselves and for other stakeholders. This was achieved through setting their experiences in the context of relevant findings and theories in the literature, and by comparing the student perspective with those of other stakeholders. Attention was given to areas of discrepancy between the perspectives of the students and

those of other stakeholders. For example, the profession's examiners indicated that the examinations rewarded understanding and application of the course material, whilst nearly all actuarial students indicated a belief in the view that the examinations rewarded the reproduction of specific knowledge in a specific form (chapter 6). Attention was also paid to discrepancies between 'espoused theories' and 'theories-in-use' (Argyris & Schon, 1974, 1978). For example, the actuarial students generally claimed that they tried to understand the course material, but many of them were adopting a reproductive approach to learning (chapter 4).

The evolving analyses of the student experience were tested through presentations to actuaries and others interested in actuarial education (Bloomfield, 1991, 1993, 1994) and dozens of opportunistic conversations and discussions. Draft versions of this thesis have been read, in whole or in part, by 23 actuaries. Their comments on the degree to which it represents a recognisable reality and suggests ways forward, have been treated as further data.

2.3.4 Focusing

Grappling with the task of organising and presenting themes from my data caused me to focus on three substantive areas within the student experience. Firstly, the transition from full-time university student to part-time distance learner (chapter 4). Some aspects of this transition are shared with other embryonic professionals, while others are unique to the actuarial context. Secondly, the multifaceted disjuncture between the students' expectations and experiences of actuarial examinations (chapter 5). Thirdly, the importance attached by actuarial students to seeking out and interpreting clues about assessment (chapter 6).

The thematic presentation of the student experience of actuarial examinations that forms Part II of this thesis, provides a description and interpretation of critical issues within actuarial education and assessment. Part III goes on to explore some of the diversity of student experiences of actuarial examinations through the Dynamic Concept Analysis (Kontiainen, 1989, 1991) of seven case studies. The **relational** nature of various aspects of the student experience is made explicit through this method of analysis. It also demonstrates that **patterns** of characteristics within the student experience are more important than the separate presence or absence of individual characteristics. This is

important in this research study, since the themes identified within the student experience were unexpectedly consistent across all subgroups of students.

2.4 Principal data sources

2.4.1 Postal questionnaire: 'the cross-sectional survey'

Partly as an extension of the familiarisation phase of this research (section 2.3.1), and as the beginning of the next phase (section 2.3.2), in 1988 I devised and piloted a postal questionnaire containing a mixture of open and closed questions. The questions were designed to test the hypotheses I had been offered to account for student success and failure (section 1.3) and to allow students to describe their experience of actuarial examinations.

Unable to generate enthusiasm for my investigation within the professional body, but working within a university department of actuarial science, I took the pragmatic decision of beginning by studying the experiences of actuarial students to whom I had relatively easy access; my Department's alumni. Days of searching old student files and the profession's public records, enabled me to identify 194 alumni who had become actuarial trainees between 1975 and 1987. I tried to contact all these, but had nine questionnaires returned 'not known at this address', thus reducing the theoretical sample size to a maximum of 185. In reality it may well have been less than this since overseas letters that could not be delivered would not have been returned to me. Indeed, some UK envelopes may have been destroyed rather than returned. Nevertheless, the response rate of at least 74.5% was exceptionally high for a postal survey (Babbie, 1990; de Vaus, 1986).

This survey was cross-sectional in the sense that it elicited data about the student experience of actuarial education and assessment, from people at all stages of the process. For example, among the respondents, 32 were in their first year as actuarial students, 34 had qualified and 17 had withdrawn from the profession.

The data from the 24 respondents who had been qualified for more than a year were treated cautiously with respect to description of the student experience. I felt that their accounts of the student experience were likely to be interpreted through the perspectives of their

subsequent roles within the profession. However, in other respects the data from these people were particularly important. The majority had served as tutors or examiners and their perspectives on these roles were valuable in informing my interpretation of the student experience. For example, there is a discussion of the style of tutoring in section 6.3.

Appendix III shows that the survey respondents were mainly members of the Institute of Actuaries. This was expected because it was the Institute of Actuaries with which exemption from the professional examinations was negotiated for the courses at City University. For various reasons, but most often geographical location, some alumni became members of other professional bodies offering routes to qualification as an actuary. Data derived from experience other than with the Institute of Actuaries were not discarded, although they had to be excluded from some analyses because the situations were not comparable.

The response rate from this survey was far higher than I expected, but a much bigger surprise was the amount of supplementary data I was given. I had inadvertently touched a very raw nerve. Actuarial students had plenty to say about actuarial education and examinations, but felt that there were insufficient people interested in listening to them. I had accidentally provided a vent for this head of steam. The respondents patiently answered my questions, then they used the margins, the blank sides and supplementary sheets to tell me what **they** wanted to be known. On balance, they were rather unhappy with the process of qualification as an actuary.

I needed to organise and analyse the cacophony of cries from the actuarial students but was not confident about my ability to do this. I busied myself coding the data and fretted about how to handle the unsolicited part of it. The statistician within me was already concerned about not having a representative sample of the total population of actuarial students. I now seemed to have acquired an additional, less tractable problem: how to deal with a situation in which some people had answered questions that I had not asked, but now wished I had. Should I try to go back to the other people and ask them? I did not have the resources to do this, which was a blessing because I did not need to do it. I needed to handle the data differently and think differently about the next phase of the research. I needed to attempt 'grounded theorising' (Glaser & Strauss, 1967; Jones, 1985; Strauss & Corbin, 1990). The

lack of a viable alternative forced me to contend with the uncertainty and anguish of this. Belatedly, I stopped trying to impose my structure on the data and began reconstructing the student experience of actuarial examinations thematically from the rich data so generously given by people who wanted to contribute to this research. I began to master qualitative data analysis.

I integrated the solicited and unsolicited data by allocating a code to **every** comment that I had received. Provisionally grouping these comments, exploring frequencies and cross-tabulations, looking for surprises, allowed middle-order categories for further analysis to emerge. The themes that were tentatively isolated included: feedback, isolation, overload, support (institutional, employer and peer group), and the nature of actuarial practice. Later cycles of data collection and analysis resulted in the elaboration and integration of these, besides the emergence of other themes. The decision to abandon much of the planned analysis of the cross-sectional survey responses has rendered it inappropriate to present the questionnaire and data summary tables in the traditional manner. Instead, I will summarise how the data were handled.

Some data from the returned questionnaires and supplementary sheets were transcribed onto index cards that gradually acquired a complex system of cross-referencing as themes were identified and tested. The remainder were coded and stored using the statistical software package SPSS. This was another pragmatic choice: the package was available at work and I was familiar with its power to partition, sort and display data. I found reflecting upon frequency tables and cross-tabulations, an excellent way into developing categories and seeing links. The ease and speed of manipulation gave me more enthusiasm for experimentation than I might otherwise have had.

The statistical power of SPSS was of little concern to me within this research study. A total sample of 138, once divided into discrete subgroups soon generates samples that are too small to expect anything other than equivocal results from statistical analysis. In any case, I was not trying to answer that type of question. Interpreting concerns of human significance within the data was my aim rather than the detection of statistical significance (or more likely, lack of it). However, one statistically significant result will be reported in section 5.3 because of its great human significance.

Increasing familiarity with my data brought a sense of dominant themes within it. I struggled for months to find significant (not necessarily in the statistical sense) differences between different groups of people. I felt that there must be different types of student experience, some kind of typology, if only I partitioned the data correctly (type of employment, higher education experience, year of entry, time to qualification, gender, etc.). I failed. Everyone seemed to be saying the same things, albeit placing the emphasis on different aspects of the student experience. In addition, I came to see serious deficiencies in my snapshot picture of many actuarial students' views, at one point in time but including people at all stages of the long, complex and evolving qualification process. I needed to look at the development of actuarial students' views during this process. Further, although the respondents to the cross-sectional survey included 2.9% of the then active home members[14] of the Institute of Actuaries, they formed a biased sample since their higher education experience was atypical. Most members of the profession had not studied actuarial science at university, but for pragmatic reasons I had sampled my own Department's alumni, all of whom had done so. These deficiencies concerned me and I sought to compensate for them in other parts of my data collection.

2.4.2 Postal questionnaire: 'the longitudinal survey'

I asked those students who left my Department in 1990 and took up positions as actuarial trainees, to participate in a survey that would take the form of three postal questionnaires. Thirty-three people agreed to participate in the survey, although one withdrew before it began. I asked these people for permission to approach their employers to request the nomination of another actuarial trainee who would be starting work in the same place, at the same time, but who had not studied actuarial science at university. I then approached the nominated actuarial students directly. This yielded sixteen further participants, fifteen of whom had not studied actuarial science at university. All were graduates.

Again the questionnaires contained both open and closed questions. The closed ones were designed to elicit specific information, usually biographical; or else to test a tentatively established theme. The open questions were intended to permit the emergence of further aspects of the student experience. In fact, very few new themes were identified, more often

[14] Fellows, Associates and Students in the UK and Eire, who had not retired.

existing ones were elaborated or transformed. This was satisfying in suggesting that the cross-sectional survey had been reasonably comprehensive in its coverage. It also indicated that the major concerns within the student experience of actuarial education and assessment were not changing rapidly.

Questionnaires were sent out in October 1990, which was expected to be within the trainees' first month at work; in March 1991, just before their first set of actuarial examinations; and October 1991, the beginning of their second year as actuarial students and after one or two sets of examinations. The response rate to the survey was exceptionally good. At phase one, 47 out of 48 questionnaires were returned. Everyone responded at phase two. Unfortunately, phase three coincided with the beginning of my maternity leave and, unable to send out my usual two reminders or follow up two returned questionnaires 'not known at this address', I saw the response rate drop to 75%. This was still a high level of response. In common with contributors to other aspects of the data collection, these actuarial students were committed to helping increase understanding of the student experience of actuarial examinations. Thirty-four participants indicated a willingness to contribute further by being interviewed; by supplying supplementary information at a later date; or by engaging in discussion, written or spoken.

The data from this survey were organised and analysed in a very similar fashion to the data from the cross-sectional survey, although more swiftly, as I was becoming more proficient and confident. The dominant themes from this survey and the earlier, cross-sectional survey were: unexpected difficulties in adjusting to the new learning milieu, and multifaceted disjuncture between expectations and the experience of being an actuarial student.

2.4.3 Semi-structured interviews

In the period 1991-94, I conducted 15 taped, semi-structured interviews, lasting between 40 and 90 minutes. Five of these were fully transcribed and the remainder selectively transcribed. Each interview concerned five or six aspects of actuarial examinations. The emphasis was on highlighting changes in perspective and discovering more about themes that were becoming central to my interpretation of the student experience.

- the person's approach to learning for actuarial examinations and how this evolved over time
- the person's (evolving) views on the assessment criteria, and
- views on the relationship of the examinations to professional practice
- views on the demands and rewards of qualification as an actuary

All of those interviewed were working in England (south of Birmingham) at the time. They were selected either because they represented one or more of the subgroups within the population of people contributing to this research, or because I felt their experience would help to elaborate a particular emergent theme from the earlier analyses. The first four interviewees primarily represented different durations of actuarial study (two, four, six and eight years). The next group of four were recently qualified. The subjects of subsequent interviews were chosen sequentially with the aim of ensuring diversity and representation from different areas of actuarial practice, different academic disciplines and different tuition arrangements. Twelve interviewees had responded to the cross-sectional survey and their interviews began with them discussing and annotating their questionnaires. Two of the interviewees were women. When they were interviewed, seven of the people had qualified as actuaries and three had withdrawn from the profession.

The interview data confirmed and elaborated many themes that had emerged from the two questionnaire surveys. Most important, these conversations brought to the foreground a theme of which I had always been aware but had not previously concentrated upon: the actuarial students' preoccupation with finding and decoding clues relating to the professional examinations. This will be discussed in chapter 6.

2.4.4 Observation and reflection

My job involved ongoing contact with members of the actuarial profession, from and in a variety of contexts. I included reflections upon my interactions with the profession in the research journal that I began in 1987 (section 2.3.1), keeping in mind the ease and dangers of noting the unusual and interesting more than the routine (Bryman, 1988). Through this I gained an understanding of the perspectives of other stakeholders in relation to the themes that were emerging from the data from actuarial students. This helped to reduce the risks

of the 'biased viewpoint effect' (Moser & Kalton, 1971) which could have resulted from considering the students' perspective to the exclusion of all others

For example, as a representative of Higher Education I observed and contributed to meetings concerned with actuarial education and assessment. This developed awareness and understanding of the concerns and perspectives of actuaries, actuarial students, employers, examiners, tutors, tuition providers and employees of the professional body. In addition, my responsibilities with respect to undergraduate and postgraduate admissions brought awareness of the perspectives of groups who have an important influence upon entry to the profession: teachers and careers advisors. Perhaps most important, in 1989 I was offered the opportunity to become an assistant examiner in one of the 'theoretical' subjects. I have now performed this role six times, gaining a deeper insight into the profession's assessment process. I have been able to compare students' experience and views of the examination system with my first-hand knowledge of helping to examine one subject.

2.4.5 Collection of documents

Since 1987 I have collected documents relating to the education and assessment of actuaries. These principally relate to the United Kingdom, particularly the Institute of Actuaries. However, I have also kept abreast of the contrasting and evolving systems in Australasia and North America. This documentary record has been very important for setting my primary data in the wider context and for gaining insights into the perspectives of other stakeholders.

I have followed the examination and career progress of those who contributed to the cross-sectional and longitudinal surveys, through attention to the profession's press (besides personal contacts).

2.5 Validity

"Qualitative Analyses can be evocative, illuminating, masterful – and wrong."

(Miles & Huberman, 1994, p262)

The making sense and interpreting of the student experience of actuarial education and assessment that follow in Parts II and III, illuminate aspects of: the actuarial profession;

professional education more generally, and adult learning. It is for the reader to judge how evocative and masterful they are, and my responsibility to ensure that they are not wrong. The validity of my analyses and inferences have been tested through: reflecting upon my own biases, triangulation (Denzin, 1989) and: member checking (Lincoln & Guba, 1985, Reason & Rowan, 1981).

2.5.1 Reflexivity

Green (1994) commended a 'triangle of reflexivity' to unearth personal assumptions and bias. This involves reflection upon the answers to three questions. The first two:

- What do I think is perfect, or really working well?
- What do I think is reality, and why do I think perfection does not exist?

are answered as early as possible in the research process. The third:

- What is actually there, and how does this differ from/between the answers to the earlier questions?

is considered later in conjunction with the data. This process increases confidence that one is not simply seeing what one expects or wants to see.

Prolonged participant observation entails the risk of 'going native', that is, becoming seduced by participants' perspectives (Bryman, 1988). The process of 'gaining distance from the data' through reflection outside the field of study is important here. Serendipity has twice aided this aspect of my research. In 1991, about two thirds of the way through my data collection, I took six months maternity leave that allowed some time for reflection and reading. Upon my return, I found that I could transform and elaborate themes within the analysis such that higher levels of abstraction and integration were obtained. Subsequent data collection was planned to test the new analysis. In late 1995 I left my post within a Department of Actuarial Science to take up a research position concerned with the professional education of nurses and doctors. Thus I have gained distance from the actuarial context, although I have not allowed myself to lose contact with it. In addition, I have benefited from insights into the education of professions from a different sector of employment and quite different traditions.

2.5.2 Data triangulation

The primary data were collected at several points in time, from people at all stages of the process of qualification as an actuary, and from all areas of employment (sections 2.3.1 and 2.4.1 to 2.4.4). These data were partitioned exhaustively, to check the consistency of findings. The themes that will be presented in Part II occurred throughout the data. Where the emphasis was different between groups of people (e.g. those employed in different types of company, or those with different educational backgrounds) this will be indicated.

The themes within the various parts of my data were remarkably consistent. However, the cross-sectional survey was answered by people who had graduated between one and eleven years previously. Partitioning their data by year of graduation showed that some concerns, such as the cancellation of study leave, declined in importance. This showed that some historical problems within actuarial education and assessment had been resolved and others were significantly improved. Later data collection (sections 2.4.2 to 2.4.4) showed that there had been continued improvement of many aspects of the education and assessment process. Since there is little point in dwelling upon issues that have been resolved, or from which the situation has moved on, I will not report at length the themes that were no longer strongly present by the end of my data collection.

The primary data have been compared with secondary data within my collection of documents (section 2.4.5). This revealed that most of the themes that emerged from my data had been encountered by other authors (e.g. Brundin, 1988; DiDonato, 1991; Driver, 1989; Hardy *et al* 1988). However, prior to this research study, the themes had not been teased out to reveal their constituent parts and interrelations. Triangulation with the secondary data has verified that many concerns that will be raised in the following pages are encountered by students of other actuarial professional institutions (e.g. Casualty Actuarial Society, USA; Faculty of Actuaries, Scotland; Institute of Actuaries of Australia; Society of Actuaries, USA), thus widening the applicability of my work.

In recent years I have shared my research interest in the examination success of student members of the Institute of Actuaries with an academic actuary at the University of Kent, Guy Thomas. He hopes to isolate factors that correlate with success in the professional

examinations [15] He obtained support from the Institute of Actuaries to survey their 1991-93 cohorts of new Fellows. Thus his sample, unlike my pragmatically obtained one, is not skewed towards actuarial science graduates. His data are intentionally quantitative and categorical (except for one open-ended question). However, just as I did in the cross-sectional survey (section 2.4.1), he acquired a significant amount of qualitative data in the form of additional comments. He kindly made his anonymised qualitative data available to me. Many themes that will be discussed in later chapters were echoed in these quotations. No new themes were evident.

2.5.3 Methodological triangulation

Several methods were employed for the collection of data: postal questionnaires, interviews, participant observation and analysis of documents. For just less than a third of my informants, I have data from at least two sources (e.g. questionnaire and interview).

Contrasting approaches to analysis were employed, reported respectively in Parts II and III of the thesis. First, a standard approach was taken with the largely qualitative data (e.g. Fielding & Fielding, 1986; LeCompte & Pressle, 1993; Miles & Huberman, 1994; Silverman, 1993). Repeated reading, marking and sorting allowed middle order categories to emerge in a holistic fashion (Dey, 1993). These categories were then tested across the data, gradually being elaborated, transformed or discarded. Particular attention was paid to 'outliers'. Three dominant strands emerged: adjustment to the learning milieu, multifaceted disjuncture between expectation and experience, and cue-seeking. The components of these are discussed in the three chapters that form Part II.

Within Part III, the relatively novel technique of Dynamic Concept Analysis (DCA) (Kontiainen, 1989, 1991), is described in detail and employed in the presentation of a series of case studies. These highlight the relational nature of the themes discussed in Part II.

2.5.4 Member checking

Throughout this research study, tentative analyses have been fed back to practising actuaries and actuarial students (e.g. Bloomfield, 1991, 1993, 1994, 1996 and numerous less formal

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[15] This could be seen as revisiting part of the work of Goddard (1977).

instances). Their comments have verified that description and analysis that follow, represent a recognisable (but not wholly uncontentious) reality.

2.6 Part-time research

Apart from the writing of the thesis, this research study was conducted on a very part-time basis. Fitting it in at the margins of a busy life so that it did not compete to a detrimental degree with a growing family and increasing responsibilities within my full-time career, has been challenging. Inevitably, these challenges have influenced the design of the research and its emphasis. For example, the phases of the longitudinal survey (section 2.4.2) were timed to accommodate my maternity leave.

I have often felt frustrated at the impossibility of proceeding with the work as quickly as I would have liked. In addition, I had the sense of continually moving goal posts as the system I was studying changed month by month, sometimes radically so, necessitating reanalysis of large sections of the work. Further, while undertaking this research I have been a part-time learner, investigating part-time learners. The risk of 'going native' or interpreting my data predominantly through my own experience was high. Awareness of these dangers has prompted extensive checking of my interpretations, but this may not have eradicated all errors.

Nevertheless, the research has gained much from being conducted over several years on a part-time basis:

- I have been able to incorporate **longitudinal elements** that would have been impossible in a full-time PhD study.

- I have acquired a better **appreciation of the history** of practices, decisions and developments, and hence, deeper understanding of the issues that I have studied than would have been possible in a short-term, full-time research study.

- There is no difficulty in **gaining distance** from one's data if there is no opportunity to look at it for a month or more[1]

- I have had **opportunities to feedback to stakeholders** and interested outsiders several iterations of my analysis. The reactions and comments generated by these preliminary analyses both helped to improve the current product and were sources of new data.

- To a large extent **I have become part of the wallpaper**. In the early part of this research study many people were anxious about my interest in actuarial education and assessment, reacting defensively towards me. I felt that the small size of the profession exacerbated this. On several occasions I was told, 'I know you spoke to person X about this last week and I don't know what you thought about what he said, but ...'. Conversations with people who felt the need to be heavily guarded in their responses to me were heavy going. After months and years of not betraying individuals or maliciously rocking the boat, but consistently being around and interested in actuarial education and assessment, people forgot to worry about me but remembered my interest. Additionally, my peripheral position in the professional educational scene of the actuarial profession, was established before many of the current student members joined the profession. In their experience I have always been there on the fringe of the profession. It can be really rewarding to be perceived as part of the wallpaper.

- Pursuing this research part-time while developing my career within a university department of actuarial science permitted me to establish my **credibility** with some members of the profession through my other work (e.g. Adams *et al*, 1993; Bloomfield & Haberman, 1987, 1992; Haberman & Bloomfield, 1988, 1990).

2.7 The limitations of this research

Most of my data were collected before the introduction of the current syllabuses examined by the Institute and Faculty of Actuaries. This is of concern in two respects:

- while I believe that the themes from the student experience that I have presented are pertinent to actuarial students' experiences of the current system, I must acknowledge that this may not be so;
- the current syllabus was being discussed within the profession throughout my research and the apprehension about this impending change may have distorted actuarial students' accounts of their experiences.

For pragmatic reasons, most of my data were donated by people who were once students at City University. I make no claim to have researched a representative sample of actuarial students and recognise that this may have biased my findings. However, I separated the data from former City students from the rest, and found no statistically significant or intuitively significant differences in the two sets of data. I am therefore, reasonably confident that I have presented a generally recognisable reality.

It might have been advantageous to delay this research study for one or two years to gain acceptance and ease gatekeeping difficulties. However, if I had not started where I could in 1988, other events would probably have overtaken my wish to research this topic. This thesis may never have begun.

During this research I had my first experience of collecting data through interviews. Undoubtedly, the data from my earliest interviews are poorer than those that I collected later. If I were beginning the research today the interview data would be richer and probably, more focused.

Originally, the postal questionnaires which were invaluable in identifying themes within the student experience, were intended to provide quantitative data suitable for factor analysis. This was due to my background in statistical analysis. Very soon the statistician within me knew that these quantitative data were not reliable and were not answering the questions set out in section 1.4. With the benefit of hindsight I would have approached the postal questionnaires differently.

The nature of part-time PhD research in the social sciences is predominantly a solitary endeavour. There are considerable advantages to conducting a study such as this one, with

another researcher. This enables independent scrutiny of the raw data and cross-checking of the emerging themes. The mitigation of my lone status through discussing my analyses with actuaries and other researchers in the field of education, will probably have been only partial.

2.8 Summary

This chapter began with a discussion of the influence of the methodology of 'illuminative evaluation' (Parlett & Hamilton, 1972; Parlett & Dearden, 1977) upon this research study. Using the terminology of illuminative evaluation (Parlett, 1981) four phases of this research study were described in section 2.3.

Section 2.4 considered the principal data sources in turn. It was seen that most of the data, particularly the primary data, relate to the Institute of Actuaries. I did not discard primary data relating to other actuarial bodies, although it was excluded from aspects of the analysis where amalgamation with the bulk of the data was inappropriate. The secondary data were drawn from three continents in order to learn from different national perspectives on actuarial education and assessment.

The validity of the analyses presented in the following chapters has primarily been safeguarded by attention to: reflexivity, triangulation, careful treatment of themes of declining importance, and member checking (section 2.5).

The influence upon the methodology of my status as a part-time lone researcher was discussed in section 2.6. This was seen to have more advantages than disadvantages.

Finally, some limitations of the research were set out in section 2.7.

Chapter 3: Literature Review

3.1 Introduction

The literature selected for inclusion here, is particularly pertinent to my study of the student perspective of qualifying as an actuary. It is not a summary of all the material searched and evaluated for degree of relevance.[16] Neither could it be a comprehensive review of research in the areas that impinge upon this study, which include: adult education, adult learning, cognitive psychology, distance education, occupational psychology, professional education, and sociology of the professions. My primary focus is on what can be learnt from the student experience, therefore, literature concerning learners themselves has been selected in preference to work focused on institutional, technological or philosophical perspectives.

Due regard has been paid to the context in which actuarial education and assessment are located. For example, both the profession's small size, and its role in providing distance learning materials, assessment and professional certification in a substantial proportion of the developing world, militate against the most modern, multimedia forms of distance education. These factors also discourage certain forms of assessment (any that are: labour intensive, difficult to moderate, difficult to oversee at a distance, or require highly trained assessors). Therefore, I have selected material that illuminates the student experience and other effects of actuarial education as it occurs, in preference to the wealth of material that illustrates alternative constructions of professional education and/or education at a distance. This does not represent enthusiastic or unquestioning support for the *status quo* of correspondence courses (supplemented for the majority by some tutorials) and three hour, unseen, written examinations. Rather, it is an acceptance that the current forms of tuition and assessment employed by the Institute and Faculty of Actuaries form a thoughtful, rational response to their needs and constraints.

[16] Evaluated sources which are relevant to this research study, but not critical to the presented arguments and analyses, are listed at the end of the thesis as 'further reading'.

The material reviewed has been grouped under six headings: the actuarial profession's literature, perspectives from other professions, adult learners, adults learning in special circumstances, professional knowledge and, transition and rites of passage.

3.2 The actuarial profession's literature

Little has been written about the students' perspective of actuarial education and assessment. Rather, authors have focused on the needs of the profession and employers (e.g. Affleck, *et al*, 1988; Brown, 1989; Bykerk *et al*, 1995; Cornwall *et al*, 1975; Daykin *et al*, 1987; Truckle, 1982). The little that exists tends to be anecdotal and/or not informed either by relevant educational theory or established principles of social science research.

3.2.1 Australia

The best work to date has emanated from Australia where, unlike the UK, the vast majority of actuarial education is conducted on a full-time basis within universities. For a decade, published debate about actuarial education has been generally rigorous and imaginative. There has been a clarity of vision about the profession's education ahead of thinking in Europe and North America. The key works are: Driver (1989), Bellis & Shepherd (1993) and Bellis *et al* (1994). These will now be considered in turn.

Driver (1989) is a rare example of an educationalist being commissioned to examine actuarial education. He identified problems within the teaching, learning and assessment of 'Superannuation', which tended to be the first 'applied subject' taken by actuarial students.[17] His report of the student experience included:

- disillusionment with the tuition and assessment processes
- dissatisfaction with learning materials
- long delays before the return of marked tests
- questioning of tutors' skill and knowledge
- lack of clarity about assessment criteria
- lack of clarity about the exact scope of the syllabus

[17] At that time, it was not examined in university programmes.

- less than desired correlation between test and examination marks
- the desire for group work
- time pressure in examinations
- poor feedback.

These are all themes that will appear in Part II

Bellis and Shepherd's (1993) paper broke new ground in the profession's literature by drawing extensively on modern educational theory regarding adult learning. They believed that the demands of seeking exemption from the 'theoretical subjects' examined by the Institute of Actuaries in London, created a deadening of student learning. Largely, they made their case from personal reflection and anecdotal evidence, but reactions within the actuarial profession endorsed their analysis as a recognisable reality upon which new light had been shone. The paper was influential in stimulating debate within the profession which resulted in policy changes.

Within the actuarial programme at Macquarie, Bellis and Shepherd identified excessive workloads which students felt prevented them from assimilating the course material. Lecturers reported that students were unable to apply course material in novel situations. They felt the style of assessment required by the British professional body encouraged a 'surface approach' to learning[18] and distorted teaching. They argued that the British syllabus mirrored the hierarchy of knowledge (first 'underlying foundations' followed by 'distinctive applications', then 'skills of day-to-day practice') criticised by Schön (1987). This was seen as depriving those new to actuarial study of the framework of knowledge about day-to-day practice which would have aided assimilation of the 'core knowledge' examined in the 'theoretical subjects'. However, it was pointed out that those studying for the early actuarial examinations while working in business, albeit at:

> *"... low-level, routine calculations and other clerical tasks, whose significance and theoretical justification were often not understood"*
>
> (Bellis & Shepherd, 1993, p18)

[18] Approaches to learning will be discussed in section 3.4.2.

had the advantage of developing a 'real-world framework' to which the course content could be attached and through which it could be interpreted. This is the situation of most UK students.

To overcome the myriad of problems that Bellis and Shepherd believed the British actuarial syllabus was visiting upon them, they recommended:

- breaking the link with London
- turning the hierarchy of knowledge upside down
- strengthening links between actuarial employers and higher education
- introducing problem-based learning
- reforming assessment to include open-book and take-home examinations, collaborative projects, self- and peer- assessment
- student involvement in the design of assessment and learning tasks.

The discussion of Bellis and Shepherd's (1993) paper led to the document prepared by Bellis *et al* (1994), setting out a vision of 'actuarial education for the next century'. This has influenced thinking within the actuarial profession across the English-speaking world, certainly influencing policy-making in the UK. The vision is more student-centred than the current British system of actuarial education and assessment, and recognises the potential contribution of educational research. It talks of facilitating student learning, appreciating how people learn, and considering the effects of assessment upon learning.

3.2.2 North America

Although North American actuarial examinations and actuarial practice are substantially different from the situation in Britain, actuarial students still spend many years studying as part-time distance learners.

Cole (1989) considered the various purposes of actuarial examinations. He frequently touched upon the arduous student experience of actuarial examinations in North America, raising several issues that will be pursued in chapter 5:

- rites of passage and professional socialisation
- the relationship between the examinations and professional practice

- the role of mathematics
- prestige

Two undergraduate projects (Brundin, 1988; and extending this, DiDonato, 1991) sought to explore the process of qualification as an actuary in relation to social relationships. These were small scale surveys and the depth of analysis was not great. Nevertheless, because others have paid so little attention to this issue they were significant contributions to debate about the human side of qualification as an actuary. Therefore, they received extensive coverage in 'The Actuary', the newsletter of the Society of Actuaries. Both women devised questionnaires to elicit information relating to: career, actuarial examinations, marriage and child rearing. There was some consideration of the interrelationships between these elements of an individual's biography. DiDonato's data from a random sample of 399 US members of the Society of Actuaries (response rate 79.1%: 256 men and 58 women) revealed that 15.5% of women and 6.3% of men had delayed marriage because of actuarial examinations. However, the effect on child rearing was greater: 46.6% of women and 14.5% of men had delayed having children because of actuarial examinations. Further, 26% of women and 10% of men had temporally or permanently discontinued the examinations due to marriage or family responsibilities. Narrowing the research questions to marriage rather than all long-term relationships, while a sensible means of delimiting small-scale projects, misses valuable data. There is scope for deeper research into this interesting area.

3.2.3 Britain

Pegrum (1993), reporting on the findings of a working party charged with examining the role of women in the profession, (without referring to other research) touched upon the issues highlighted by Brundin and DiDonato, providing evidence that these apply to the UK too.

> *"Nearly half of the respondents[19] felt that there were aspects peculiar to the actuarial field which hinder women more than men ... The most frequently cited aspect was the length of study time, meaning that women either deferred starting a family (or, some said, even starting a relationship) until qualification, or faced the prospect of studying with a young family."* (Pegrum, 1993, p29)

[19] 376 female members of the profession.

She noted that those who had experienced career breaks reported that the burden of continuing to pay expensive professional subscriptions, tuition material costs and examination fees was difficult. Further, rapid technical and legislative developments in the financial sector necessitated substantial updating to facilitate a successful return to work. Although these findings are important and suggest areas in which the profession and employers can improve their practices, it is unfortunate that a report that should have addressed the role of women in the actuarial profession emerged as basically a litany of barriers to female participation and success. In particular, the framing of family responsibilities as a women's problem may have been detrimental to perception of women within the profession. Unusually, the General Purposes Committee of the Institute of Actuaries, who instigated the work, added a *post script* to Pegrum's report (p29), including:

> *"A distinction needs to be made between employers on the one hand and the profession on the other. Many of the difficulties which women in the actuarial profession experience are caused by the employers and not the profession. However, it is also true that senior actuaries are often in a position to influence the practice of their employers."*

Earlier, PWMC (1985) had provided an insight into the student experience of actuarial examinations through their survey, commissioned by the Institute of Actuaries. Besides eliciting information from careers advisors, they carried out postal surveys of 94 former students of the Institute of Actuaries (25 replied) and 151 current students or recent qualifiers (57 replied). Those who had left the profession identified as contributory factors:

- difficulties with part-time study
- disappointment with student support
- the nature of the material to be studied.

The then current members also stressed these issues and they tended to be more vehement in their criticisms. The majority of respondents felt that passing the examinations was more difficult than they had expected and (consequently) more than three quarters thought it would take longer to qualify than originally anticipated. In outlining the 'essential attributes' of an actuary, in addition to numerical or mathematical ability, respondents drew attention to communication skills, problem-solving abilities, and the ability and tenacity required to study for and pass actuarial examinations. This contrasted with their reported entry

influences which stressed mathematics, status, challenge and variety. All of these themes will recur in Part II.

Glimpses of the student experience occur in a variety of sources written from other perspectives. For example, Purchase (1981), then a newly retired member of the Board of Examiners, described the profession's examining process in some detail, several times commenting: *"despite a common belief to the contrary ... "*. Much of the paper, which was aimed at student members, was dedicated to reassurance regarding the reliability and validity of the examining process, thereby illuminating the existence of disquiet and demoralisation.

Kennedy *et al* (1984), while concentrating on the needs of the profession, noted that most of the submissions received from members concerned the professional examinations:

> *"There was a general feeling that the examinations were unduly hard and a recurring theme was the over-emphasis on time pressure in the examination room."*
>
> (Kennedy *et al,* 1984, p6)

The report also considered the student experience of high wastage rates, a topic more often discussed as an intolerable strain on the profession's resources (e.g. Gray & Wilkie, 1982, Truckle, 1982). It was noted that more than 40% of entrants withdrew within four years, that about 30%:

> *"... can then expect to qualify within a tolerable period, say nine years, a further 10% in ten years or more while the remaining 20% struggle on for periods of five, ten, fifteen years or even longer without completing the examinations. ... the waste in purely human terms must bring much anguish and disappointment. It is inevitable that a number of entrants will realise that their interests lie elsewhere, others never really buckle down to studying, but there must be a considerable number who put in hundreds, if not thousands, of hours work before finally abandoning the examinations."* (Kennedy *et al,* 1984, pp 21-22)

The Committee considered that the education and examination systems lacked structure to an extent that created:

> *"... an environment which almost encourages students to trifle with their studies in a dilettante manner."* (Kennedy *et al,* 1984, p26)

It is perhaps more likely that the absence of structure created anxiety and frustration leading to demotivation and disillusionment

By 1988 most of the recommendations of the 'Kennedy Report' had been implemented by the Institute of Actuaries. However, this was not sufficient to stave off the stinging criticisms of both UK professional bodies made by Hardy *et al* (1988) in their portrayal of *"ineffective"* and *"unacceptable"* approaches to professional education and certification. They drew attention to various types of unfairness or invalidity within actuarial examinations, including:

> *"The divergence of the reality of actuarial work from the fantasy of exam questions, especially that arising in the last two decades as a result of computerisation"* (Hardy *et al*, 1988, p9)

They identified that most of the profession's existing literature regarding education and assessment adopted the perspective of senior actuaries; that the student voice was virtually unheard; and that insufficient attention had been paid to relevant educational theory. Some theoretical perspectives that they considered appropriate were described briefly, but the case was not made as well as that expounded by Bellis and Shepherd (1993).

Hardy *et al* (1988) made a strong plea for curriculum planning through the elucidation of aims and objectives for actuarial education. However, they emphasised the behaviourist perspective and did not draw on *any* of the work that will be reviewed in sections 3.4, 3.5 or 3.6. Their main means of drawing attention to the student perspective was a quantitative summary of a postal questionnaire survey to which 85 actuarial students and 56 recently qualified actuaries replied, 40% volunteering views beyond those specifically requested. The themes they emphasised were:

- conflicts between actuarial study and work and/or personal life
- dissatisfaction with the assessment format
- severe dissatisfaction with the profession's tuition system.

As intended, this provocative paper stimulated considerable debate within the profession. It coincided with the decision to appoint an educationalist as Director of Education at the Institute of Actuaries, and made it easier for him to drive forward his favoured approach of planning tuition and assessment through the setting out of detailed aims and objectives.

Examining Board (Francis, 1990) to review existing examination procedures and suggest improvements. The report:

- endorsed the decision to define syllabuses in relation to aims and objectives rather than the existing, rather vague, reference to a 'Course of Reading'.
- stated that examination *"Question Papers fall short of desirable qualities as measuring instruments in terms of ... assessing the (implied) objectives of the syllabus; setting clearly defined tasks."* (Francis, 1990, p35)
- suggested that the examinations could become more friendly to candidates by improving: rubrics, page layouts, question structuring, and phrasing of questions.
- advised that *"The layout of questions, showing clearly what material is information and what statements are the 'questions' requires attention."*

  (Francis, 1990, p16)
- noted that the intellectual demands made upon candidates in different areas of the actuarial syllabus were strikingly different, and referred to Bloom's (1956) taxonomy: *"In Subject 4[20] almost half the marks are given for the lower order skills of recall of definitions, terms and the description of factual occurrences. Conversely, in Subject 9a (May 1989), First Paper, 80-90% of the marks are given for higher order skills the ability to analyse, explain and evaluate."*

  (Francis, 1990, p21)

The profession were invited to consider whether this was what was desired. Further, Francis questioned the profession's total reliance on three hour, unseen written papers with many unstructured questions. He suggested that assessment could become more reliable and valid by considering other forms of assessment, different question types, improving mark schemes and training examiners. Francis described the Institute of Actuaries' approach to assessment as 'old-fashioned' and pointed out that this would increasingly be at variance with the experience of candidates who had taken GCSE, reformed A levels and the consequently changed higher education courses.

I remember this report creating much food for thought! It hastened changes of practice and influenced the new examination structure proposed by Daykin *et al* (1991), a modified form of which was adopted by the profession from 1993.

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[20] Subject 4: Economics and Accounts, Subject 9: General Insurance.

3.3 Perspectives from other professions

The previous section explained that the actuarial profession's literature on education and assessment is thin in the areas of

- debate informed by educational theory
- attention to the student voice

It is important to note that this is not peculiar to the actuarial profession. Searching the literature belonging to the professions of accountancy, insurance and pensions, law, and medicine revealed that nearly all analyses of education and assessment are concerned with the needs of: the profession, employers, or education providers (e.g. Cattell, 1989, General Medical Council, 1993; Gow *et al*, 1994; Law Society, 1990). The student experience is usually accorded attention in relation to curriculum overload causing an emphasis on the reproduction of knowledge, or curricula and assessment downgrading the practical aspects of professional practice.

Approaching from the opposite direction was slightly more fruitful. There are numerous accounts of the student experience of seeking professional recognition. However, a large proportion are concerned with marketing the profession and therefore, present sanitised or idealised descriptions (e.g. Chapman, 1993; Crabtree, 1994; SoA, 1994). Much of the remainder relates to full-time higher education courses (e.g. Hirst & Cox, 1995; McIntyre & Byrd, 1996; Parry, 1993), thus having limited usefulness in relation to this research. Nevertheless, some salient perspectives from other professions are available. Perspectives from Medicine, Law, the Royal Air Force and Accountancy have been selected because the help to illuminate the actuarial case and suggest ways forward.

Both medicine and law have been forced to consider radical measures to cope with a rapidly developing knowledge-base and chronic curriculum overload (e.g. GMC, 1993; Jones 1994).

> *"The scarcely tolerable burden of information that is imposed taxes the memory but not the intellect"* (GMC, 1993, p5)

This is due to the historical weakness of requirements for postgraduate qualifications and the desire to guarantee safe practitioners.

"There is a persisting drive towards an unrealistic degree of completeness in the curriculum." (GMC, 1993, p6)

These problems, common to many professions, have been tackled in medicine and law by:

- seeking to develop an ethos of lifelong learning and the skills required for independent learning as part of the process of initial qualification
- employing problem-based learning
- strengthening post-qualification education and certification requirements
- seeking to assess capability, a combination of current performance and inferred future competence, rather than attempting to itemise and exhaustively certify the components of professional competence
- making the element of supervised practice, which is a requirement for registration, more systematic, and strengthening the role of the mentor/preceptor/supervisor.

Jones (1994) described how curriculum overload and the vain quest for completeness resulted in course materials that encouraged rote learning, a lack of integration, poor ability to apply knowledge and poor long-term recall.

"There is an assumption within the teaching methodology that the text should cover everything and that everything within the topic be covered. This in turn leads to a requirement to brevity and the repeated listing of points in a form that students commit to memory" (Jones, 1994, p 59)

Dissatisfaction with the skills of those who emerged from this system, provided the momentum for a movement towards skills-based and problem-based courses.

Likewise, dissatisfaction with the skills of those who passed the examination hurdle set for the promotion of junior officers to senior ranks, prompted the Royal Air Force to restructure this element of its training (Hutchison, 1980). The experience used to be remarkably similar to actuarial study: young graduates with demanding jobs completing lengthy correspondence courses perceived as:

"a long dark impersonal tunnel" (Hutchison, 1980, p18)

The tutors who marked the course tests felt the same way!

Examiners were critical of candidates' examination preparation, the inadequacy of which they felt was evidenced by incomplete answers, poor examination technique, a poor standard of writing and

> "... *the apparent inability of candidates to express original thought as an extension to professional knowledge.*" (Hutchison, 1980, p6)

They believed that candidates were over-reliant on 'banker' questions and last-minute cramming. Much of this mirrors the criticisms of actuarial students by their examiners, which will be discussed in chapter 6. It seems that in both professions the preparation and examination performance of candidates was adversely affected by:

- combining demanding part-time study with responsible full-time employment
- the nature of the examinations
- widespread doubts about the relevance of the examined material to professional practice.

Since the mid-1980s the RAF has gradually reformed its training; the amount of part-time distance learning for this promotion hurdle has been dramatically reduced and split into shorter sections. More of the syllabus is now covered on three or four-week residential courses. Failure rates are much lower and, senior officers and candidates are more satisfied with the learning outcomes.

Wilson (1989) identified 'occupational reality shock' (Dean *et al*, 1988; Hughes, 1958; Lortie, 1966) as a major influence in the failure of new recruits to the accountancy profession to complete their training contracts. This gap between an individual's prior expectations of work and the perception of the reality of that work, can produce great dissatisfaction, demotivation and active attempts to leave the company. Such disaffection often occurs when recruitment has engendered unrealistic expectations, or the employee's transition to the new working environment is not handled well (Dugoni & Ilgen, 1981; Phillips, 1987; Wanous, 1980; see also section 3.7).

It will be seen in chapter 5 that unmet expectations were a source of disaffection for actuarial trainees in this study. Their reactions were in many ways similar to those of Wilson's neophyte chartered accountants:

"... trainees perceive there to be much less variety in their work and even greater reduction in the insights that accounting gives them into the business world than they had been led to expect. This suggests that more realism should be injected into recruitment endeavours." (Wilson, 1989, p20)

He suggested that pre-graduation work experience was the best vehicle for reducing the incidence of unrealistic or unmet expectations.

Having seen that the professions themselves have a restricted range of literature that might aid the interpretation of their students' experiences of professional examinations, it is necessary to turn to other sources. First, the more general literature on adult learners (section 3.4) then analyses of the development, use and assessment of professional knowledge (section 3.6).

3.4 Adult learners

3.4.1 Adults as opposed to children?: andragogy and pedagogy

Like Atkins (1994), I am convinced that in most respects adult learners are not very different from pre-adult learners. However, Knowles found it useful to set out sharp distinctions. The tenets of Knowles' andragogy (e.g. 1978, 1984) are that adults:

- bring a store of experience to learning which should be recognised and used, hence, the relationship between tutor and learner should be one of mutual respect
- are life-centred and problem-centred; ready to learn whenever that learning is perceived as relevant to solving the problems they have identified as targets for change within their personal plans
- need to feel self-directed, otherwise their self-concepts (as responsible, independent decision-makers) become threatened[21]

Knowles argued that this contrasted with most formal teaching, which he termed 'pedagogy'.

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[21] Rogers (1969) said much the same thing, stressing the self-actualization of the learner. He also emphasised the influence upon learning of the perceived level of threat (cf. section 3.4.2).

> *"The pedagogical model assigns to the teacher full responsibility for making all decisions about what will be learned, how it will be learned, when it will be learned, and if it has been learned."* (Knowles, 1984, p52)

While agreeing with Jarvis (1983) that the distinction between pedagogy and andragogy seems to be based on a false perception of the education of children, I feel that considering these conceptions of teaching and learning is valuable. It seems an exaggeration to argue that most education (school and beyond) is totally teacher-directed, requiring submissive obedience from the taught. On the other hand, imagining a pure form of andragogy within formal education is difficult. An authority (or a group) will always be involved in weighing the appropriateness and success of the learners' steps towards solving the problems they identified for themselves. Therefore, regarding andragogy and pedagogy as the poles of a continuum may be more useful.

For the past few decades school, further and higher education in the UK have been moving towards the andragogical pole. Students' prior experiences have been valued more and they have been encouraged to become more reflective. The route to this, particularly in higher education, has been: more individually negotiated work; greater effort towards identifying learning outcomes; greater openness and student-centredness within the processes of curriculum development, assessment and course administration (Gibbs, 1992; Haselgrove, 1994). Although actuarial education has also been drifting towards andragogy, it is much nearer to the pedagogical pole. What will be learnt, how it will be presented, the pace at which it will be delivered, how the learning of it will be verified; these things are all very much institutionally defined. There is little scope for individually negotiated learning. This is seen by the actuarial profession as consistent with using limited resources efficiently to meet its needs to certify competent practitioners and to safeguard its good reputation (Lumsden, 1995). However, as Knowles' work predicts, actuarial students contributing to this research experienced the shift in the direction of pedagogy, encountered as they moved from university to professional studies, as a frustrating retrograde step (chapter 5).

> *"Adults have a self-concept of being responsible for their own decisions, for their own lives. Once they have arrived at that self-concept they develop a deep psychological need to be seen by others and treated by others as being capable of*

self-direction. They resent and resist situations in which they feel others are imposing their wills on them." (Knowles, 1984, p56)

However, it has been shown with higher education students that there is a degree of ambivalence here. The desire to exercise autonomy coexists with the desire to discover and meet the requirements of learning tasks set by others (e.g. Entwistle & Wilson, 1977; Laurillard, 1993; Miller & Parlett, 1974). Learners in the process of transition from one learning milieu to another often express an increased need for tutor guidance and ask for the new domain to be structured for them (Kahl & Cropley, 1986; Stewart, 1981). Knowles would argue that this is the result of dependency created by prolonged exposure to pedagogy

"For some time now I have been aware of the fact that the products of our educational system don't know how to learn – they only know how to be taught." (Knowles, 1984, p219)

However, this position led Day and Basket (1982, p150) to argue that Knowles work is not a theory of adult learning, but:

"... an educational ideology rooted in an inquiry-based learning and teaching paradigm."

3.4.2 Responding to perceived demands and the learning milieu

It will be seen in chapters 4 and 6 that the actuarial students contributing to this research devoted considerable energy to unearthing the requirements for success in their professional examinations. Therefore, considering some literature relating to student responses to their conceptions of tasks is pertinent.

The most important research in this area grew from a series of phenomenological investigations into student learning carried out by Marton and colleagues in Sweden from the mid-1970s, extended by Entwistle and colleagues in Britain. The early work (with samples of 30-40, first-year, social science and education students) used interviews to explore the ways in which they approached the studying of a given text (Dahlgren, 1975; Fransson, 1977; Marton & Säljö, 1976a & 1976b; Svennson, 1976). The most influential finding, replicated across the data collected by the team was that:

"Some subjects had the discourse itself (the sign) as the object of attention, and others were more concerned with what the discourse was about (what it signified)"

(Marton, 1976, p35)

Concentration on detail and its reproduction was termed a 'surface approach', while concentration on underlying meaning and relating what was encountered to prior knowledge became known as the 'deep approach' (Marton & Säljö, 1976a).

Hypotheses about students approaches to learning were developed and tested in a series of experiments which included attempts to manipulate the students' approaches and learning outcomes. In addition, students' experimental performances were linked with their academic performance and they were asked about their normal approaches to studying. It was discovered that students' approaches to tasks could easily be influenced, most importantly:

- making the situation stressful encouraged the adoption of a surface approach
- testing students' learning with different types of questions influenced their approach to subsequent learning tasks
- inducing a surface approach was easier than encouraging a deep approach.

The analysis of the qualitative data gathered for these studies was unusually rigorous. Although there was a danger that the similarities in interpretations from several researchers were a product of like-minded people working in close proximity, rather than evidence of the stability and ubiquity of the concepts, the concepts have since been tested all over the world and in a wide variety of settings (Marton *et al*, 1984). They have not failed, not even with the extreme contrast of science students studying at a distance (Morgan *et al*, 1982). The replication of results nullified criticism that the students who participated in the original work were not representative of the diversity of the university student population. These studies comprise a turning-point in thinking about student learning and the influence of curriculum design and assessment upon this process, particularly because of the phenomenological approach, using authentic learning tasks and analysing real learning outcomes.

The Swedish work was quickly taken up by Entwistle and his team who were already investigating student learning in an essentially quantitative manner, which was not yielding the insight that they desired (Entwistle, 1987; Entwistle *et al*, 1974; Entwistle & Wilson,

1977). The British team developed a questionnaire version of the reading experiments and so were able to collect data from many more students, spanning a wider range of disciplines. The questionnaire was also influenced by the findings of their colleague Pask (1976b, also Pask & Scott, 1972), who used laboratory experiments to explore students' learning strategies.[22] The team's survey research was supplemented by interviews. These investigations led to the elaboration of the concepts 'deep approach' and 'surface approach', besides the identification of a third approach 'strategic'[23] (Entwistle, 1981b; Entwistle *et al*, 1979; Entwistle & Ramsden, 1983). The strategic approach is characterised by the intention to achieve the highest possible marks, usually through:

- systematic time management
- optimising study conditions
- question-spotting, via the scrutiny of past examination papers, then concentration of effort in identified areas
- alertness to cues about assessment criteria.

In the following chapters the importance of a strategic approach to actuarial examinations will become clear, this is particularly noticeable in the case studies presented in chapters 7 and 8. In chapter 8, the first conceptual model presented for Dave is a further example of the well-established link between a surface approach to learning and academic failure, particularly when there is extensive text to be assimilated (e.g. Entwistle & Ramsden, 1983; Ramsden *et al*, 1986; Svensson, 1976; and indeed in the actuarial context, Shepherd, 1992). Ben shows that the deep approach can be successful in the actuarial context, but Emma

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[22] Pask & Scott (1972) described two main types of learner: 'serialists' who built up problem solutions incrementally; and 'holists' who formed complex hypotheses to test several properties simultaneously. These types had associated pathologies: 'globetrotting', the holist's tendency to make inappropriate analogies, leading to conclusions without adequate evidence; and 'improvidence', the serialist's tendency to concentrate on evidence and neglect building a synthesising overview. Although they recognised that the experiments may have accentuated the differences observed, they felt that the two approaches represented fairly stable preferred styles that would be evident in students' normal learning activities. Later, Pask (1976b) described a third type: 'versatile' learners who can operate as a serialist or as a holist, depending upon the situation.

[23] The strategic approach was also identified by Biggs (1979) in parallel work in Australia. He termed it the 'achieving approach'.

displays the problems described by Entwistle (1987) of attempting to adopt a deep approach without adequate prior knowledge, when time is short.

Unfortunately, perhaps influenced by Pask & Scott (1972) who showed that serialists find holistic learning materials difficult and *vice versa*, some work (e.g. Abouserie, 1995; Murray-Harvey, 1994) has treated approach to learning as a characteristic of individuals, in the same sense as say, eye colour. Indeed Entwistle (1987, p17) encouraged this by describing approaches to studying as *"relatively consistent individual differences"*. However, Marton (e.g. 1988) and Ramsden (e.g. 1987, 1992) are adamant that approach to learning is a student's reaction to a learning situation.

> *"An approach to learning is a description of a relation* ***between*** *a learner and a learning task: the description of an intention and an action. An approach is not something inside a student. It is dynamic: it has the idea of change tied up in it: it only has meaning with reference to a situation and to certain types of content."*
>
> (Ramsden, 1987, p276)

Thus, learning is always about a person, for particular reasons, addressing something that is set in a particular context. Learning is always 'situated' (Brown *et al*, 1989). This will be taken up again in section 3.7.

It is critical for course designers that learners can and do, adopt both deep and surface approaches (Gibbs, 1992a; Laurillard, 1979, 1984), depending upon their perceptions of what is required or what is possible in given circumstances. In contrast with the concentration on reproduction at the heart of the surface approach, the deep approach to learning with its intention to understand material by transforming it so that it becomes personally meaningful, is more enjoyable and satisfying. It almost always results in deeper understanding (Davis & Ogborn, 1977; Entwistle & Entwistle, 1992; Morgan, 1988). However, course design can easily encourage the unrewarding and ineffective surface approach to learning (Crooks, 1988; Ramsden & Entwistle, 1981; Ramsden 1988b) even when learners would prefer to adopt the deep approach. For example, Cox (1987) discovered that most of the first year engineering students he studied had sophisticated conceptions of learning, but they felt constrained by the 'grind' of their overloaded courses and the nature of the course material. Many also felt that the course content was concerned

with becoming a scientist rather than the engineers that they wished to become. They stopped trying to adopt the deep approach.

Gibbs (1992b, p9) summarises the course characteristics that tend to lead to students adopting a surface approach:

"- *A heavy workload*
- *Relatively high class contact hours*
- *An excessive amount of course material*
- *A lack of opportunity to pursue subjects in depth*
- *A lack of choice over subjects and a lack of choice over the method of study*
- *A threatening and anxiety provoking assessment system*"

It will be seen in Part II that except for long class contact hours, actuarial examinations and their associated courses exhibit all these features.

Through their illuminative evaluation of the effects of assessment in three contrasting departments at Edinburgh University, Miller and Parlett (1974) explored students' reactions to the 'hidden curriculum' (Snyder, 1971). This extended the work of Becker *et al* (1968) whose participant observation had shown that students lives are dominated by assessment demands. To cope, students exploit the hidden curriculum, 'playing the system' in a way that runs counter to the intentions of the explicit curriculum. Analysis of their interview data led Miller and Parlett to postulate the existence of three broad categories of student: 'cue-seekers', 'cue-conscious' students, and the 'cue-deaf'. The cue-conscious students talked of the need to look out for hints from staff, to note staff preferences, and to observe the impact of their in-course arguments. They felt that regard for these things would influence their final marks. The smaller cue-seeking group were not content simply to wait for these clues, but actively sought hints from staff, also deliberately trying to make a good impression. In contrast, the cue-deaf group believed that hard work was the key to success and that the assessment system could not be influenced. They did not talk about hints or clues.

In Miller and Parlett's rather small sample the cue-deaf group obtained lower degree grades than the others. However, there is probably not a simple correlation between degree of cue seeking and academic success. The researchers noticed that the cue-seekers were

> "... *remarkably self-aware, had done a lot of thinking about assessment and were notably sophisticated and articulate in their analysis of the system.*"
>
> (Miller & Parlett, 1974, p69)

These students seemed to be offering an intelligent and mature response to assessment systems that they viewed as artificial tests of their ability. (This theme will be echoed by the actuarial students in chapters 5 and 8.) Miller and Parlett linked their observations with the work of Perry (1970), who described Harvard undergraduates developing conceptions of knowledge over time, suggesting that the cue-conscious and cue-seekers could have relatively mature conceptions of knowledge, learning and assessment. This will be addressed further in section 3.4.3.

The process of finding out the demands of the hidden curriculum and clarification of explicit criteria, proceed most easily when there is ongoing dialogue between teachers and students. Indeed Laurillard (1993, p94), drawing on the work of Pask (1976a), Ramsden, (1992) and Vygotsky (1962), argued that:

> *"The learning process must be constituted as a dialogue between teacher and student"*

She added the view that the dialogue should be discursive, adaptive, interactive and reflective. The quality of dialogue between teachers and students has been shown to be critical for students' conceptions of essay-writing and hence, the quality of the resultant essays and learning (Hounsell, 1984, 1987). Studies of the influence on learning of the varying milieux within academic departments upon learning (e.g. Entwistle & Tait, 1990; Marsh, 1987; Mathias, 1981; Ramsden & Entwistle, 1981) the quality of student/teacher interaction was found to be important. This is one reason why students on large courses and modular courses may have less satisfactory experiences than other students (Gibbs & Lucas, 1995). It also places students of self-directed learning programmes and distance learners at risk, unless the course design ensures dialogue between learners and facilitators (Brookfield, 1984; Wildemeersch, 1989).

"The drama lived in the variety and ingenuity of the ways students found to move from a familiar pattern of meanings that had failed them to a new vision that promised to make sense of their broadening experience, while it also threatened them with unanticipated implications for their selfhood and their lives."

(Perry, 1981, p78)

Although Perry's work has been criticised for the unrepresentative nature of his sample (Belenky *et al*, 1986; Entwistle, 1981b, Richardson, 1983) it is important as a rare longitudinal study, capturing changes in individuals' conceptions of knowledge and learning. Further, Perry questioned the notion that people have relatively stable preferred learning styles (e.g. Kolb & Fry, 1975, assimilator/accommodator & converger/diverger; Witkin, 1971, field dependence/field independence), asking:

" when students radically revise their notions of knowledge, would they not be likely to change their ways of going about getting it?" (Perry, 1981, p102)

This aligns Perry with the work from Gothenberg and subsequently elsewhere, which holds that approach to learning is related to the learner's conception of the task and the context.

Säljö (1979), based in Sweden, in a phenomenological study with traditional university students who were at various stages of their courses, identified five qualitatively different conceptions of learning:

1. the increase of knowledge
2. memorising
3. the acquisition of facts, procedures, etc. for use in practice
4. abstraction of meaning
5. an interpretive process aimed at understanding reality

He argued that the conceptions represented a developmental series, but not all students would attain the fifth conception. The first three conceptions of learning are similar in outlook to the positions that form the dualistic part of Perry's scheme. It was shown that these early conceptions are associated with adopting the surface approach to learning (Gibbs *et al*, 1984; van Rossum & Schenck, 1984). The fourth and fifth conceptions, with their emphasis on meaning, are associated with the deep approach to learning, corresponding to the later parts of Perry's scheme.

One might speculate that students who had developed a meaning-oriented conception of learning would find it difficult to cope with a course that required a substantial amount of

rote learning, the acquisition of facts and procedures for later use. It will be seen in chapters 5 and 8 that some actuarial students felt frustrated in their desires to understand and link together the content of their courses. They also had problems linking their learning for examinations closely with their learning in professional practice. They wanted to abstract meaning and interpret what they experienced, but felt that the professional examinations rewarded the reproduction of knowledge, a conception of learning which they had moved beyond. This was a significant dilemma for many actuarial students and Laurillard (1993, p46) suggests why:

> *"Their conception of learning is an important manifestation of a student's epistemology, being, quite literally, the way they believe they can come to know."*

Säljö's work was extended by Marton *et al* (1993) who identified the original five conceptions of learning within interview transcripts released to them from a longitudinal study of a small group of Open University Students in the UK (Beaty & Morgan, 1992). They elaborated the defining characteristics of these conceptions of learning and added a sixth: learning as changing as a person. This is clearly related to the original two meaning oriented conceptions, but hierarchically above them since it:

> *"... provides an explanation for how studying books can change one's way of seeing phenomena in the world around: through learning the person changes, hence phenomena will appear differently to that person. ... One form of this dimension is the experience of a transition from having been the object of events (things happened to one) to becoming the agent of events (one makes them happen or at least has a full grasp of why they happen)."* (Marton *et al*, 1993, p298)

The conceptions of learning as making meaning and changing as a person bring us to the final group of theories about adult learners which will be presented in this section (and also back to where we began with Knowles, who stressed the readiness of adults to learn when they have identified areas of desired personal development).

3.4.4 Seeking meaning and attaining personal change

Jarvis (1987) presented a model of learning which was developed with more than 200 adult educators in a series of nine workshops. It emerged from reflection upon participants' prior

learning experiences and consideration of the adequacy of Kolb's (1984) learning cycle as a model for describing these. Kolb argued that there are four parts to learning: concrete experience, reflective observation, abstract conceptualisation, and active experimentation. He regarded these as cyclical, with the learning process beginning at any point in the cycle. Starting with concrete experience and moving round the cycle is a good model for many kinds of learning experience. It has been used as the guiding model in many professional education programmes (e.g. Harb *et al*, 1993; Studdy *et al*, 1994). However, Schön (1983) described 'reflection-in-action' where reflection immediately follows experimentation, or they may even occur simultaneously. Thus in some circumstances, jumping over parts of the cycle may be appropriate, something not envisaged by Kolb.

Jarvis' model has nine components, firstly two 'inputs': the person, the situation. Then experience (not necessarily concrete as in Kolb's model), followed by a selection from four processes: practice/experimentation; memorisation; reasoning and reflecting; and evaluation. There are two 'outputs': the person - reinforced but relatively unchanged; the person - changed and more experienced (but not necessarily changed for the better: learning can be harmful). However, the individual components of the model are less important than the nine routes that may be taken through it that comprise different types of learning in response to a potential learning situation:

1. presumption
2. non-consideration
3. rejection
4. pre-conscious learning
5. practice
6. memorisation
7. contemplation
8. reflective practice
9. experimental learning.

Jarvis describes the first three types as non-learning responses, the second three as non-reflective learning, and the final three types as reflective learning. However, the nine types do not form a hierarchy like that of Perry in which one level subsumes all those below it. A learner may select from the repertoire of nine routes depending upon the context and conception of the learning opportunity, perhaps simultaneously working at different levels on different tasks.

The types of learning which emerged from Jarvis' work are similar to those considered by Gagné (1985) as a precursor to the development of his model of instruction. In Jarvis' model, type one represents habituated behaviour. Type two recognises that we may not attempt to learn from an encountered situation because of competing demands for our time and attention. Type three is similar to Dewey's (1938) 'miseducative' experience. This might occur when the gap between an individual's biography (experiences to date) and the potential learning experience is too great and learning cannot proceed. Type four is learning from the experience of daily living without reflecting upon it and is similar to Beard's (1984) 'incidental learning'. Type five is conscious imitation, perhaps of a skill or as in role-modelling. Types six and seven are similar to Säljö's second and fourth conceptions of learning: memorisation; abstraction of meaning (page 73). Type eight is closely related to Schön's (1983) 'reflection-in-action', while type nine is similar to Kelly's (1955) idea of people as scientists, constantly experimenting on their environments to validate and elaborate their personal constructs.

Jarvis' model draws attention to the variety of responses that may follow when an individual in a particular social context encounters a potential learning experience. Critical to its interpretation and use, is the notion of 'disjuncture': a gap between current knowledge or self-concept, and an encountered situation or idealised future experience, which creates an awareness of deficiency and hence, a need to learn. This is very similar to Mezirow's (1977, 1981) idea of a 'disorientating dilemma' which begins a process of questioning that may eventually lead to 'perspective transformation': the development of a new 'meaning-perspective' which serves better to interpret experience and guide action than did one's previous interpretation of the world and one's roles within it.

> *"Maturity may be seen as a development process of movement through adult years toward meaning-perspectives that are progressively more inclusive, discriminating, and more integrative of experience. ... As we move forward to new perspectives, we can never return to those in our past. Indeed, we are continually reconstructing the reality of the past by reinterpreting it from each successive vantage point as we move from one perspective to the next."* (Mezirow, 1977, p159)

In Part II, particularly chapter 5, I will draw heavily on the concepts of disjuncture and disorientating dilemma to illuminate the actuarial students' experiences. It will be seen that

their professional education and assessment were at variance with their expectations to such a degree that learning from their new experiences was difficult. Sometimes it seemed that they were being asked to adopt a conception of knowledge and learning which they had left behind during their undergraduate education. According to Mezirow, this would be impossible and a new meaning-perspective would be required to integrate the new experiences with those less recent.

The development of a new meaning perspective is a difficult process. Mezirow (1991, pp 168-169) identified eleven phases from interview studies of mature women returning to education:

1. the disorientating dilemma
2. self-examination with feelings of guilt
3. a critical assessment of assumptions
4. recognition that one's discontent and the process of transformation are shared and that others have negotiated similar change
5. exploration of options for new roles, relationships and actions
6. planning a course of action
7. acquiring knowledge and skills for carrying out the plans
8. provisionally trying out new roles
9. renegotiating relationships and negotiating new relationships
10. building competence and confidence in new roles and relationships
11. reintegration into one's life on the basis of conditions dictated by the new perspective.

The case studies in Part III show actuarial students displaying these stages in the development of new meaning perspectives.

Perspective transformation may be sudden, following a major event; or cumulative, resulting from several small transformations of one's meaning schemes. It may also be faulty in the sense of not resulting in a view which is more inclusive, discriminating and integrative of experience. For example, when uncritical adherence to one external set of beliefs is exchanged for uncritical adherence to another external set of beliefs. Thus, perspective transformation is not inevitably developmental.

The view of adult learning adopted for Kontiainen's (1991) model, which will be the focus of chapter 7, is that learners are meaning-seeking beings, operating within a social environment. It particularly draws on the work of Jarvis, in addition to others mentioned in this section (Dewey, Kelly, Kolb, Knowles, Mezirow and Schön).

3.5 Adults learning in special circumstances

3.5.1 Part-time learners

It will be seen in chapter 4 that actuarial trainees are part-time students with substantial competing commitments. The principal problem for such students is managing their time, particularly setting aside appropriate time for effective studies (Bourner *et al*, 1991, De Winter Hebron, 1986, McIntosh, 1976). The experience of part-time learning is often described as juggling (e.g. Arksey *et al*, 1994; Lunneborg, 1994). Part-time students need particular types of institutional support which, while desirable, are less critical to full-time students. For example:

> *"Part-time students in higher education have to pursue their studies in an effective, efficient and economic manner. ... They expect educational institutions, in their dealings with them, to be similarly effective, efficient and economic."*
>
> (Blaxter & Tight, 1994, p127)

That is not to say that they expected not to have to think because they felt they did not have time for this, but that they did not feel that important and scarce thinking time should be absorbed by unnecessary institutional and administrative barriers, such as difficulties in obtaining study materials or inefficient processing of their enquiries. It will be seen in chapter 5 that the actuarial students often felt that their institutional support was deficient.

Institutional factors which students perceive as militating against their success contribute to feelings of overload, lack of control and demotivation, (Saltzberger-Wittenberg, 1983). This overload is associated with the inefficient and demotivating surface approach to learning (section 3.4.2) and perceived lack of control also adversely affects motivation and performance (Skinner, 1995). Chambers (1992) found that the degree of overload perceived by students is related to the subject matter. Difficult or uninteresting material takes longer to study, creating overload. Further, she discovered that tutors are not very skilful at estimating the time required for assignments, generally underestimating.

Part-time students tend to be more isolated than full-time students (Bourner *et al*, 1991; Haselgrove, 1994). Therefore, their need for social support to be built into the course is similar to that of distance learners, who are the subject of the next section.

3.5.2 Distance learners

Virtually all distance learners study part-time. Therefore, the comments of the previous section apply to them also. However, their most easily recognised problem is isolation, which may affect women more than men (von Prummer, 1994). Kahl & Cropley (1986) associated isolation with lowered self-confidence and a greater desire for structure within the learning materials. The process was described by Kember & Murphy (1992, p9):

> *"When students attend an institution, they form groups, and these groups provide points of reference. For example, a student may come out of a lecture feeling that he or she hasn't understood what the lecturer meant. Checking with friends, the student may find that they didn't understand either, and so is not too worried. Further, the group may get together and work out for themselves what the difficulty was. On the other hand, consider the student working alone who comes across some written material that he or she doesn't understand. Having no-one to discuss it with, the student feels that the fault is their own, that there must be something wrong with them, that they are stupid."*

Kember and Murphy continued that therefore, distance learners need two-way communication with their tutors, providing help, guidance and encouragement. They also need prompt and constructive feedback on their work and to feel confident in their tutor. These factors were also noted by Rouse (1986) who found that students particularly valued the National Extension College's practice of sending students a 'biography' of their tutor before the course began. With respect to prompt feedback, Altrichter (1991) found that students were uneasy about starting a new assignment without having received feedback on the previous one. Further, Rekkedal (1983) found that reducing turn-round time to no more than a week had a favourable effect upon learning.

It will be seen in Part II that frequently, the actuarial students were disappointed by their relationships with correspondence course tutors, particularly in their first year of study. The work of Rouse (1986) predicts this. He termed this relationship a 'study partnership', but this is a greater commitment than the actuarial profession traditionally expects from its tutors. He argued that students who are new to distance education, in response to missing the face-to-face contact that is characteristic of full-time education, seek partially to compensate for this deprivation through their relationships with tutors. Initially, this makes them dependent on their tutor, who is regarded as an authority. With skilful tutoring the

relationship gradually becomes more equal. Similarly, Stewart (1981) drew attention to evidence from the Open University that effective tutoring reduced wastage, describing the consequent 'front-loading' of tutoring and counselling. Unfortunately, the professional development of the actuaries serving as distance education tutors is minimal.

Further, Stewart cautioned that the role and required approach of the correspondence tutor is not always grasped:

> *"The correspondence tutor is not there to transmit information - all this is done in the package of materials. The role of the correspondence tutor is that of a facilitator. This requires two things: the ability on the part of the correspondence tutor to convey through his comments advice for further study and the ability to perceive his student's present state of knowledge and conceptual framework, so that the advice may be as relevant as possible to the individual student. The tutor must offer comments which are considered human, constructive and supportive. The formal nature of written comment which is not susceptible to the inflection, tone and pause of speech, renders it liable to misinterpretation. Clarity is essential."*
>
> (Stewart, 1981, p159)

The ACACE report (1983) noted that tutors with experience of both contexts found tutoring at a distance more demanding than face-to-face tutoring. Rouse (1986) suggested that it might be helpful to distance education tutors to think of the role as 'tutor correspondent' rather than 'correspondence tutor'. Of course this would also have institutional benefits since dialogue between distance learners and their tutors is an efficient mechanism for course designers to evaluate the success of their planning.

Isolation may be mitigated for distance learners by using technology to reduce the 'transactional distance'[24] (Moore, 1993) between learners, or between learners and teachers. Indeed, in the actuarial context there has been some consideration of the use of E-mail. Holmberg (1982, p9) also suggested that transactional distance can be reduced by the adoption of the tone of a 'guided didactic conversation' for written course materials.

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[24] The psychological and communication distance which exists between people as a consequence of the physical separation, creating the potential for misunderstanding.

> *"A distance education course provides actual teaching by giving complete explanations with elucidating examples, by constantly referring to what the student has already learnt to master, and by activating (interacting with) him or her. It is thus a substitute for both a textbook and the exposition of a teacher ... Naturally this does not mean that it is a complete substitute for the teacher in class (who does not only lecture but also listens, argues and influences students by his or her personality). It is meant to compensate for that part of a good teacher's activity that consists of motivating students, presenting the subject, explaining, providing exercises and causing students to reply, express opinions, and act"*

This is very similar to the notion of 'tutorial in print' promoted by Juler (1990).

The type of materials advocated are likely to include 'advance organisers' (Ausubel & Robinson, 1969), learning objectives and in-text questions (Holmberg, 1986; Marland & Store, 1982). However, Lockwood (1992) has pointed out that many learners skip over in-text features designed to aid their learning, particularly if their conception of learning is predominantly one of reproduction. Bååth (1982) stressed the need for distance education materials to provide feedback to learners, giving them some of the bench marks they require, building confidence, providing assistance and aiding motivation.

Perraton (1991, p15) gave a different emphasis to the importance of feedback within distance education:

> *"... there are ideological reasons ... unless it is built into the system, the hidden curriculum of a distance teaching system is that the educator already posses all the knowledge relevant to the student, and the latter's knowledge an understanding is of no importance to the educator."*

This would be very damaging in the context of professional education, since the learners will have developed a sense of autonomy and professional judgement that would be ignored. The devaluing of the learners' professional expertise and judgement is a theme that will emerge in chapters 5 and 6. Further, Perraton argued that the alienation which could result from flawed course design was likely to encourage a surface approach to learning.

3.6 Professional Knowledge

3.6.1 Types and use

Although this research study concentrates on the formal pre-qualification education and assessment of actuaries, this is just part of the web of interdependent aspects of learning as a professional. Eraut (1985) listed three dichotomies within professional education: pre- and post-qualification; on-the-job and off-the-job; theory and practice, stressing that these are not as clear-cut as the common, polarised representation suggests, for example behind the:

> *"...distinction between technical and practical knowledge lies an assumption that technical knowledge is used systematically and explicitly while practical knowledge is used idiosyncratically and implicitly. This is true for some kinds of knowledge and some modes of use; but to deny other possibilities is to put unacceptable limits on the symbiotic development of theory and practice. If we create expectations that theory is only used systematically, we direct attention from learning to use it in other ways and encourage its early dismissal as 'irrelevant'"*
>
> (Eraut, 1985, p123)

The idiosyncratic use of theory was discussed by Argyris & Schön (1974, 1978) who argued that as people interact they **design** their behaviour and hold theories about the design. They termed the public explanations of behaviour 'espoused theories', and also identified 'theories-in-use' which were implicit in professionals' actions: a tacit use of knowledge.

A desire to celebrate the 'tacit knowledge' (Polanyi, 1967) and artistry of professional practice, led Schön (1983, 1987) to develop his model of 'reflection-in-action' opposing the 'technical rationality' model that holds that professionals apply theoretical knowledge to practice in a conscious and systematic way. Schön draws on Ryle's (1949) distinction between 'knowing how' and 'knowing that'. This recognises that it is possible to possess some internal pattern which permits the successful execution of a complex task (e.g. riding a bicycle, communication with a client), without necessarily being able to reflect upon the pattern sufficiently to break it into a series of propositions which describe what is necessary for successful execution. Schön termed this 'knowing-in-action' and suggested that whilst operating in this manner, we sometimes encounter surprises which trigger 'reflection-in-action' causing immediate reconceptualisation of the situation and perhaps immediate experimentation with ongoing reflection-in-action to evaluate the outcomes. He argued that separately, 'reflection-**on**-action' may occur. However Eraut (1994), while concurring with

most of Schön's argument, regarded this as a false distinction related to the pace of events. Eraut saw reflection as being **on** action, but following that action more or less swiftly and operating at a variety of levels

Ellis (1992) regarded the integration of theory and practice, including the appropriate recognition of tacit knowledge and artistry, as one of the principal challenges for professional curricula. It will be seen in chapters 5 and 8 that the actuarial students grappled with a perceived gulf between the theory encapsulated in their professional studies and their experience and observation of practice. This may be regarded as symptomatic of the anti-intellectualism and downgrading of theory that Carter & Webb (1993) noted in professional education throughout the financial sector; regarded by Burrage (1994a) and Becher (1994a) as typically English, and a response to the political environment.

Torstendahl (1990b, p2) pointed out that professional knowledge:

> *"... is used by its owners as social capital and not only with the purposes connected with the immediate problem-solving to which the system itself may refer."*

This is possible because:

> *"Experts exercise authority based on the belief of others in the existence of particular skills held by them. The point of educational credentials typical of professions, is to sustain such beliefs in authority grounding skills. Professions represent socially sanctioned expertise."* (Beckman, 1990, p125)

This theme was echoed by Collins (1990b) in his discussion of 'credential inflation', which implies that the theory-practice divide in professional education may be inevitable and unbridgeable. This is problematic for learners who regard it as axiomatic that their professional education should be wholly concerned with preparation for professional practice and the need to certify competent practitioners. Such learners were commonplace in this research study and also identified by Becher (1990, p143) who quotes an academic pharmacist describing his students' progressive disenchantment with the theoretical aspects of their courses:

> *"... they seem to regard the scientific stuff as what you have to go through to be a professional."*

This raises the possibility that professional education is a rite of passage, during which (but possibly separately) professional socialisation is substantially achieved. This will be explored further in section 3.7.

Eraut (1992a, p116) asserted that:

> "... *professional work of any complexity requires the concurrent use of several kinds of knowledge in an integrated, purposeful manner.*"

He discussed three such kinds of knowledge and noted that other types exist. First, 'propositional knowledge', which can be public or private and includes discipline-based theories and concepts; generalisations and guidelines used in practice; and propositions arising from particular instances. This type of knowledge tends to dominate professional education. Secondly, 'impressions' or 'personal knowledge' arising from the individual's interpretation of experience. Eraut argued that the influence of impressionistic knowledge upon a professional's practice has been neglected and requires greater attention in professional education. Svensson (1990) also drew attention to this point, suggesting that professionals systematically transform formal professional knowledge to suit the context and client. From this he inferred that, since knowledge only lives through the people who apply it selectively, the formal body of knowledge cannot be used to predict the actions of a profession. Extending the arguments of Eraut and Svensson, it is logical that impressionistic knowledge will also influence the way in which young professionals experience their formal professional education and assessment, with its emphasis on public, propositional knowledge.

Finally, Eraut (1992a) discussed 'process knowledge' which includes professional procedures and skills, such as: acquiring, utilising and giving information; decision making; and self-management. While professional education often gives propositional knowledge precedence over process knowledge, both are essential for competent practice. Eraut argued that concentrating on professional processes would be profitable for professional education and assessment because this:

> "... *would give a more economical structure to the qualifications, as well as providing close links to the modes of learning and the use of propositional*

knowledge. It would also attend to the thinking which underpins a professional's capacity to perform in a wide range of contexts and situations."

(Eraut, 1992a, p115)

This should help learners to become 'independently capable', rather than 'dependently capable' (Stephenson, 1992).

3.6.2 Assessment

The profound effect that assessment has on learning in every context, was discussed in section 3.4.2. This section is concerned specifically with the assessment of novice professionals, particularly the relationships between various objectives within such assessment.

Concerns about reliability and validity have to be confronted whatever the context of assessment (e.g. Cole, 1989; Matthews, 1985; Preston, 1979; Rowntree, 1987). However, in the case of professional education these are both entwined with the concept of competence to practice. Eraut (1994) discussed two dimensions of professional competence: scope and quality; also noting that assessment by professional bodies amounts to making inferences about candidates' future actions and capabilities in a wider range of situations than those directly assessed.

The task of identifying competence to practice logically suggests criterion-referenced assessment: the objective comparison of performance with pre-specified criteria, such as in the driving test. This contrasts with the assessment style within general education, which seeks to identify and grade the relative performance of a candidate; norm-referencing. To attain reliable norm-referencing, tests should be constructed to discriminate well, that is, maximise the differences between candidates, spreading out their scores. This often results in mark distributions similar to the bell-shaped normal curve. In criterion-referenced assessment, there is no need to discriminate between candidates, if all meet the criteria, then all will pass. Therefore, scores in such examinations tend to be less variable than those for norm-referenced examinations, and often have skewed distributions (Fullerton *et al*, 1989). However, specifying criteria for assessment is a complex process (Wolf, 1993; Worth-Butler *et al*, 1994), particularly in the assessment of professionals before certification or licensing for practice. In this context, the crucial criteria become those which are deemed to

constitute a minimum proficiency level (which inevitably contains an element of norm-referencing, Angoff, 1974). Frequently, the crucial criteria become translated into a cutoff score (Glass, 1978) at which point, the distinction between a norm-referenced and a criterion-referenced assessment becomes one of intention and interpretation, rather than anything more concrete (Matthews, 1985; Rowntree, 1987).

Hoskin & Steele (1991, p2) listed three functions for the assessment systems of professional bodies:

- educational - *"getting students to acquire and retain both the details and the principles underlying the relevant professional skills"*
- attestation - *"ensuring that successful students have been seen to cover the required syllabus"*
- selection.

These all contain elements of reliability, validity and competence to practise.

The 'educational' function recognises that assessment manipulates learning (section 3.4.2). An assessment system that consistently identifies those with a command of specific competencies is the ideal. Nevertheless, a system which at least removed those whose deficiencies would bring the profession into disrepute and invite outside regulation (Siegrist, 1994), would probably suffice. One would expect such a system to be criterion-referenced, although provided the quality of candidates is fairly stable, a norm-referenced system with suitably stringent failure rates is likely to serve the same purpose. This must be balanced against the risk of 'false negative' errors: failing to identify and retain people who would otherwise become competent practitioners. Such errors are costly in management terms and can adversely affect the image of the profession (Jones, 1994). This is an example of the conflict that may arise between the educational and managerial objectives of an assessment system (Bates, 1983).

The early models of professionalism, based on old professions such as medicine and law, saw the assessment that led to professional qualification as protecting the public by guaranteeing competence and an ethical standard. Any subsequent shortcomings would be punished by the professional body (Collins, 1990b; Millerson, 1964). However, during the 1960s and 70s the concept of the selfless professional exercising expert knowledge for the

good of all was ridiculed, professionalisation being portrayed as the acquisition of power and prestige for practitioners through 'market closure'. This was linked to the stratification of society, and education as a means of social mobility (Collins, 1990a, Johnson, 1972, Larson, 1977). This model of professionalisation would hold professional assessment systems as means of strengthening closure and enhancing status. Reality probably contains elements of both these perspectives (Becher, 1994a) and the 'attestation' function identified by Hoskin & Steele (1991), with the emphasis on being **seen** to have covered certain material, relates to this compound perspective:

> *"Experts exercise authority based on the belief of others in the existence of particular skills held by them. The point of educational credentials typical of professions, is to sustain such beliefs in authority grounding skills. Professions represent socially sanctioned expertise."* (Beckman, 1990, p125)

Carter & Webb (1993) argued that the finance professions differ from the traditional professions because most members are employed in commercial organisations, rather than practising independently. While the public remain these professionals' 'ultimate clients' (Schein, 1972), they tend not to be the 'immediate clients' as they are in the traditional professions such as law or medicine. In the financial sector, primarily, it is the employer who monitors the professional's work. Thus:

> *"... the professional qualification and membership of the professional body are not therefore the sole guarantor of standards to protect the public interest; instead it is a responsibility shared with the employer. Hence the qualifying process (and subsequent continuing development) are closely aligned to company training and there is a close match between the needs and objectives of the professional body and those of employing organisations."* (Carter & Webb, 1993, p31)

I would also add that the finance professions have only obtained weak interprofessional closure. There is a lack of clarity among those who use the expertise of finance professionals with respect to whom should be engaged for which purpose (Adams *et al*, 1993).

The selection function identified by Hoskin & Steele (1991) relates to professions' need to maintain their status. They must select out those who might bring the profession into disrepute through incompetence or unethical practice. This would imply criterion-

referenced assessment. Professions must also ensure that supply and demand for their services do not become too unbalanced: oversupply would reduce material rewards and social status, while undersupply could invite the colonisation of previously exclusive areas of work by rival professions. The actuarial profession has obtained statutory closure over very few functions, mainly the valuation of pension schemes, investigation and certification of the 'financial condition' of insurance companies and any others writing long-term business[25] (Institute of Actuaries, 1996). The remainder of their extensive area of activity is open to competition from other occupational groups, for example accountants, investment specialists and statisticians. This would encourage norm-referenced assessment.

This section has shown that the assessment of professionals is centred on the notion of competence to practice. If the elements of competence can be clearly defined, a criterion referenced system of assessment would seem inevitable. However, the definition of valid and comprehensive criteria is difficult (Barnett, 1994). Cohen (1985) noted that assessment systems often concentrate on the professions' specialist knowledge and skills, almost ignoring the 'nonexclusive'[26] skills and knowledge, such as continued learning, self-evaluation, team working and managing information, which are:

> "... *essential prerequisites to good professional practice; the lack of them leads to many of the most serious criticisms by consumers of professional services.*"
>
> (Cohen, 1985, p175)

Also, there are conflicting objectives within assessment systems and these often distract from the intention of purely assessing professional competence, so that a mixture of norm- and criterion-referencing tends to emerge from pragmatic responses to constraints. The pattern is sufficiently familiar and its outcomes sufficiently predictable that it can command confidence and repel criticism, even if upon close inspection, it cannot be said to be performing its espoused function of detecting competence to practice.

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[25] Life & annuity; marriage & birth; linked long-term; permanent health; tontines; capital redemption; pension fund management; collective insurance; & social insurance.

[26] Elsewhere, these have been described as 'soft skill competencies' (e.g. McKensie *et al*, 1985), 'transferable skills' (e.g. Harvey *et al*, 1992) or 'generic skills' (e.g. ASME, 1996).

3.7 Transition and rites of passage

In section 3.5.2 it was noted that the isolation experienced by beginning distance learners tends to reduce their confidence and increase their dependence on information from tutors. With effective tutoring, confidence increases, dependence decreases and student wastage is curbed. Often, the need to nurture the development of adult learners' confidence and study skills is thought of as compensating for deficiencies in confidence and skills engendered by earlier academic failure (Lunneborg, 1994). However, the same processes have been observed with new research students who, while not formally operating 'at a distance', also exchange a great deal of face-to-face undergraduate teaching for solitary work (Becher *et al*, 1994; Hockey, 1994; Welsh, 1979). This demonstrates the magnitude of the transitions that even very successful learners must make when they enter a new learning milieu. It will be seen in chapter 4 that the actuarial students found this transition very difficult and that its difficulty was rather unexpected.

Some previously successful learners, upon experiencing a discontinuity in learning competence after transferring to a different learning milieu, suffer a catastrophic decrease in 'competence motivation' and 'achievement motivation'.

> *"Competence motivation describes the positive orientation towards learning created by the repeated experience of successful learning activities ... achievement motivation, relies on a striving for success which feeds on perceived success and boosted self-confidence."* (Entwistle, 1984, p7)

The 'disenchanted elite' described by Wankowski (1991) were very successful sixth formers who suffered extreme demotivation whilst making the transition to undergraduate life. Perhaps they were able to meet the demands of the sixth form very easily. Perhaps they had been victims of 'pedagogical hugging': excessive teacher attention and direction, which had enhanced academic performance. In either case, their high achievements created an expectation of future success which was not immediately experienced in the new learning environment. Unfortunately, the:

> *"... 'deposit account' of competence and charge of optimism is not self-perpetuating and dissipates with an absence of success in performance."*
>
> (Wankowski, 1991, p69)

For some students the dissipation was of catastrophic proportions, resulting in withdrawal from university. Wankowski argued that the most vulnerable were anxious students, driven by fear of failure (Birney *et al*, 1969; Entwistle, 1981).

In chapter 4 it will be stressed that nearly all new actuarial students face the challenge of concurrent transitions to learning as part-time distance students and being graduate entrants to the workforce. Herriot's (1984) study of graduates beginning work, drew heavily on the work of Super (1963, 1981). It was mainly concerned with the mutual influences of self-concept and occupational choice, including consideration of 'anticipatory socialization'. This is the process by which, to reduce the gap between self-concept and an anticipated work role:

> *"The individual may change his self-concept to accord with his preferred occupation or intended employer"* (Herriot, 1984, p116)

He noted that this adjustment is effectively towards the stereotype of the work role.

The congruence between self-concept and perceptions of occupations was similarly discussed by Mansfield (1973) who asked 300 final-year students at Oxford to indicate from a list of 15 items the abilities they saw themselves as possessing. The list included such items as ability to express oneself, leadership, intelligence, and administrative ability. The students also used the list to indicate those abilities that they perceived as essential, first in their preferred occupation, and then in a second occupation that was not a preference. Mansfield's main aim was to demonstrate the moderating effect of self-esteem on agreement between self ratings and occupational ratings. However, of prime interest here is his finding that undergraduates saw themselves as possessing a higher percentage of the abilities that they thought essential for their preferred occupation than of those they thought necessary in occupations not cited as preferences. This would be problematic if the stereotype was inaccurate or the recruitment process engendered unrealistic expectations (Ilgen & Seely, 1974; Kidd, 1982; Nicholson & Arnold, 1989; Wanous, 1973).

Arnold (1985) argued that however well researched the expectations of new entrants to the workforce, a degree of 'occupational reality shock' (Hughes, 1958) is inevitable. He discussed surprises encountered by graduates in their early months of employment. These triggered reflection and 'sensemaking' (Weick, 1995), thus being similar to Mezirow's

disorientating dilemmas (section 3.4.4). These processes result in the individual's secondary socialization into an occupational role (Arnold, 1986; Louis, 1980). Simpson (1972, pp 169-170) suggested that this occurs in three distinct phases:

> *"As a person is socialized into a role he learns its* ***cultural content*** *(i.e., its skills, knowledge, and ways of behaving toward significant others in the role set). And he also acquires* ***self-identification*** *with the role, which leads him to internalize certain values and goals. ... During the first phase, the person shifts his attention from the broad, societally derived goals which led him to choose the profession to the goal of proficiency in specific work tasks. During the second, certain significant others in the work milieu become his main reference group. Third, he internalizes the values of the occupational group and adopts the behaviours it prescribes. These three phases may overlap, but in general they constitute a sequence."*

Her empirical work was with student nurses and she also draws on the work of Becker *et al* (1961) with medical students. Thus, her phase one refers to the setting aside of idealism about helping people (termed 'lay conceptions' by Hughes, 1958) in favour of technical concern about cases. It is not clear that this phase is applicable to entrants to the financial sector, although it still seems reasonable to assert that:

> *"The first task of socialization into a profession is therefore to transform the person's lay conceptions about the occupation into the technical orientations of the insider."* (Simpson, 1972, p 171)

Nicholson & West (1989) argued that if anticipatory socialization is reasonably accurate and the transition is well managed by the employer, transitions in work roles need not be very stressful, although (p184):

> *"... post-change disillusionment is a common experience, particularly among those in career entry level jobs."*

Such disillusionment is generally short-lived because people simultaneously adjust themselves to the demands of new work roles and develop these roles according to their own needs and self-concept. Those in career entry level jobs are likely to experience most

difficulty in to developing their work roles because of the restricted nature of the roles usually assigned to newcomers. Further, Herriot (1984, p109) argued:

> "... *greater stress will result when there is a high degree of commitment to one's present role ... Hence, the more academically motivated a student, the greater the stress of making the transition to the industrial or commercial theatre.*"

Many of the new actuarial students who contributed to this research were very attached to their 'academic tribe' (Becher, 1989).

Role transitions are often aided by 'rites of passage': rituals which mark and organise the passage of an individual from one status to another. They have psychological and sociological elements:

> "... *changes of condition do not occur without disturbing the life of society and the individual, and it is the function of the rites of passage to reduce their harmful effects.*" (van Gennep, 1960, p3)

Sociologically:

> *"Rites confer status or office, legitimate it by the declaration of authority, and present it as belonging to society. Rites remind the public of the sacred trust which thus imposes obligation on both the recipient and society to preserve the office."*
>
> (Redding & Dowling, 1992, p222)

Psychologically, rites of passage ease role transitions by acting as emotional supports for those facing change. They provide an arena in which to separate from old behaviours and beliefs, perhaps also to mourn this separation, and to look forward to new practices, beliefs and values (Trice & Morand, 1989). Combining these, rites of passage legitimise biographical phases through their symbolism, thus:

> "... *the individual passing from one biographical phase to another can view himself as repeating a sequence that is given in the 'nature of things', or in his own 'nature'. That is, he can reassure himself that he is living 'correctly'.*"
>
> (Berger & Luckman, 1966, p117)

Van Gennep (1960) described three categories of rite: rites of separation, rites of transition, and rites of incorporation, noting that these can overlap. Separation rites help to detach individuals from former roles, moving them into a 'betwixt-and-between' phase. The

separation is often physical, as well as symbolic, for example, the residential 'basic training' of entrants to the armed forces, police, and clergy. During the transitional phase

> "... *former statuses and roles are symbolically stripped away, and the rite puts newcomers in an ambiguous state in which they pass through experiences that have few if any features of past or approaching conditions.*"
>
> (Trice & Morand, 1989, p398)

In fact, arguably, the more bizarre and difficult the better as an aid to extinguishing old roles and creating readiness to embrace new roles. In addition, demanding initial training can generate camaraderie which may last for many years into the new occupation, thus providing ongoing social support. Rites of incorporation are signals that the transition has been successfully completed. Some are formal, such as degree ceremonies or passing-out parades, but often they are informal and subtle, perhaps being delayed some time after formal rituals. For example, a newly qualified professional may have to wait some time before colleagues signal full integration into that role within the workplace by not commenting upon or cross-checking the individual's decisions. It will be seen in Part II that the whole experience of actuarial examinations can be viewed as a long and difficult rite of transition. Further, it will be suggested that actuarial students' transitions to a new learning milieu may not be sufficiently aided by the existing rites of separation.

3.8 Summary

In section 3.1 it was stressed that the literature reviewed in this chapter was a selection of pertinent work from a variety of disciplines. Concepts and theories critical to the analyses in later chapters, have been described and discussed, except for consideration of the methodology of Dynamic Concept Analysis. This is found in Chapter 7. Inevitably, there is much more that could have been included here, but the preceding sections relating to the actuarial profession's literature, perspectives from other professions, adult learners, part-time and distance learning, professional knowledge, and transition, are sufficient for understanding and interpreting the analysis that follows.

Section 3.2 stressed that previous studies of actuarial education have:

- neglected the student perspective
- largely ignored pertinent research from education and the social sciences.

My research addresses both omissions. It is the first extensive, longitudinal, rigorous, qualitative analysis of actuarial education and assessment.

Part II: Dominant themes in the Actuarial Students' Experience

Overview of Part II

Patton (1990, p69) defined phenomenology as asking the question:

> *"what is the structure and essence of experience of this phenomenon for these people?"*

The following three chapters offer a thematic consideration of the dominant concerns of actuarial students, with the intention of portraying the structure and essence of trying to qualify as an actuary. The presentation of analysed data, including illustrative quotations, and its discussion are interwoven. This gradually builds a picture of the students' multifaceted experience. However, mindful of Ramsden's (1987) plea for a 'relational perspective' of teaching and learning, the material presented is not totally restricted to the student perspective. The experiences and views of other stakeholders, and discussion of other aspects of the process of actuarial education and assessment, are included where this aids understanding and interpretation of the student experience.

Chapter 4 is principally concerned with the actuarial students' transitions to part-time learning and distance learning. Some consideration is also given to the simultaneous transition to the role of actuarial trainee. Conflict between the roles of actuarial student and actuarial trainee is noted, and comparison of the ease of transition to each of these roles is made. The issues raised in this chapter are not heavily context-dependent. Actuarial students encountered many challenges faced by all graduate entrants to the workforce. They shared their adjustment to the rigours of part-time distance study with other embryonic professionals.

While sharing some themes with the experience of students in other contexts, the next two chapters are primarily concerned with actuarial students' experiences of their professional examinations. Chapter 5 considers several areas of 'disjuncture' (Jarvis, 1987) between the actuarial students' expectations and experiences of the professional examinations. It will be seen that virtually all the actuarial students contributing to this research wrestled with 'disorientating dilemmas' (Mezirow, 1981,1991) relating to the meaningfulness and

relevance of their professional examinations. There was a strong sense that the kind of learning which the majority perceived as necessary for success in actuarial examinations was not meaningful. There were doubts about the relevance of the examinations to professional practice. Consequently, these actuarial students found it difficult to undertake the learning required for examination success. Chapter 6 is concerned with the actuarial students' preoccupation with finding and decoding clues relating to the requirements of the professional examinations. This preoccupation results from a dearth of explicit criteria and from the mistrust precipitated by disjunctions described in chapter 5.

For the following three chapters I have drawn almost exclusively upon data collected during the first two years of the actuarial students' experience, in fact concentrating on the first year experience. This is because the transitions to part-time learner and distance learner are made, successfully or otherwise, within this period. The discovery of the disjunctions discussed in chapter 5 tended to occur during the first year and all were apparent before the end of the second year. The discovery of a need to search for clues (chapter 6) tended to occur within the first eighteen months as an actuarial student, again more often sooner, rather than later. However, the processes of finding and learning how to use clues took longer than two years for a minority of the actuarial students. Thus, the data drawn upon mainly comprise the longitudinal survey (48 people) and responses to the longitudinal survey from actuarial students with less than two years experience (51 people).

Before presenting my analysis and discussion of the dominant themes in the actuarial students' experience of the professional examinations, I will briefly consider the previous step towards qualification as an actuary; joining the profession. This will set in context the transitions and disjunctions with which the new actuarial students found themselves contending.

Becoming an actuary: joining influences and expectations

At the beginning of this research project, when I was trying to understand more about actuarial education by talking with and listening to members of the profession, I experienced a growing sense of unease. I came to feel that actuarial practice, or specifically the role of

actuarial trainee, was not as new entrants expected it to be. This stimulated an interest in the entry influences and expectations of those joining the profession, and in the gap between their expectations and their later perceptions.

I felt that some things which seemed to have influenced people to join the profession were problematic. For example, the high level of remuneration and the mathematical content of the work were often mentioned to me as attractive. These represent different types of motivation. First, money provides extrinsic motivation, but I was doubtful whether it could sustain students through the arduous qualification process. Although actuaries are well paid, and actuarial students were extremely well paid at the time of the cross-sectional survey, the entrants to the profession are almost exclusively high calibre graduates. They could have joined other professions within or outside the financial sector. Many of them could have commanded very high salaries without qualifying as actuaries. Further, in Herzberg's (1959) terms, money is a 'hygiene factor' and not a 'motivation factor': a poor salary may decrease the motivation to remain with a particular job, but a high salary will not increase motivation within the job. On the other hand, the opportunity to apply mathematics would provide intrinsic motivation for many entrants to the actuarial profession. Indeed, 58% of the cross-sectional survey respondents indicated that the perceived opportunity to apply mathematics was an important influence upon their decision to become an actuary (see Colin in chapter 8). However, it will be seen that the role of mathematics in actuarial practice is less dominant than most of the new entrants expected it to be (section 5.3).

For those contributing to this research, the principal influences encouraging them to join the actuarial profession were (in descending order of frequency) the perception of:

- opportunities for rapid promotion ($\geq$90%)[27]
- high remuneration ($\geq$75%)
- high status ($>$60%)
- opportunities to apply mathematics ($\geq$55%)
- a challenge ($>$50%)
- a range of career paths or the variety inherent in work as an actuary ($\geq$50%)

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[27] The uncertainty is because not everyone was asked about these things, although many volunteered the information.

There were no striking differences in the importance of these influences between men and women, or between those joining insurance companies and those joining consultancies. Students from overseas were influenced by the factors above and, in addition, often stressed the need for actuaries in their home countries. Where there were very few qualified actuaries (sometimes none) the desire to take on the challenge of filling this gap may have been linked with the prestige and material rewards which would follow. Therefore, this factor could be subsumed within the influences already listed.

Having summarised the main influences which encouraged the actuarial students to join the profession, I will briefly consider their expectations upon joining. They expected the things which encouraged them to join: material success, status, challenge, variety, demand for particular skills. In addition they expected (in descending order of frequency):

- to pass the professional examinations (100%)
- to have to work hard to qualify, but to be equal to the challenge (>80%)
- that the professional examinations would be relevant to professional practice, and that professional practice would be relevant to the professional examinations (>75%)
- to enjoy the office work (>70%)
- that content and choice of questions apart, the professional examinations would be essentially the same as university examinations, for which they had devised successful strategies (>70%)
- that learning at a distance would be like learning at a traditional university, but with correspondence course notes replacing lectures (>60%)
- that the main difference between full-time study and part-time study would be rearranging their schedules, with more study falling within what had hitherto been considered leisure time (>50%)
- that people would be available to help them with their studies, and would be proficient and enthusiastic in providing this assistance (>50%).

The degree to which these expectations were met, and the influence of this on the students' perceptions of actuarial examinations, will unfold in the following three chapters. It will be seen that the actuarial students experienced significant gaps between expectation and reality, causing them to reassess their views of the professional examinations. Indeed, some

previously successful approaches to study and examinations seemed impossible in the context of actuarial examinations. Virtually all of the actuarial students who contributed to this research came to share the policy-makers' espoused theory (page 21) that actuarial examinations are not like university examinations. However, the students and policy-makers held rather different views of why this was so.

Chapter 4: Becoming a Part-time Distance Learner

4.1 Introduction

This chapter will consider actuarial students' adjustment to the status of part-time distance learners. This is not an adjustment which is unique to actuarial students (e.g. Hutchison, 1980; Lunneborg, 1994). However, it is a facet of the experience of becoming an actuary which has previously been neglected. The actuarial literature does not contain reflection upon the ramifications of actuarial students' situation as part-time distance learners. The professional body has not employed distance education specialists. Actuarial employers and the professional body provide study skills courses for new actuarial trainees, but these are not focused on the implications of becoming a part-time distance learner. Actuarial students are expected to negotiate (perhaps muddle through) these transitions with very little assistance. A few people suggested to me, without terming it as such, that this is part of the 'rite of passage' for those who aspire to belong to the profession.

Of the simultaneous role transitions: university student to employed actuarial trainee, and university student to actuarial student; the latter was experienced as the more difficult. This was unexpected for the vast majority of entrants. This will be considered further in the next section, after which the actuarial students' experiences of the peculiar demands of part-time study and learning at a distance, will be discussed in sections 4.3 and 4.4. Section 4.5 considers various aspects of being a part-time distance learner in the context of preparation for actuarial examinations. The expectation and experience of the nature of these examinations will be the focus of the next chapter. Throughout, the recurrent theme will be overload.

4.2 Becoming

Becoming a student member of the actuarial profession is a time of multiple transitions. For all but a handful of those included in this study, these changes occurred both at the end of full-time university studies and at the beginning of permanent employment. Individuals were

leaving behind the role of university student which they had perfected over three or four years, and in which they had experienced a high level of success. They became permanent employees. They started to work towards becoming professionals. They gave up being full-time students and became part-time students. They started to study at a distance, a new experience for all except two. Almost everyone changed accommodation. Most moved location. They were physically more distant from many of their friends. They had to establish relationships with a variety of new people. They had to discover what their new roles entailed. They had all the opportunities and challenges common to graduate entrants to the workforce (Arnold, 1985; Herriot, 1984; Keenan & Newton, 1986). They shared the environment of the financial sector with many other embryonic professionals, such as investment specialists and accountants (Fisher & Murphy, 1995). They had the unique challenge of the actuarial examinations.

About 5% of those who contributed to this research seemed to take all this in their stride, while the remainder reported difficulty in adjusting. This may have been because some changes were not anticipated, or only hazily so.

4.2.1 Unexpected transition and disenchantment

The primary role with which this research is concerned is that of 'actuarial student', preparing for and sitting examinations. This necessitates a secondary focus on the parallel role of 'actuarial trainee' in the workplace. The vast majority of those contributing to this research found the role transition to actuarial **student** more difficult than the role transition to actuarial **trainee**, although only one indicated expecting this (his father was an actuary). This appears to stem from a lack of anticipation that becoming an actuarial student would be a role transition.

I would paraphrase the virtually unanimous view within my data, relating to the imminent commencement of work and professional study, as:

> 'Well, I am a successful exam taker, I know how to study, I have been doing it for years. The thing that will be different now is coping with a job as well. Obviously there will be less time for studying and more will have to be done in the evenings and at weekends. Nevertheless, I am prepared for hard work and a curtailed social life while qualifying. The ultimate rewards make this sacrifice worthwhile.'

Perhaps this was not unreasonable from very successful students facing further study in what they generally perceived to be a closely related discipline (but see section 5.2). Their long years of success as students had built up a store of psychological success, increased self-esteem, enhanced self-concept, a belief in competence with respect to preparing for and taking examinations (Entwistle, 1981b; Handy, 1985). As a result, they were very willing to take the risk of commencing actuarial studies and examinations, despite many knowing that about half of those who commence, do not qualify. However, being a part-time distance learner, especially in the actuarial context, was very different from being a university student.

The realisation of the need for significant changes in approach, because familiar strategies became ineffective or impractical, was often accompanied by reactions similar to the disenchantment of new undergraduates described by Wankowski (1991). It was expected that being an actuarial student would be hard work but manageable: they expected to succeed. When the role was much more difficult than they had imagined and the novel possibility of examination failure became only too apparent, nearly all became discouraged. Many came to doubt that qualifying as an actuary was really what they wanted to do (e.g. Ben in chapter 8). The vast majority came to doubt the validity of the qualification process (chapter 5). For example, within this doubting they questioned:

- the relevance of the professional examinations to professional practice
- the reliability and the validity of the assessments of their learning
- the degree to which the profession's education system was itself 'professional'
- whether the prestige attached to qualification as an actuary was deserved.

4.2.2 Rites of passage

Perhaps the lack of preparedness for the role transition to actuarial student lies in the lack of an effective rite of passage to support this process (section 3.7). With respect to commencing work as actuarial trainees, the often rigorous and demanding recruitment and selection procedure could be regarded as the rite of separation. Then, virtually all the actuarial trainees had a period of planned induction shortly after commencing work. This acted as the rite of transition. Information was imparted and expectations were transmitted, newcomers from several departments tended to be brought together, thus engendering a

sense of community. Rites of integration were less often reported, perhaps because they were less clearly defined, but included for example, being invited to departmental or company social functions.

On the other hand, detecting the equivalents of any of these three constituents of a rite of passage aiding the transition from university student to actuarial student is very difficult. Most important, there appears to have been no separation rite to help people begin the process of changing their way of being a student. There was a need, unanticipated by most new actuarial students, to approach studying and taking examinations in a different manner, but the mechanisms in place to alert people to this were very weak. Acceptance as a student member of the professional body, the symbolic transition to actuarial student, was very low key, a formal letter. It was accompanied by information about the professional body, in particular its student services and examinations. Advice that the professional examinations are different from university examinations, and suggestions about an appropriate approach to the professional examinations, were embedded in the information supplied. However, most new actuarial students did not decipher the code. Exhortation to treat actuarial examinations differently from university examinations was common from employers and those speaking on behalf of the profession. However the message, if received, was not necessarily useful:

> *"People say these exams are different, but they don't say anything to help you, they don't say how or why. They just say they are different."* f203 Tape qual-med[28]

This is a theme to which I will return in chapter 6.

It seemed that for some unfortunate actuarial students, the separation rite beginning their journey from successful students in the university context to successful actuarial students, was the experience of failing their first professional examinations; that is, nine months after becoming actuarial students. For example, one actuarial student after failing his first year examinations lamented his:

> *"Lack of preparation for the nature of the exams, they were unlike any others I had ever sat, yet this only really hit me once I was in the exam room. ⇒ exam technique training."* 167 Q'naire qual-med

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[28] Codes following quotations from my primary data are explained in Appendix IV.

Some companies did manage the transition from university student to actuarial student pro-actively. For example, one appointed both an 'uncle' (or an 'auntie') and a 'cousin' for each new actuarial trainee. The role of the uncle or aunt, who was a recently qualified actuary, was threefold. To:

- monitor the niece or nephew's study, perhaps via noting progress through correspondence course tests;
- offer some help with the courses when necessary; and
- perhaps very importantly, to give the niece or nephew a personal view of the experience of becoming a successful actuarial student.

The role of cousins, who were experienced actuarial students, was less formal but equally important. They were encouraged to socialise with the new actuarial student with the aim of providing support in the form of empathy and accumulated wisdom regarding the process of studying for and passing actuarial examinations. It seems that the level of practical assistance provided by the allocated 'relatives' was quite low, but the students' perceived levels of support were quite high; a 'Hawthorne effect' [29]. Even in companies without an elaborate scheme, the transition to a new way of being a student was eased for some of those contributing to this research by helpful social interaction with actuaries and other actuarial students.

4.2.3 Control and fatigue

Role transition is stressful and although it should be remembered that this is not necessarily a bad thing (Nicholson & West, 1989), the process is demanding. Over 80% of the actuarial students reported feeling very tired during their first year of actuarial examinations. Some of this fatigue was physical, related to a longer working week and often more arduous travel between home and work than between home and university. However, it also had emotional and cognitive aspects. The new actuarial trainees had a higher proportion of their time committed to compulsory or essential tasks than was the case when they were undergraduates. Moreover, many of these tasks were constrained to occur at particular times which, lectures apart, was less often the case at university. It follows then, that they had a smaller quantity of rest time and less control over its position in the week. These

[29] Term derived from the work of Mayo, particularly that at the Hawthorne Works of the Western Electric Company in Chicago 1924-27, which is succinctly described and discussed in Brown (1954).

conditions made fatigue more of a problem than they had previously found it. The level of compulsory activity led to tiredness. The more restricted opportunity for rest time made it harder to recuperate. The residual lassitude made it more difficult to complete the next round of compulsory activity. The weariness then became cumulative, a vicious circle from which it was difficult to escape. The burden of compulsory tasks and lack of time, quickly made some actuarial students feel that they had little control over their lives.

It was not just a matter of finding the physical energy required for carrying out the tasks essential to daily living; for commuting, for office work, for study, and for social activities too. Learning the new roles of employee, aspiring professional and part-time distance student; in a new social context, was draining. They were suffering from 'role overload' and 'role conflict' (Handy, 1985). It will be seen in the next section, which concentrates on the part-time nature of studying as an actuarial student, that the overload and conflict could be mitigated by downgrading one or more roles. Reducing the acknowledged importance of a role allowed individuals to accept doing less than their best in this sphere and concentrating their efforts elsewhere.

4.3 Part-time

4.3.1 Overload

Being a part-time student means juggling the demands of that role with the demands of contemporaneous roles (ACACE, 1983; Bourner, 1991; Harris, 1987). Part-time students often feel that they cannot give as much of themselves as they would like to each of their roles, there is simply not enough time to do this. Usually something has to suffer, and choosing what should suffer can be a difficult decision. The problem is exacerbated when the level of essential activity in a person's life, or at least activity perceived to be essential, is high enough to make them feel overloaded, without control. This was the case for the vast majority of the actuarial students who contributed to this research. The factors contributing to their sense of overload which will be discussed in this chapter are:

- the combined load of office work and study
- the contrast between the final year of full-time undergraduate study and part-time professional studies

- insufficient experience in managing time and conflicting demands
- the influence of degree subject on the nature of adjustment required in the new learning context
- the temptation to devote too much time to office work
- personal circumstances
- overloaded courses.

The combined effect of these facets of part-time study for actuarial examinations was a very demanding juggling feat. It was not the level or style of challenge that the actuarial students had in mind when they selected the profession (pages 97 and 194).

Their workload, even just in terms of office work and study, was high. Most trainees were doing between 30 and 40 hours office work each week, while several employers were suggesting that 20 hours study per week was an appropriate target. One personnel officer, in an address to potential new recruits, cheerily illustrated the 'ease' of attaining the weekly study target:

> *"That's just four hours on each of your study afternoons and a couple of hours a night, six nights a week, which still leaves one of the weekend days completely free; or you could organise it differently to suit yourself. ... It's much better to ruin your life for two years than to half ruin it for five."* f 608 Obs

Certainly this level of work and study is possible, indeed in later years many would go on to adopt longer work and study weeks, but it is a punishing schedule.[30] It is a longer working week than they consistently completed as undergraduates, similar to the level of increased effort for concentrated periods before assessment dates.

Consistently working and studying at this rate requires tenacity and sacrifice. It is difficult to maintain without a strong belief that the effort is worthwhile, that it is what one really wants to do. Almost all the actuarial students who contributed to this research asked themselves whether the pain was worthwhile. For some the answer was unequivocally, yes. They tended to be extrinsically motivated by the rewards beyond the barrier of qualification. No-one reported finding their studies intrinsically motivating, which is a theme to which I

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[30] In March, four to six weeks before their first set of professional examinations, the first year actuarial trainees who contributed to the longitudinal survey reported (however accurately) studying for an average of 15-20 hours per week.

will return in the next chapter. The majority experienced fluctuating levels of conviction about whether studying for actuarial examinations was worthwhile, and what they really wanted. The principal concerns causing their doubts will be discussed in the next chapter, but some doubts arose simply from the difficulty of juggling the demands of an overcrowded life in which actuarial examinations seemed to consume too much. For example, the actuarial trainee who found that working and studying

"Doesn't leave any time to live." f820 Q'naire withdrawn

Or, echoing her sentiments, another trainee thought that his progress through the professional examinations was impeded by:

"Trying to have a life apart from the office and actuarial studies."

277 Q'naire qual-fast

It is worth revisiting the personnel officer's words which were quoted on page 107, for two reasons:

"It's much better to ruin your life for two years than to half ruin it for five."

f608 Obs

Firstly, none of the aspiring actuarial trainees in the room flinched when she talked of actuarial examinations ruining their lives, but she meant it. She had first hand experience of being a part-time distance student (in a different context). I also felt that she had a fairly good appreciation of the effort required to pass the actuarial examinations, but she did not seem to convey much of this appreciation to the assembled students. This was partly due to the cheery optimism of her presentation which was intended to sell her company to the best applicants present, since these would later be in a position to select among competing job offers. Nevertheless, the students present were also conspicuously 'cue deaf' (Miller & Parlett, 1974). They felt that while other people might find it difficult to juggle work and study and everyday life, they would not. They organised themselves perfectly adequately now and they would continue to do so next year, even if it would be a bit more of a challenge, after all they were looking for a challenge (page 97).

Secondly, the personnel officer was describing a 'greedy institution' (Coser, 1974). One which seeks the undivided commitment of its members, resenting their outside activities; but attains this through appearing highly desirable to aspiring members, rather than through coercion. There is often a clear agenda of resocialisation, perhaps to 'knock out of them'

the attitudes engendered by higher education (Parry, 1990). Coffey (1994) noted that this pressure partly encouraged the accountancy trainees she studied, to support each other through a difficult time. However, the individual and organizational goals of qualification and competitive promotion limited the type and extent of cooperation between peers.

4.3.2 Prior experience as a disabling influence

It was noticeable in this research that comparison between actuarial study and undergraduate study tended to refer to the final undergraduate year, rather than the entire undergraduate experience. This was particularly demoralising for the aspiring actuaries because the final year of a degree is often the most enjoyable. The lowering of spirits was compounded because time management and prioritising tasks should not be difficult for final year undergraduates without significant extra-course responsibilities. Courses are planned such that there is sufficient time for the required tasks. Managing time well is a bonus which creates free time, but it is not vital. Further, if all tasks are completed, prioritising them is not essential. Most of the new actuarial students had not yet needed to become proficient at this type of self-management. Consequently, 89% of them experienced difficulties with time management.

Problems with time management and finding an effective approach to study in the new context were experienced somewhat differently by graduates of different disciplines. Therefore, I will consider in turn graduates of mathematics, engineering, economics and actuarial science.

Those contributing to this research who had pure mathematics degrees had typically been timetabled for seven lectures per week during their final undergraduate year. They were set problems each week and most had a project to complete. The majority expressed the view that most of their work was *"something you could either see or you couldn't"*. Thus if it were something they could 'see' they did not have to work very hard or spend too much time on the assignment. They were referring to the possibility of solving problems by reasoning from first principles and therefore, the lack of necessity to memorise very much of the course content. Mathematics lends itself to this approach more readily than other disciplines, probably because the first principles are more precise and more explicit. Moreover, the actuarial profession tends to recruit those mathematics graduates who can

normally see straight through to the underlying principles. However, the actuarial examinations cover a substantial amount of material which simply has to be remembered, rather than be derived from general principles when required. There are general principles which can be extracted from the course content, but those skilled in handling material largely expressed in numeric or algebraic form, were not necessarily able to extract principles from lengthy text with the same ease or confidence. One such actuarial trainee said

> *"I'd just forgotten what it was like to work really hard, to slog through mundane things."* 610 Obs

Thus the difficulties experienced by the mathematics graduates in studying part-time were simultaneously about the restricted amount of time, and the nature of the material to be studied. The coincidence of these two factors seemed to have a multiplicative effect rather than a simple additive one. The actuarial students, highly skilled in meeting the disciplinary demands of mathematics, were inexperienced with the different demands of actuarial studies. In which respect it is helpful to remember the view of Säljö (1987, p106):

> *"... learning does not exist as a general phenomenon. To learn is to act within man-made institutions and to adapt to the particular definitions of learning that are valid in the educational environment in which one finds oneself."*

These actuarial students had to adapt to a new definition of learning, but that process is time consuming and time was at a premium. They already felt overloaded because of their multiple roles and the daunting length of the correspondence courses with which they were faced (see page 115). In fact ideal conditions for inducing a surface approach to learning which would inevitably be disastrous, particularly in those subjects for which there was an extensive amount of text to be digested (Svensson, 1976).

Graduates of other disciplines may have been better placed in this respect, either because they were more familiar with learning from extensive text, or because they were accustomed to overcrowded courses. For example the two within this research study with first degrees in engineering were used to being overloaded, although even for them the final undergraduate year was comparatively light. However they had to contend with the early, numerical, professional examinations without a particularly strong mathematical background. This handicap was probably less significant than they imagined, but the

perception of disadvantage could have outweighed the advantage of familiarity with grinding through large syllabuses.

Like the mathematicians, the economics graduates had few contact hours during the latter stages of their degrees, but also less finite assignments. Therefore, they had to manage their efforts more actively. However, like the engineers, most of them worried initially about the weakness of their mathematical background, not fully recognising the advantage of their greater experience of time management. Only one person asserted a belief in economics as a superior preparation for actuarial examinations, this he felt resulted from the inevitability of more highly developed study skills and a more independent style of learning. In particular, he felt that meeting the disciplinary demands of his degree had developed his ability to evaluate his own work. He thought that many of his peers with different disciplinary backgrounds lacked this expertise.

Those who had studied actuarial science at university were used to relatively high contact hours, but for some, their exemptions brought more responsible office work at an early point, making the conflict between work and study more difficult to manage. In addition, it is likely that these graduates would have suffered most from the absence of a separation rite to aid their transition to actuarial studies in the context of being an actuarial trainee, (section 4.2). For these people more than the graduates of other disciplines, studying for the professional examinations would have been less obviously a matter of adjusting to the particular definition of learning in a new environment. This is notwithstanding the fact that university actuaries are clear that studying the academic discipline of actuarial science and studying for the professional examinations of the actuarial profession is quite different; they have different purposes (Hardy & Macdonald, 1995). Interestingly, Hardy and Macdonald suggested that while the former is definitely a beginning, the latter might be thought of as an ending. This theme recurs in the next chapter and in the case studies in chapter 8.

4.3.3 Juggling work and study

Returning to the general experience of those contributing to this research, many experienced unexpected conflict between their roles of part-time student and nearly full-time employee. Some of this was conflict between the nature of actuarial study and the nature of actuarial practice. This will be discussed in the next chapter. However, the remainder was about

juggling competing demands, time management and setting priorities. The impression the trainees seemed to have gained in the process of joining the profession was that, other than during exceptionally busy periods when 'flexibility' would be required, their office responsibilities would not seriously compete with their studies. The majority were allocated the equivalent of one day of study leave per week during the months in which they were preparing for examinations and they all knew that they would have to study in their 'free' time. The overwhelming majority thought that this was reasonable and manageable. However, faced with overloaded courses and the requirement or temptation to do overtime in the office, coupled with inexperience of being part-time learners and distance learners, the demands began to feel unreasonable and unmanageable.

Quickly, the 'espoused theory' (Argyris & Schön, 1974) of many trainees became that there was insufficient time to fulfill both commitments adequately. If they had less office work they could study more. If they did not have to study so much, they could do a better job in the office. If it were not possible simultaneously to study and work at a level which was satisfactory to themselves, to reduce the level of role conflict, a choice would have to be made about what would be done more or less well.

The choice was made very easy for those whose companies rewarded actuarial students' examination passes much more highly than their excellent office work. It was not difficult for these people, particularly if they were part of a group of actuarial students, to resist office overtime (requested or volunteered) by referring to the clear signal that examination passes were all important. The choice was more difficult for those trainees who felt that they must regularly devote more than 30 hours a week to office work; in order to do their job adequately, or to make a favourable impression. This was most likely to happen to isolated actuarial students, perhaps working alongside other new graduates without the burden of professional examinations, or whose studies were less onerous. In a few cases these office demands were genuine, with study leave frequently being cancelled or moved to inconvenient times. However, the lone actuarial students may have miscalculated the effort which had to be directed to office work because of the absence of others with whom to compare themselves. They needed stronger direction from their managers than the actuarial students who were part of a group.

It is worth noting that doing too much office work, to the detriment of examination preparation, was something that many ultimately successful actuarial students recognised and corrected after one or two years at work. During this time they found the confidence to judge the appropriate expenditure of time and energy on office work, and learnt which requests for additional commitment they could safely refuse.

Some trainees found an alternative method of reducing the experienced overload of working and studying. While they conformed to their employers' expectations by entering for examinations in two subjects at the spring sitting, and possibly another in the autumn, they concentrated their efforts on one subject at a time. This was an unofficial way of reducing overload by slowing their rate of taking examinations. It was hardly detectable on an individual level because the pass rates were quite low. However the introduction in 1994, of a restricted number of sittings for each subject was partly designed to prevent this approach, which was a noticeable problem at the macro level. Now, reducing overload by slowing the rate of taking the professional examinations has to be more open. However it is also likely to be easier to negotiate, since the excessive size of syllabuses is now more generally acknowledged to be a major problem. For example, in 1995 the decision was taken to permit candidates to gain credit for each 'half' of the theoretical subjects A-D. This might be viewed as replacing four overloaded syllabuses with eight more reasonable ones.[31]

A small number of actuarial students in all settings, while holding the espoused theory described on page 112, described the conflict in roles and their resultant actions in a way that suggested a theory-in-use that it was more rewarding to devote a disproportionately large amount of time to office work. They did not miscalculate the minimum amount of time and effort required for office work. They preferred the office work it was more intrinsically motivating, and so they concentrated on it at the expense of their studies. Juggling competing roles according to their importance is made more difficult when less important roles are more enjoyable and, at least in the short term, may yield the rewards of promotion.

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[31] This move was also driven by the desire to improve the intellectual coherence of students' study load, by permitting a more flexible grouping of subjects, particularly in the first year as an actuarial student.

4.3.4 Responses to overload

The difficulty of appropriately balancing the various demands entailed in being an actuarial trainee was graphically described by one young actuary as

"The tyranny of the urgent over the important." 259 Obs qual-fast

He was describing how, during his first year of studying and working, there were always things which needed doing urgently. Study could always be rearranged more easily than the urgent things could be ignored. Whether the demands came from the office or his personal life, study was always the easiest thing to squeeze out in the competition for inadequate time. However, he realised that since he **really wanted** to qualify as an actuary, studying was one of the most important things in his life. He started assessing the things he felt he had to do in terms of their importance rather than their apparent urgency: he began to manage the conflicting demands successfully. This enabled him to protect sufficient study time and thus, it was one of the factors which led him to qualify quickly.

Successfully managing conflicting demands was not simply a dichotomous choice between office work and studying, for example, many actuarial students faced greater family or home care responsibilities than they had undertaken while undergraduates. Inevitably this had costs in terms of both time available for study, and residual energy. Several married or began common law marriages and adjustment to this new lifestyle took a while. Initially, study time tended to be reduced as the actuarial trainees tried to accommodate their partner's needs and routines. Ultimately, as Brundin (1988) found in America, many partners bore the brunt of household responsibilities, thus freeing more time for the actuarial student to study.[32] The situation was rather less happy for three members of my sample who found it necessary to help with the care of infirm relatives; this was time-consuming and exhausting.

There were a few exceptions to the norm of increased responsibility, notably those who had moved back home 'to mother' for their first year of professional examinations. They seemed to have virtually no home care responsibilities, and two were happy to attribute their examination success to their common sense in finding someone to look after them while they

[32] This is at variance with the experience of Open University Students reported by Holly and Morgan (1993).

studied. This has a psychological aspect, as well as the practical aspect of time which would otherwise have been consumed by chores becoming available for study or social activities. These students were generally more supported, less pressured and less isolated than their peers; factors which have been shown to be linked with academic success (Bourner *et al*, 1991; Powell *et al*, 1990)

Successful actuarial students have all had to find a way of balancing the various demands in their lives so that they spent an amount of time studying that was sufficient and appropriate **for them**. Many found that it took a few years to get this right. However, while adequate study time is a necessary condition for success, it is not a sufficient condition. Some actuarial students spent a great deal of time studying inefficiently, largely 'surface learning' (e.g. Marton & Säljö, 1976, 1984; Entwistle, 1987).

Much of the students' surface learning was induced by time pressures and content overload (Gibbs, 1992b; Marton & Säljö, 1984; Ramsden, 1992). Most were surprised at the length of the correspondence courses:

> *"The studying is intrinsically easier than expected but for some subjects there's just SO MUCH."* 728 Q'naire student
>
> *" The course was far too long for Sept - May, over 1000 pages."* 229 Q'naire qual-med
>
> *"Some interesting parts but there is too much boring, irrelevant reading material to plough through to get the parts necessary for exams. The amount of reading is unbelievable."* 801 Q'naire qual-fast

Very long courses seemed all the more defeating because the trainees were tired. Covering the material was going to take longer than they had hoped, but they did not have spare energy or time to redirect to studying. They became preoccupied with completing their courses and lost sight of their original objective of understanding the material. Many felt under pressure to learn the material as quickly as possible. Some even felt that they could not afford the time to make or review notes. They resorted to the liberal use of a highlighter pen. Their revision then involved attempting to memorise the marked chunks. This was disastrous, the knowledge was not restructured so that it had personal meaning, connections were not made between different parts of the body of knowledge. The volume of material

made memorisation unviable, even if it had been desirable. Further, adopting a surface approach is a soul destroying way to study, the resultant boredom being associated with decreased motivation (Marton & Saljo, 1984, Svensson, 1976).

Although the previous set of quotations draws attention to the fact that the correspondence courses were long in absolute terms, it should be remembered that these are students' perceptions of workload. Chambers (1992) reported that perceptions of overload are affected by interest in a topic and the degree of difficulty experienced. Further, interest and perceptions of difficulty are interrelated. Only 4% of the actuarial students contributing to this research reported experiencing difficulty with the course content, but 33% reported finding the course material substantially irrelevant to professional practice and/or simply boring. For these people, their perceptions of irrelevance and the interrelated feelings of boredom, are likely to have increased their perception of overload.

4.3.5 The future

It has been seen that the actuarial students found the transition from full-time student to part-time student very difficult for a host of reasons. However it does not necessarily follow that this will continue to be an area necessitating significant adjustment for new actuarial trainees. In the future, as undergraduates suffer even more financial hardship, it is anticipated that most 'full-time' students will rely on part-time employment during term for survival, (Ford *et al*, 1995; McNay, 1994). Then, those moving on to part-time study for professional examinations may be proficient part-time students already, even if not officially so. Nevertheless, they will still have to make the transition to distance learning.

4.4 Distance

Fifty six percent of the actuarial students reported difficulty in adapting to distance learning. Their biggest difficulties were:

- missing face-to-face tuition or otherwise learning in a group
- dissatisfaction with feedback
- taking responsibility for pacing and structuring their studies

- distilling the essence of the course material and separating this from illustrative examples or irrelevant detail without the guidance of lecturers.

A small number of people also experienced significant difficulties with the physical conditions under which they had to study.

About a third of the actuarial students regretted that they were no longer learning within a group. Those not expressing regret seemed to fall into three categories:

- those who liked to work predominantly alone;
- those who found a learning group to belong to; and
- those who felt strongly that the correspondence courses should be improved. They sought greater clarity and direction, along with more knowledgeable and more accessible tutors to guide them.

In effect, members of the last group were seeking replacements for things which happen naturally when learning in groups (Jaques, 1994; Knights, 1995).

Intermittently assembling as a group provided the actuarial students who had this opportunity with welcome variety within their studying. The variety and commitment to the group, helped to sustain motivation to study between meetings. Such meetings, usually either tutorials associated with a tuition course or in-house tutorials, were vital to many students as a source of clues about how they should be directing their efforts. This will be pursued in chapter 6. Further, tutorials were much valued opportunities for instant feedback.

Feedback on performance came mainly from correspondence course tutors in the form of comments on answers submitted to course tests.[33] These comments were supplemented by students' self-assessments in conjunction with specimen answers and hints which were

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[33] At the beginning of this research, tuition courses were provided by part of the professional body. For the Institute of Actuaries this was the Actuarial Education Service (AES). Their correspondence courses interpreted and expanded upon the 'Course of Reading' which effectively defined the syllabus. They were available with tests to be submitted for marking by an 'honorary tutor', or in non-marking versions where the students evaluated their test attempts by comparison with provided 'specimen answers'. There were also a limited number of places in tutorial classes for the applied subjects. The AES was officially kept entirely separate from the examining function of the professional body, the examiners being protected by 'Chinese walls'.

returned with the marked tests. About a fifth of the actuarial students expressed strong dissatisfaction with the feedback they received from correspondence course tests, and the majority would have liked better feedback. For example

> *"Don't really get test scripts marked meaningfully."* 165 Q'naire qual-fast

> *"I was surprised at how terse the tutors comments were in the marked tests."* 195 Q'naire qual-med

In common with distance learners in many other contexts (Altrichter, 1991; Rekkedal, 1983; Rouse, 1986), the actuarial students experienced problems with the time delay between submitting an assignment and receiving comments on it. In some cases the delay was several weeks.[34] This was particularly difficult for the least independent learners who really wanted an 'expert' to evaluate their work, since they felt unable to evaluate it themselves. Students felt they were discouraged from adding to the tutors' workload by asking them supplementary questions or by ringing to discuss the supplied feedback.

The correspondence courses were very long (see page 115) and did not adopt the tone of 'didactic conversation' advocated by Holmberg (1982). They did not, in Holmberg's terms, guide and teach, becoming a substitute for the exposition of a teacher. Some actuarial students found it very difficult to manage without such guidance.

Most of the actuarial students had, as undergraduates, relied (however unwittingly) on lectures and assignments to pace and structure their studies. They hoped that their correspondence courses would do this, but found that the courses did not adequately pace or structure their studying. The implied pace set by test deadlines was too slow, irrespective of the fact that the deadlines were not met by everybody. The most successful students all

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[34] Excessive delay in the return of tests is now much rarer than when most of my data were collected. Occasional long delays are inevitable in a system which relies on the goodwill of practitioners to act as tutors in their spare time. These are predominantly, busy newly qualified actuaries. They are paid for marking, but this is not usually their primary motivation. Members of the profession are frequently reminded of the words of Francis Bacon: *"I hold every man a debtor to his profession, from the which as men of course do seek to receive countenance and profit, so ought they of duty to endeavour themselves by way of amends to be a help and ornament thereunto."* Serving as a tutor or an examiner is a common way of 'paying the debt' owed to one's profession.

ignored test deadlines, completing their correspondence courses and tests as quickly as possible; usually by the end of February.

Some actuarial students reported great difficulty in making notes from the reading material. Indeed for about 5% of my sample, the old chestnut about the definition of a lecture being 'a means of transmitting the notes of the lecturer to the notes of the student, without the content passing through the brain of either', seems frighteningly apposite. This group included several people with first class degrees, some from very prestigious departments. Having gained predominantly numerical degrees, their lecture notes were a fairly complete reproduction of what had been presented to them. These were rarely annotated as a result of further reading or discussion. Private study tended to be limited to completing set problems and attempting some additional problems. Revision centred on reading and rereading the notes, and practising more problems. The following quotation is from a very successful undergraduate:

> *"I do all the questions in the book, and sometimes, if it's a difficult topic, I'll do it twice ... I suppose in my approach to exams, I see it as a whole pile of drill. You know, the more questions you get through, then when you sit the exam paper there's no surprise, it's the 35th exam paper or something you've done, it becomes quite easy then."* (Bellis & Shepherd, 1993, p16)

Such students were unfamiliar with making notes which were truly their own; the result of distilling the essence of a topic and connecting it with prior knowledge. They had not previously needed this skill and had to develop it as part of their transitions to being more independent learners, to learning in a different context, to meeting the different demands of the new environment (see quotation on page 110 and surrounding discussion).

Approximately 4% of the actuarial students who contributed to this research study found distance learning difficult because of poor access to study facilities or materials. Most of these were studying overseas.

4.5 Being a part-time distance learner in the actuarial context

The actuarial students found that being a part-time distance learner in the actuarial context was very different from being a full-time university student. Superficially, they always knew that the demands of the new learning environment would be different from the demands which they had grown used to satisfying. However, the extent of the required 'perspective transformation' (Mezirow, 1981, 1991; section 3.4.4), the precise nature of the new demands, and the difficulty of making the necessary transitions, together were shocking. The strength of the 'disorientating dilemmas' (Mezirow, 1977, 1981) triggering a reappraisal of their learning, was sufficient to quickly reduce the self-confidence and motivation of nearly all the actuarial students.

The prevailing experience was a battle against an overwhelming workload. This was produced by the interaction of several factors:

- role transition is demanding and many experienced a sapping of energy
- the professional curricula were widely acknowledged to be overloaded
- time was restricted because they were part-time students
- they were inexperienced distance learners
- they were unfamiliar with the demands of the new learning milieu.

The overload created by interacting influences upon learning is illustrated in the case studies to which Dynamic Concept Analysis has been applied (chapter 8).

Various combinations of the five factors listed above, induced (at least initially) ineffective approaches to studying in over 70% of cases. 'Surface' approaches (section 3.4.2) were very common. Almost everybody found it difficult to maintain consistently high levels of motivation. Many students felt that the actuarial examinations could easily be all-consuming and that they wanted to resist this, but perhaps could not, (see quotations on page 108, and Alan & Ben in Part III).

To succeed, the actuarial students needed to come to terms with the demands of the new learning environment. Various aspects of this will be explored in the next two chapters, but with respect to being part-time correspondence course students, they needed to:

- manage their time and studying more actively
- become more independent learners
- find ways of maintaining their motivation.

The appropriate pacing of studies was made more difficult by institutional correspondence course test deadlines which implied a less urgent pace than was actually necessary. Therefore, many first year students, no matter how diligent, were caught out with insufficient time for revision and consolidation.[35] If the students had actively scheduled their work at the beginning of the correspondence courses, they would have seen the folly of relying on the test deadlines to pace their studies. However, such long range planning was extremely rare. Its necessity simply did not occur to the vast majority. They trusted the course providers to present well planned and paced courses, because they saw this as part of the professional responsibility of course designers (sections 5.4 and 6.2.1).

Although higher education lecturers' lamentations about the inadequacy of student learning and students' lack of independence in learning are well documented (e.g. Boud, 1988; Ramsden, 1992), with respect to pacing work or time management, the situation may be worse than many of us realise. The academic year has a natural ebb and flow, alternating teaching terms and 'vacations' (i.e. non-taught time). The latter can be oases of respite during which catching up on work is possible if one is behind, or to catch up on other things that had taken second place to term-time activities. The abrupt loss of these oases was a disorientating dilemma for those people who had unconsciously relied on them. In term time, the pacing of students' work is substantially dictated by short-term assessment deadlines and progress of lecture courses. Naturally, lecturers pace themselves through the syllabus with the aim of completing the parts on which they wish to lecture within the allocated number of lectures. Therefore, university students have little real practice at allocating a large quantity of work over a long period of time, the general exception to this

[35] This problem has now been addressed by the profession. The test deadlines have been brought forward significantly.

being project work (unless this is closely supervised). The correspondence courses, with their periodic tests, appeared to be so much like lecture courses delivered on paper, with intermittent course work, that the actuarial students did not realise that they had a significant transition to make (section 4.2).

The learning context required the actuarial students to plan and structure their learning to a much greater degree than had previously been necessary. This combination of more active management and greater independence in learning was an unexpected transition for most actuarial students. Formerly, lecturers had linked parts of the material together into coherent pictures, they had stressed the important parts, they had connected new knowledge to existing knowledge. Although well written distance learning materials can do all of these things (Gagné, 1991), most of the actuarial students were overwhelmed by courses containing an enormous volume of reading, from which they found it difficult to extract the important issues and the overall structure. This was due to both the nature of the material, the students' inexperience with the demands of the learning milieu. The study skills which they required can be developed quite successfully with appropriate support (Stewart, 1981) but 64% of the actuarial trainees said that they had not received any formal instruction or advice about study skills. Further, nearly half of those who received study skills training were disappointed with it.

Most of the actuarial trainees disliked being a correspondence student, so they alleviated the isolation and monotony of that form of study by attending tutorials wherever possible. This was rarely possible for the students working overseas and did not occur for a few UK students. However for those who could attend, 'tutorials' (many of which amounted to lectures), provided an opportunity to revert to their undergraduate style of learning. Much of the required structuring and pacing was being supplied. This was comforting, helping to reduce students' perceptions overload and lack of control. In addition, attending tutorials was effective for those students who seemed to need to **hear** people talking about the course content before they could sort out the relative importance of its parts, or make connections between its parts. Further, the 'cue seekers' found tutorials the most rewarding aspect of their courses in terms of the density and accuracy of cues. Likewise, these meetings were a boon to the 'cue conscious'.

The most successful actuarial students all talked of the importance of creating variety to maintain motivation. They found ways to relieve the monotony and thereby arrest the decline in their motivation to study. Some studied their two courses singly, on alternate weeks, to give themselves definite changes in subject matter. This strategy may have had as by-products: the regular review of material studied one to two weeks ago, helping consolidation; and a greater chance of reflection on the material covered. These by-products are likely to have been advantageous, leading to greater understanding and retention. Many actuarial students, like the Open University students investigated by Aspen (1977), talked of rewarding themselves with *"treats"* such as leisure time. Some varied their study schedules to create variety. Several 'treated' themselves to some annual leave for full-time study in late January or early February. This usually marked the transition from working through the courses, to revision. Many tried to make notes in interesting ways to keep themselves awake, usually this involved using pens of various colours. These 'rainbow notes' were more interesting to make and more interesting from which to revise.

Nearly all actuarial students gradually gained a sense of some control over the demands of their new learning environment as they came to know and understand it better. Their means of coming to understand what was being asked of them will be discussed in chapter 6. The process is also very visible in the case studies presented in chapter 8.

4.6 Summary

In this chapter, different aspects of being a part-time distance learner in the actuarial context have been considered. For almost all of those contributing to this research, the transition to this role, or rather a combination of roles, was much more difficult than anticipated.

- The actuarial students **did not anticipate** that preparing for the professional examinations would be as difficult as they found it. They **lost both confidence and motivation**. **Disenchantment** with the profession's education and assessment systems appeared in response to the difficulties which the actuarial students experienced.

- The actuarial students felt **overloaded** and that they lacked control within their lives. Indeed, their courses were long and the time available for study was restricted. Initially, the majority felt pressurised into adopting a **surface approach** to learning, which increased the probability of examination failure and adversely affected motivation. Many also found it difficult to select the appropriate **balance** between the **competing demands** of office work and their studies.

- The actuarial students lacked proficiency in **managing their time** and in **learning independently**. Graduates of different disciplines experienced different problems, but over-dependence on **feedback** from tutors was a handicap for new actuarial students, irrespective of first degree subject. The graduates of predominantly mathematical or statistical courses experienced substantial difficulty in making appropriate and **effective notes from the extensive prose** of the applied subjects' syllabuses. Nearly all the actuarial students lamented the loss of **face-to-face tuition** as the dominant mode, missing: the pacing and structuring of the lecturers and course schedule; the availability of swift feedback and assistance; an arena in which to test and clarify ideas; the social aspects of learning in a group.

- The difficulties of adjusting to the distance learning milieu were exacerbated by the style of the distance learning materials, the training of correspondence course tutors and initial 'cue deafness' (Miller & Parlett, 1974) on the part of the students.

- Some of the students' difficulties were attributed to absent or inadequate **rites of passage**: for example, correspondence courses which were superficially, very similar to lecture courses (section 4.5). However, it was noted that some actuarial employers did handle the transitions inherent in moving on from university to professional life proactively.

- It was noted that comparisons between professional studies or examinations, and Higher Education, tended to be with the final undergraduate year, rather than the entire degree. That is, the unfamiliar and thus challenging learning milieu was contrasted with a milieu which had become familiar and in which success had been the norm.

Chapter 5: Unprofessional Examinations?
Disjuncture between expectation and experience

5.1 Introduction

Throughout my data, with reference to preparing for and sitting the actuarial examinations, two sentiments shout out:

- 'This is not how I expected it to be.'
- 'This isn't as easy as I expected it to be.'

That is, the actuarial students experienced disjuncture between their expectation and their experience of the professional examinations.

Jarvis (1987) considered the disjuncture between biography (social history, stock of knowledge and self-concept) and experience (actual or idealised) to be central to adult learning (section 3.4.4). When disjuncture occurs, it causes questioning and reflection because the individual's taken-for-granted behaviour and knowledge are no longer adequate to provide an automatic response. Mezirow (1994, p223) amplified this:

> *"We resist learning anything that does not comfortably fit our meaning structures, but we have a strong urgent need to understand the meaning of our experience so that, given the limitations of our meaning structures, we strive toward viewpoints which are more functional: more inclusive, discriminating and integrative of our experience."*

Jarvis and Mezirow both pointed out that learning from disjunctive experience is not always successful, particularly when the disjuncture is so great that it intolerably threatens the individual's self-concept. Then, there may be no learning, or there may be faulty learning.

This chapter is concerned with the multifaceted disjuncture between actuarial students' expectations (idealised experiences) and actual experiences of their professional examinations. Each facet of this disjuncture was a catalyst for critical reflection upon the meaning of qualification as an actuary and potentially, the site of significant learning. Superficially, the disjunctions reported are a catalogue of students' difficulties with attaining

success in actuarial examinations. However, they are all broader and deeper than that. They concern

- the nature of professional qualification
- the nature of actuarial practice
- the nature of learning

The disjunctions have been grouped under seven broad headings (sections 5.2 to 5.8). Discussing facets of disjuncture within the student experience separately, makes consideration of the total experience tractable. It suggests areas which are amenable to resolution or amelioration. However, it was the **interaction** of a set of disjunctions which determined the outcomes of their presence (section 5.9 and Part III).

5.2 The nature of professional knowledge

The new actuarial students' expectations of learning in the actuarial context sprang from their prior learning experiences. These expectations were influenced by their interpretation of professionalism, both generally and specifically in the actuarial context. The significant, recent set of learning experiences with which the actuarial students repeatedly compared their new situation, was studying for an undergraduate degree. It was evident that, in contrast with Säljö's (1987) findings, they felt that learning exists as a general, context-free phenomenon. Thus, having been a successful undergraduate implied to them pre-developed competence in learning for professional examinations. There was very little anticipation of learning in the new context involving different demands and requiring a different approach. When it quickly became obvious that learning as an actuarial student was very different from undergraduate learning (chapter 4), most of the new entrants looked back to a more distant set of learning experiences to interpret their new experience; A levels.

The comparison with A levels served most of them very well, enabling them to interpret their experience and to find a way of meeting the demands of the learning milieu. However, it was a 'disorientating dilemma' because it threatened their view of the nature of professional knowledge. They had a sense of progression or hierarchy from learning at school which was fairly routine and other-directed, to learning at university with its greater

independence and individualism. They expected, even if only subconsciously, continued movement in this direction. Their experiences of the new learning milieu, particularly of preparing for the professional examinations, felt like a retrograde step.

> *"Possibly A levels, like actuarial exams require a certain amount of hard work and not too much inspiration. It's quite a come down in a sense."*
>
> 270 Tape qual-fast

Many were able to view this pragmatically, as a means to an end, but a few were very upset by the disjuncture between expectation and experience. A minority, including Dave in chapter 8, felt that stepping back to an inferior form of learning was somewhat unprofessional. It felt unprofessional knowingly to change to a lower intellectual gear, not fully to utilise their intelligence. They did not readily see this as an intelligent response to the new learning milieu. Rather, they worried that the profession was signalling it did not want them to work to the best of their ability, which surely had to be unprofessional. They received the message that the profession wanted them to think **less**, while the profession was trying to send the message that it wanted them to think **differently**. Although simply an initial irritant to most, this breakdown of communication led to serious discontent and demotivation for a small proportion of the actuarial students.

Upon joining the profession, most people thought that the knowledge which they prepared for examination through studying the correspondence courses, would be the basis of their professional expertise; the 'propositional knowledge' described by Eraut (1992a). To this would be added 'personal knowledge' and 'process knowledge', largely derived from professional practice. Professional work, Eraut argued, requires the concurrent use of different types of knowledge in an integrated and purposeful way. Thus, the propositional knowledge from the correspondence courses would be expected to compliment the personal and process knowledge derived from working in an office as an actuarial trainee. This expectation was reinforced by the messages disseminated by the profession. For example, the introduction to the edition of the Institute of Actuaries' Examinations Handbook which was current at the time of the cross-sectional survey, begins:

> *"The examinations cover the subjects of which knowledge is required by the actuary in the practice of his profession. The subjects to be studied fall in two broad groups: the first covers mathematical, statistical and financial techniques*

whilst a second group is, in effect, the application of the matter of the other group to professional problems." (Institute of Actuaries, 1987a, p2)

However, most of the actuarial trainees experienced dissonance between their studies and their office experience, and also between their expectations and experience of the content of actuarial knowledge. An aspect of the latter will be the focus of the next section, but first I will consider the former.

Within the longitudinal survey, 53% of the trainees reported that their studies were not relevant to their office work, and a further 9% were ambivalent about the connection. There are several reasons for this, the dominant three being:

- obsolete course material
- the breadth of the actuarial qualification
- the form of assessment.

Firstly, some of the material to be studied was out of date. To an extent this is inevitable since financial regulations and legislation change each year. To accommodate this, the Board of Examiners promulgated its intention to award full credit for examination answers derived from the legislative and taxation provisions contained within the Course of Reading and Guidance Notes which were current during the September preceding an examination. Additionally, obsolescence within the Course of Reading was exacerbated by the small market for actuarial text books and monographs. It was difficult to keep them up to date on economic grounds, and it was even more difficult to find people in a position to write them.[36] While often appreciating the causes of obsolescence in the course material, the actuarial students found it difficult to motivate themselves to learn such content for examination purposes only. The wasted time which this represented was irksome, particularly in view of their now more limited study time (section 4.3). Such material was often rote learnt as a chore. There was no point in trying to integrate it within their conceptual framework of actuarial principles and their application to professional practice.

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[36] Although the Course of Reading was replaced in 1993 by an objectives-based syllabus, accelerating the trend of several years for (annually updated) tuition course notes to contain a more comprehensive version of the course content, reducing the extent of obsolete material, there is still substantial use of additional sources. The updating of these sources remains a problem. However, the Core Reading introduced in 1995, which is updated annually, may eventually replace the additional sources.

Such learning is very unrewarding and tends to result in students spending less and less time studying, with consequent detrimental effects on their examination performance (Svensson, 1976). For example, one actuarial student complained of the

> *"Uninteresting nature of courses - especially when you know you're learning out-of-date-'facts'."* 251 Q'naire withdrawn

Secondly, because of the profession's longstanding commitment to the generally qualified actuary (Crabbe *et al*, 1945; Daykin *et al*, 1987; Kennedy *et al*, 1984; Menzler, 1960; Scurfield, 1990), some actuarial trainees were studying subjects outside their work specialisation (and eventually all would have to).[37] For example, those working as trainee pensions consultants still had to pass the general insurance course. Thus by design, some of the courses to be studied were of limited relevance to the actuarial trainees' office work. About half of the actuarial students found it difficult to value this breadth in their training. They did not feel that it served its espoused purposes of permitting transfer between different spheres of actuarial work, and developing understanding of the range of actuarial activity.

Thirdly, the three hour, unseen, written examination paper format used by the profession tended to test a limited type of knowledge (Francis, 1990). In the more numerical subjects, hand calculations were often requested, arguably to demonstrate that the candidate understood the constituent parts of such a calculated solution. However, the requested calculations had to be sufficiently simple to permit hand calculation in a reasonable time. This caused two difficulties:

- the problems set often appeared unrealistic in comparison with problems encountered in the office
- hand calculation itself was unrealistic.

In reality, the trainees would have utilised the power and speed of the personal computers and advanced software which were accessible from their desks (Roberts, 1991).

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[37] This may recede if the recommendation of Nowell *et al* (1995) (influenced by Bellis *et al*, 1994) for a 'standard' qualification, with the option of a specialised 'standard plus' qualification, are implemented.

In this respect, the kinds of actuarial problems which the actuarial trainees were learning to solve through their studies were not the kind of problems which they encountered in their office work (Cole, 1989, Francis, 1990). Further, they were not the kind of problems which the trainees saw qualified colleagues addressing. They were being asked to study and reproduce an 'imitation subject', (Sawyer, 1959). As Sawyer predicted (p9), they found that it was *"far easier to learn the real subject properly, than to learn the imitation badly"*. In particular, this was the unresolved problem of those who concentrated on their office work at the expense of their studies, (see page 113). Comparing 'real' and 'imitation' subjects, Sawyer argued (p9):

> *"... the real subject is interesting. So as long as a subject seems dull, you can be sure that you are approaching it from the wrong angle. ... To master anything - from football to relativity - requires effort. But it does* ***not*** *require* ***unpleasant*** *effort, drudgery."*

However, unpleasant effort and drudgery was the majority experience for those contributing to this research. For example one actuary pointed out to me that he had not suffered disjuncture between expectation and experience in this respect:

> *"I was expecting to be bored and frustrated and I experienced both in ample measure!"* 198 Q'naire qual-fast

What kind of imitation subject did the actuarial students feel that they were required to learn? One which was not rigorous and internally consistent, unlike their undergraduate disciplines. The lack of rigour and consistency, the apparent absence of structure (no suitable framework on which to build their knowledge and understanding, Ausubel, 1985), left the majority of the actuarial students feeling lost and cheated. To some extent this disorientation was a product of the differing demands and orientations of the curricula which they had mastered and the unfamiliar actuarial curriculum. Simply, they were not experienced in learning in the new context (Ramsden, 1992). They felt that the professional curriculum should comprise the 'particular skills' (Beckman, 1990) of actuaries. Instead they found themselves overwhelmed by excessively long correspondence courses, overloaded with detail and obsolete material (see page 115, and Dave & Frank in chapter 8). Whatever their original intentions with respect to seeking understanding, most felt pushed into adopting a surface approach to learning (Cox, 1987; Entwistle & Ramsden,

1983, Marton & Saljo, 1976b). They were unaware that this would probably have disastrous consequences.

Nevertheless, the majority of those contributing to this research would eventually be successful in the actuarial examinations. Nearly all the successful students used the sources of clues discussed in the next chapter, to peer through the mist which they felt surrounded the assessment criteria (section 5.4). They, thus, discovered the nature of an imitation version of actuarial science and practice which was suitable for passing the professional examinations. This enabled many of them to adopt a successful, strategic approach to learning for and taking actuarial examinations (e.g. Colin and Dave in chapter 8).

Having considered aspects of the disjuncture between expectations and later perceptions of the nature of professional knowledge generally, I will turn to a specific area of the professional knowledge of actuaries: the role of mathematics and statistics.

5.3 The role of mathematics and statistics in actuarial knowledge

The message from the professional body (page 127), which accorded with the general image of the profession (Pitcher, 1988; PWMC, 1985), was that an actuary applied mathematical, statistical and financial techniques to solve problems. These techniques were thus, the 'particular skills' to which Beckman (1990) referred, or Eraut's (1992a) 'propositional knowledge'. Upon joining the profession, the majority of the actuarial students possessed only hazy ideas about which problems actuaries dealt with, and many were unsure as to the precise nature of 'financial techniques'. However they all had a much clearer picture of the nature of 'mathematical and statistical techniques'. Almost all the new actuarial trainees thought that they would be **doing** a substantial amount of mathematical or statistical analysis. They soon discovered that this was not so.

While there are some actuarial jobs (mainly in research departments and within the relatively new field of General Insurance) which require frequent use of complex mathematical and

statistical techniques in novel situations, most do not (Akhurst, 1991; Murphy *et al*, 1989). The mathematical demands on the majority of actuaries are for

- general numeracy
- a comprehension of techniques which are often used via the medium of computer software
- an appreciation of the limits of applicability of the techniques

Actuaries must have a feel for when figures look right (and perhaps more important, wrong) and they must interpret the results of calculations. They must explain actuarial calculations to non-specialists and convince these people to act in accordance with the actuarially based recommendations. Much of what might look like mathematics to a non-mathematician, is in fact the application of standard routines; like following recipes. Although the software is sophisticated, in use it can feel monotonous, lacking in challenge and originality. For example, one new actuarial trainee described her work as:

> "... *nearly all running quotes off a system, that a 16 year old could do.*"
>
> f 716 Q'naire qual-med

While another said:

> "*There is a very great deal of number crunching, just plugging numbers into a formula.*" 717 qual-med

The challenge and originality, the intrinsic motivation, lie within the ongoing development of the software, and within the interpretation and defence of the output. However, in the early months at work the actuarial trainees were not asked to do much interpreting or defending. Further, many of those not occupied with the production of standard computer output, were engaged in calculating particular values for the special cases which were unsuitable for the mass-produced analyses. This was generally felt to be more like doing arithmetic than like doing mathematics. The actuarial trainees expectations of interesting and challenging office work, which were substantially engendered by the recruitment process, seem to have been unrealistically high. This is a well-known phenomenon among graduate entrants to the workforce (Auburn *et al*, 1993; Mabey, 1984; Roizen & Jepson, 1985) which would be expected to reduce motivation and to increase the probability of withdrawal (Herriot, 1984; Wanous, 1973).

When respondents to the cross-sectional survey were asked to indicate the strength of various influences on their decision to become an actuary, using a six-point scale from: (1) 'very important', to (6) 'not at all important', 58% of them rated the opportunity to apply mathematics as 'very important' or 'important' (1 or 2). While most of these actuarial trainees found other challenges to compensate for an unexpectedly low level of mathematical demands, for a small number this disappointment was an ongoing source of dissatisfaction. The cross-sectional survey data reveal that a higher proportion of the respondents who have now withdrawn from the profession considered that the opportunity to apply mathematics was 'very important' to them, than was the case with those who have remained in the profession, (n = 136, z = 1.71, one-sided p = 0.0436). In particular, those who have left the profession were more likely to consider mathematics very important, than those who have now qualified as actuaries, (n = 101, z = 2.11, one-sided p = 0.0174).

This may have implications for those who recruit actuarial trainees. At the beginning of my study the actuarial profession was expanding and entrants were being drawn from a wide range of courses and universities. The latter part of this research fell into a period of retrenchment for the profession and the financial sector. Recruiters, most of whom are not actuaries, have been keen to point out to me that in times of limited recruitment they are primarily seeking 'good' mathematical graduates from 'good' universities. The latter 'good' seems to mean the older the better, and certainly pre-1992. It might be expected that the desired variety of graduate would find mathematics intrinsically motivating. If this intrinsic motivation was a very strong (possibly erroneous) entry influence, the favoured graduates might exhibit a relatively high withdrawal rate.

The intrinsic motivation of mathematics, particularly pure mathematics, is often linked to an appreciation of power combined with economy. For example, the beauty of an elegant proof lies in its complete definition and explanation of a situation, combined with brevity. Mathematics can be simultaneously precise to the smallest detail and all encompassing. This is not the kind of mathematics with which the actuarial examinations are concerned. An experienced actuary, who is an 'Oxbridge' graduate, reminisced with me:

> *"When I started actuarial studies I found myself having to give up most of the rigour which I'd spent the past few years developing. It was like going back to A*

level really, getting used to reading things with woolly assumptions, mixed up limits, etc." 005 Obs

The quotation from the examination handbook on page 127, gave some clues that rigorous mathematics would not hold a central place within the professional examinations. The emphasis was clearly on practice. Further, candidates were told plainly:

"Some University mathematical examinations set a premium on elegant solutions; they are not required in Institute papers."

(Institute of Actuaries, 1987b, p20)

In professional practice solutions need to be good enough for the requirements of the situation, but not necessarily absolutely correct. There is extensive use of approximation and rules of thumb; rightly so because frequently, the data available for consideration are not sufficiently reliable or extensive to warrant complex analysis. In common with other novice professionals (Ashworth & Saxton, 1992; Nicholson & Arnold, 1989), many actuarial trainees did not anticipate this change in perspective, and some found it difficult to accommodate. Although most adjusted pragmatically to the lack of mathematical demands within their office work, some found the lack of mathematical rigour within the professional examinations more disturbing. They became frustrated by the inconsistencies and inaccuracies. They felt that there was little emphasis on obtaining correct solutions where they were possible, and it felt unprofessional not to try to get things 'right'.

This feeling was exacerbated by the limitations of three-hour, unseen, written examination papers (section 5.2). Examinations required extensive simplification and use of approximation. This was less necessary in the office, due to desktop access to significant computer power. Although, in the office environment, analytical solutions producing 'correct' answers were frequently unattainable, iterative solutions via simulation were commonplace. These could be more complex and more 'accurate' than the solutions which the actuarial students were learning to produce for examination purposes. While it can be argued that the more complex and more accurate solutions were not necessarily more useful for informing professional practice than the approximate manual solutions, they felt superior to the actuarial students. They seemed to be as good as they could be, not just good enough. It felt more professional to do one's best than to do adequately under the constraint of no access to computer power, which seemed like an echo from a past age.

Another dilemma here was whether the manual solutions really were good enough, given that it was possible to do better now than when the manual means of solution had been developed. This is a matter of professional judgement, which the actuarial students were in the process of acquiring and refining. For those who judged many of the manual techniques of solution as not good enough for modern professional practice, studying and reproducing them felt futile. An irritating imposition, absorbing precious time and reducing both their sense of control and their motivation. It caused them to question the validity of the examinations. Validity will be considered further in the next section, along with other aspects of assessment.

5.4 The nature of assessment in this context

Although on entry to the profession, those contributing to this research did not have clearly articulated expectations regarding assessment, their subsequent statements, predominantly about what they did not expect, enable identification of their implicit expectations. They expected:[38]

- the assessment criteria to be easily divined
- the assessment criteria to be similar to those they had met at university
- the assessment criteria to value understanding in preference to the rote reproduction of information
- the demands of the assessment criteria to be congruent with the demands of professional practice
- the assessment of their correspondence course tests to be formative and illuminating in relation to the examination assessment
- those assessing them to be competent and dedicated: 'professional'
- helpful feedback from the assessment process

In the next section the first three of the listed expectations will be considered together.

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[38] It is not possible to state the proportion of those contributing to this research which held each of these expectations, since they were not questioned directly about them, rather the expectations were usually inferred from qualitative data expressing dissonance. However, everybody with whom I have explored these expectations, in interviews or less formal conversations, has concurred with them.

5.4.1 The assessment criteria

With respect to divining the assessment criteria, a sensible place to start might be the Examinations Handbook from which the quotation on page 127 was taken. It offers students the following definition:

> *"The questions set in the examinations will be intended to test the candidates' grasp of principles and independence of thought rather than memory of the matters included in the Course of Reading. Further, candidates will be expected to show a practical **outlook** and approach to questions, particularly, but not exclusively, those in subjects 7-10.[39] At the **ordinary** level in these subjects, however, it will be possible to answer the questions with a knowledge of the material in the course of reading alone. At the **specialist** level questions will require a greater depth of understanding to be answered satisfactorily, and will require the candidate to demonstrate a significant degree of judgement. However, evidence of actual practical **experience** is not essential in any subject."*
>
> (Institute of Actuaries, 1987a, p12) (original emphasis)

Thus the institutional message was that candidates should concentrate on principles rather than details; independence of thought would be valued above reproduction of the course content; a practical outlook was important but practical experience was not. These criteria do not, at a glance, look dissimilar to university assessment criteria. At least they do not strongly signal a different perspective on assessment from the higher education approach with which everyone was familiar. Because of their apparent familiarity, these criteria appeared perfectly explicit to the actuarial students.

Through their prior learning experiences at university the actuarial students had come to believe that a firm grasp of principles, that is a sound understanding, was the ideal to be striven for. They had come to expect their understanding and independence of thought to be especially rewarded in the assessment process. They saw the reproduction of the course content as necessary up to a point, but a lower level of achievement than proving their understanding by interpreting and perhaps extending the course content a little. There was

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[39] These were the prose-based 'applied' subjects, now effectively examined at 'ordinary' level in subjects E-H, the Fellowship paper (among other things) replacing the 'specialist' level examinations.

less satisfaction for them in 'bookwork'[40] questions than in solving problems which required, or gave scope for, some originality. Many felt that the 'bookwork' questions were a baseline which everyone should have been able to master, the best students (including themselves) could go beyond that. However it is possible to interpret the third sentence of the previous quotation as a cryptic clue that knowledge of 'bookwork' might be terribly important. Indeed with hindsight, the majority of the actuarial students would come to judge the reproduction of bookwork as crucial (see case studies in Part III).

During their studies, nearly all of the actuarial students formed a view of the assessment criteria which was at variance with their initial expectations. Firstly, they all became aware of a 'hidden curriculum' (Snyder, 1971) of which a principal constituent was opaque assessment criteria. The actuarial students felt that neither the professional body nor the examiners themselves were willing to make clear (at least not officially) what was required to satisfy the assessment criteria: they had to find out for themselves. (Their quest for, and use of clues will be discussed in the next chapter.) In effect, discovering enough about the assessment criteria to tailor their examination answers appropriately, was an unexpected assessment criterion. To the overwhelming majority this was not a valid assessment hurdle.

There were two competing explanations for the opaque assessment criteria, both unpalatable to the actuarial students. On the one hand, the suspicion that the hidden agenda was the tripping up and failing of candidates, rather than the support of and passing of candidates. Students cited historically low pass rates combined with the normally high level of prior educational achievement of actuarial students, as evidence of this. Without naming it as such, they were suggesting the operation of gatekeeping. The competing explanation was incompetence on the part of those within the profession who were responsible for communication with students on matters relating to the professional examinations. This was unpalatable because it suggested the paradox of an unprofessional, professional education system.

Within my data the ubiquitous view of the nature of professional knowledge which was rewarded by the examinations in discursive subjects, was the reproduction of particular lists

[40] The reproduction of standard definitions, solutions, or proofs.

of points. Indeed the following quotations from Institute of Actuaries publications, representing official advice, were strongly suggestive of the accuracy of this view:

> *"Avoid all unnecessary verbiage and irrelevant material in your answers."*
>
> (Institute of Actuaries, 1987a, p8)

> *"As time is limited it is important not to waste time in unnecessary verbiage. Anything not directly to the point should be firmly excluded. Unless a draft letter or report is specifically required, answers may often with advantage form a series of short notes setting out the salient points."*
>
> (Institute of Actuaries, 1987b, pp 23-24)

This placed a premium on a good memory and speed of reproduction.

> *"The theory behind them is quite easy, but the exams are reasonably tough (from the point of view of writing for 3 hours at top speed, hoping not to make a mistake."* 806 Q'naire withdrawn

The students came to feel that they needed to possess two sorts of professional knowledge: the sort which enabled them to practise competently, and the sort which enabled them to pass the professional examinations so that they should be allowed to practise. There was some overlap in these domains, but not to the degree originally expected by those joining the profession. This led to questioning of the validity of the assessment process.

The previous quotation also draws attention to another characteristic of the professional examinations; severe time pressure.[41] The issues of listing points and time pressure are intertwined so that it is difficult to separate cause and effect. If excessively long examination papers are set, the consequent time pressure on candidates makes the presentation of fluent reasoned arguments difficult. Candidates are thus pressurised into simply listing the salient issues with minimal comment. Although the examiners might want to read expanded arguments they have to settle for what candidates can produce in the time available. On the other hand, if the examiners simply want to verify candidates' knowledge of extensive amounts of the course content, they would wish to see that content easily. They would prefer it to be simply stated and would prefer not to have to wade through *"unnecessary verbiage"*. They would be happy with lists of relevant points. Therefore,

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[41] Since my data collection, attempts have been made to ameliorate this in the 'applied' and fellowship papers, through the introduction of 15 minutes reading time.

they might set papers of the correct length to be answered in this form in the time available.

Throughout the period of this research project examiners have publicly stated that they do not want to see the mere reproduction of course content, particularly not in the form of lists of points. The usual reason given for this desire, was the difficulty of knowing whether the candidate really understood the relative importance of the points listed. Often added to this was the subsidiary reason of the necessity for actuaries to communicate complex technical issues to non-actuaries (both clients and colleagues without actuarial training). The inference being that the verification of this ability was one of the roles of the professional examinations. Further, it will be seen in the next chapter that since 1991[42] there have been increasingly frequent lamentations similar to the following remarks from a senior examiner:

> *"Once again this year, candidates showed that they knew the bookwork, but they just could not apply their knowledge."* 612 Obs

Thus, there was a risk that the actuarial students' perception of the type of examination answer required was in error, that the folklore (section 6.2.3) concerning the examinations was inaccurate. If so, that would have been a partial cause of the high failure rates (appendix II). However, twelve examiners, spanning the four final, prose-based subjects, have privately talked with me about searching candidates' answers for relevant points and paying little heed to the form of the answer. They suggested that the penalty for answering in list form, even where connected prose had been specifically requested, was sufficiently small to affect only the borderline candidates.[43] Further, those actuaries contributing to this research who qualified quickly ($n = 17$), if discussing their approach to the examinations, talked of learning lists of points for later reproduction. It seems that the folklore was a fairly accurate divining of the criteria for passing actuarial examinations.

Nevertheless, there remained the problem of deciding which lists should be reproduced. The examiners desired those they considered relevant and **only** those. However, many of the

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[42] Two years after the arrival of the tuition provider Hazell Carr Training, see page 166.

[43] The actuarial students' belief in an excessively large proportion of borderline scripts will be discussed in section 6.2.3.

actuarial students were unsure about what they would be rewarded for listing and so tended to hedge their bets by listing as much as they had time for. A strategy which brought expressions of frustration from examiners

> *"When we ask them the time of the next train from London to Norwich, they give us the whole timetable!"* 615 Obs

Extracting important and relevant points from the course material, particularly when that material is extensive prose, requires a good comprehension of the material. The material, the question and the context must be understood to select the correct list of points and to tailor it to the specific demands of a particular question. In these ways the actuarial students felt that the professional examinations tested their understanding. However, most felt that the professional examinations did not give them sufficient opportunity to demonstrate what they knew. This was frustrating and they felt they had no influence or control. It was demotivating in that they were compelled to navigate the barriers of the professional examinations, but they could not feel that what they were required to do was worthwhile.

Anxiety associated with too little control and inability to make sense of demands recurred throughout my data. I will return to these themes in each of the subsequent chapters, but particularly in section 9.3.

The actuarial students' unease with assessment criteria was substantially to do with their expectations of correspondence between the assessment criteria and the demands of professional practice; the fourth expectation listed at the beginning of this section (page 135).

5.4.2 Relationship between assessment criteria and professional practice: lists of points

The emphasis on 'a practical outlook' within the assessment criteria set out in the previous quotation tallied with, and thereby reinforced, the actuarial students' expectations about the professional examinations, which were based on their view of professional knowledge. Everyone needs a body of knowledge at their fingertips for use in daily work. Therefore professional examinations have a legitimate role in verifying the possession of knowledge deemed to be essential. However the actuarial students felt that the type of examination

answer required, bore little relation to professional practice: experience of which they were simultaneously gaining. Some argued that it would be unprofessional to do calculations or prepare reports based on one's memory of important formulae or regulations. Professional practice required that appropriate references be consulted, that things be cross-checked. This suggested the suitability of 'open-book' examinations (Lang, 1994).

Senior members of the profession, involved with pre-qualification education and assessment, agreed with the students' view of the demands of responsible professional practice, but countered that actuaries must also be able to think quickly under pressure. It was argued that professional examinations did prepare people for that. Several students saw some validity in this view.

> *"The written exam is important in assessing how well someone can 'think on their feet' in order to crack a practical problem."* 167 Q'naire qual-med

Another respect in which there was debate about the relevance of the professional examinations to professional practice was the value of extracting and reproducing lists of points as a professional technique. Support for this comes from two different angles. First the argument expounded by, among others, an actuary working for a large consultancy:

> *"Exam passes are valuable in demonstrating that an individual can extract important points from text and see the implications for a practical problem."* [These skills are required in the workplace and thus, the qualification] *"gives employers confidence."* 123 Tape qual-med

Secondly, the view, here expressed by a life assurance actuary:

> *"In my job it's important to think of all the relevant points, not just a few obvious ones. The exams do develop that."* 270 Tape qual-fast

It seems that the identification and enumeration of salient issues, which was experienced by the students as the monotonous compilation and reproduction of lists, may be the precursor of an important professional skill. There was a felt need for actuaries to think divergently and laterally in order to formulate possible solutions for the problems of their daily practice. In this process they have to assess large quantities of documents and data. In a way, the professional examinations are a preparation for that, because divining the assessment criteria is an exercise in lateral thinking, and handling the course material is valuable experience in

separating the important from the superfluous. Compiling lists of all the possibly relevant points could be thought of as similar to brain-storming. It could generate a genuine willingness to look widely for components of problem solutions, not exclusively at the narrow range of tried and tested components. It could be a creative process. However, lists of points could be very conventional and conformist. This raises a number of questions

- Is the exhaustive listing of possibly relevant factors a vital part of problem solving in actuarial practice?
- If so, is it intended that the professional examinations should begin to develop that skill?
- If so, how? For example, does the common student behaviour of extracting lists of points from the course material contribute to the development of this skill?
- If so, should there be more specific, more official encouragement for students to practise this?
- How can students be helped to view this activity more positively?

The first four of these questions can only be answered by members of the profession. The fifth is a matter of communication.

5.4.3 Relationship between correspondence course assessments and examination assessments: 'Chinese walls'

The fifth of the expectations listed at the beginning of this section (page 135) concerned the relationship between correspondence course assessments and examination assessments, which was a site of disjuncture also identified by Driver (1989).

Initially, the new actuarial students viewed the correspondence course tests as similar to undergraduate course work assignments. They expected the completion of the tests and the feedback which they would subsequently receive, to be formative and illuminating in relation to the examination assessment. However they experienced the tests and subsequent feedback as conflicting with their examination preparation and attempts. Firstly, it is discussed elsewhere (page 118, and later in chapter 8) that test deadlines were disruptive to examination preparation. Secondly, it was noted on page 118 that, in common with other distance learners, the actuarial students found that the time delay between dispatching an assignment and receiving feedback, rendered the feedback less valuable than it might

otherwise have been. More importantly, the signals sent by the assessment of tuition course tests were experienced as negative by the majority of the actuarial students. Occasionally they were very destructive.

Many students received consistently high test marks and very few corrections or additions were made to their work. Not unnaturally, they interpreted this feedback as indicative of having attained a satisfactory standard. That was often an interpretation with reference to the profession's published advice to students:

> *"The student himself should get a 'feel' from the marks he is getting, coupled with the tutor's comments and the model solutions, as to whether his performance is adequate. ... High marks are probably of less significance than low marks. ... A student who averages less than say 65 per cent would be vulnerable to examination failure."* (Institute of Actuaries, 1987b, p16)

In harmony with the general experience (Scurfield, 1990), almost half the actuarial students in this study failed their first year examinations. They felt misled by their test feedback. Most reasoned that they had not completed their tests under examination conditions and so their examination answers would be inferior. However they felt that, for example, consistently scoring in excess of 70% in the tests **should** have been capable of interpretation as a high level of performance. Surely high enough to indicate sufficient understanding and sufficiently competent presentation of answers to secure an examination pass; but no. They had to learn to interpret tuition course feedback in a different way to that in which they had interpreted formative assessment at university. This was only a problem because they did not anticipate having to do so; another unexpected transition. In the next chapter the problem of these confusing 'cues' will be discussed further.

A large part of the explanation for the lack of correspondence between high test marks and examination passes must lie with the division between examiners and tutors. Throughout the period of this research, the decision-makers within the profession almost invariably indicated their pride in the existence of 'Chinese walls' between the examiners and everybody else with an interest in initial qualification. They saw this as a means of ensuring the integrity of the examinations. They felt that it was important that it was seen to be impossible to influence the examiners. One manifestation of this isolation of the examiners was that they did not publish model solutions to examination questions, nor comment on the

'model solutions' to test or past examination questions used by the tutors. Even the small group of Staff Tutors who were employed by the profession's tuition service, the Actuarial Education Service (AES), were not advised by the examiners on the quality or accuracy of their advice to students. Thus, the formative assessment exercises within the tuition courses could have been based on different criteria to those of the examiners.

Further, most of the test marking was done by relatively newly qualified actuaries in their spare time, at a point where hopefully, their own careers were just taking off. Many also had young families at this stage. These tutors received minimal training for their role and frequently squeezed test marking in at the margins of a busy life from a sense of duty, or a sense of employer expectation. Through no fault of their own, some were not skilful in providing the high quality feedback which distance learners need (Kember & Murphy, 1992; Perraton, 1991; Stewart, 1991). This led to their assessments being less positively formative than anyone who was involved with the system would have viewed as ideal. Additionally, because of the pressures they faced and their lack of training, some tutors were less familiar with the course material and exhibited a lower level of mastery of the content, than their tutees expected. This reduced the actuarial students' confidence and motivation.

The disorientating dilemma for the actuarial students was that something they had expected to be an important part of their examination preparation might be unreliable due to institutional secrecy; and the variable competence and dedication of key people. They questioned whether this was a professional, professional education system. Their trust in the system diminished as did their personal confidence and motivation. Worse still, if their tutors lacked proficiency in their role, should the inference be made that the assistant examiners, largely drawn from the same ranks of fairly newly qualified actuaries paying their debt to their profession (footnote 60), might also lack proficiency? This was not a major concern for the first year actuarial students, but became a matter of increasing concern to students in their later years of study.

5.4.4 Student perceptions of examiners' motivation and competence

From the second year of study onwards, the view that problems might lie with the marking of examination scripts became increasingly common. There were two aspects to this: first, concern that the examiners were seeking to fail candidates rather than to award passes; and

secondly, concern that the examiners, particularly the assistant examiners, might not be as competent as the actuarial students would have liked.

The former concern was fuelled by the profession's practice of grading failures (FA, FB, FC, and recently also FD) while having ungraded passes. The institutional rationale for this is to guide students in their approach to future examinations. During my data collection, those who received a FA grade (the modal class within my data) were sent a very brief, standardised report on their performance on each question. Those who received a FB grade were simply advised:

> *"A substantial degree of improvement is necessary to reach the pass standard."*

It was suggested to those receiving a FC grade that they may wish to consider discussing their:

> *"... future course of action with an actuary or with the Institute's educational staff."*

Actuarial students receiving this advice on the interpretation of their FC grade, read it as an invitation to reconsider their plan to qualify as an actuary. Thus, the institutional intention was to assist students, but the negative message received by the students was that the professional body was more concerned with failing candidates than with rewarding success. The actuarial students found this demoralising, particularly because of its stark contrast with the institutional outlook during their undergraduate studies. They saw the emphasis in their new learning milieu as evidence of gatekeeping and indicative of a lack of concern for them as people.

A minority of the actuarial students became convinced that the examiners' gatekeeping extended to trying to trip up candidates. For example, the actuarial student who thought the professional examinations should be changed to:

> *"Test concepts in subjects 7-10 rather than having at least one question on an abstruse and esoteric part of the reading that results in marginal failures!"*
>
> 124 Q'naire qual-long

And, *"Sometimes it seems questions refer to a small part of the reading (1 paragraph) as if to try to catch people out."* 184 Q'naire student

With respect to numerical questions:

"They should not put in questions which rely on a 'trick' picked up in MCS test questions, this does not prove a greater understanding of the course, just an arbitrary knowledge of the trick." f 722 Q'naire withdrawn

This was despite the Institute of Actuaries' (1987b, p20) assurances under the heading of 'some hints on examination techniques'

" ... there are no trick solutions; no questions are set that can be solved only by some unexpected and ingeniously hidden manoeuvre."

One might infer that the assurances of an absence of tricks reflected the author's knowledge of a student preoccupation with tricks: an awareness that the students did not trust the examiners.

The other principal aspect of the actuarial students' lack of trust in the examiners, particularly the assistant examiners, was the concern that they might not be completely competent (e.g. Alan in chapter 7). As previously discussed (section 5.4.1), nearly all of the actuarial students sooner or later acquired the view that in the prose-based parts of the syllabus, the required examination technique was the listing of points. It does not matter whether this perception was accurate. The important thing is that the perception influenced the actuarial students' views of the assessment of their examination answers. Most of the actuarial students expected the assistant examiners, who did the first marking of scripts, to search for points which were listed in the examiners' marking guide. These assistant examiners were often fairly newly qualified actuaries. The students' perception of the demands of the situation was that they must attempt to hit the target of the examiners' list of points.

"Obviously it helps to have background knowledge when you are answering questions, but there is no substitute for getting that core answer down which is bookwork. ... You've really got to get those points down. ... You are always bound by the fact that the answers they are looking for are very clearly defined. ... You've got to be able to work out what they want in the question. I've seen people repeatedly fail exams when they clearly know the course." 266 Tape qual-long

Although there were institutional assurances that all valid answers would be rewarded, the students suspected that this might not happen. They feared that the time pressure under which the assistant examiners worked would deter them from spending additional time in

considering novel approaches. They also feared that the assistant examiners' grasp of the subject which they were examining could be somewhat tenuous and thus, valid alternative solutions might slip by unnoticed and unrewarded. For example, one actuary shortly after qualification, reflecting on the process:

> *"Somebody tried to prove to me that if a lot of people came up with an alternative solution they would not miss out. But if one person came up with an alternative, would they necessarily catch? I did change to think that its just the particular points on their marking schedule that they're going for. Whereas before, I gave them a lot of credibility for knowing."* f203 Tape qual-med

The students' perception that their task was to try to hit the target of an arbitrary examiners' solution engendered the sense of a lack of autonomy and a lack of natural justice. Displays of sound understanding would be of no use unless they hit the target. Creative and elegant solutions might be worthless if they were not recognised because they were not on the target list.[44] No amount of effort on their part would influence the outcome unless they could find a way to hit the hidden target, but perhaps this was substantially luck. Perhaps the whole process was just a lottery. The actuarial students hated this idea; it was not fair, it was unprofessional. Nevertheless, the notion of a lottery is the second most common category (after lists of points) in over a thousand pages of data relating to the professional examinations.

The fear that *"It's a lottery"* will be explored in the next section.

5.5 'It's a lottery'

People from all the groups interested in the actuarial examinations (students, qualified actuaries, employers, tuition providers and examiners) have described aspects of the assessment process as a lottery. The consensus is that progress through the professional examinations involves a substantial element of chance and that this is undesirable. A few

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[44] Arguably, it is always dangerous to attempt creativity within the confines of a three hour written paper. In these circumstances it is difficult to set out a novel approach as comprehensively as would be required to convince the surprised assessor.

argue that this is unavoidable given the limited resources a small profession can dedicate to initial qualification. The majority argue that within this constraint, steps can and must be taken to reduce the degree of unpredictability in student progress (e.g. Daykin *et al.* 1987, Truckle, 1982). I will now give an example of an area in which the degree of chance attached to passing the examinations has been reduced during this research: improvements to the checking of examination questions.

In the early part of this research a small number of examination questions appeared with mistakes in them. Additionally, some questions were set which were widely thought to include topics which were not part of the professional syllabus, as defined by the Course of Reading. On rare occasions, examination questions were set which drew on parts of the texts which had been explicitly excluded from the course of reading. Sometimes papers were set which were impossibly long. Such human errors were rare, but their occurrence was very unsettling to the actuarial students. They felt that their diligent efforts to pass the professional examinations were in danger of being thwarted by poor screening of the examination questions. They felt they had no control over this and that it was unjust. They felt that this amounted to unprofessional administration of the professional certification. Perhaps it was no more than a lottery whether they faced papers that they should not be expected to be able answer fully.

Their dismay and lack of trust in the process of checking examination questions were out of proportion with the frequency of errors in the question screening process. The actual event was rare (and is now rarer still), but the students found it so distressing and debilitating that it featured as large in their perceptions of the examinations. It was a significant feature of the actuarial folklore or gossip which was passed on from generation to generation of students (section 6.2.3). Even students who had never come across a problem question 'knew' that the examiners could not be trusted not to set them. The existence of a level playing field in the sense that every candidate had to face the same examination paper, without a choice of questions, was little consolation to the candidates. The examiners' assurances that candidates were never disadvantaged by examiners' errors detected after the paper had been set, were generally met with disbelief.

While eliminating human error from the process of producing examination papers will never be possible, during the later years of this research study the professional body tightened up its procedures and reduced the incidence of problems. Following the introduction of an objectives-based syllabus to replace the Course of Reading in 1993, it was required of examiners that they should make explicit to other members of their team to which objectives any question they set related. This should have eliminated the examining of topics which are not part of the syllabus. Additionally, in recent years all examination papers have been worked by 'guinea pigs', often assistant examiners who have not been involved in the setting process. This practice identifies errors and ambiguities which have crept through the earlier stages of checking. It draws attention to miscalculation with respect to the length of time required to answer the questions. Additionally, it provides a means of testing the examiners' proposed solutions. Today's examination papers are definitely better checked and less ambiguous than they used to be. However, the belief that 'it's a lottery' whether one is faced with a fair examination paper persists. Destroying trust is easier than building it. It is easier to lose a good reputation than a bad one.

The students' reactions are the result of interaction between lack of control and perceived unfairness. Students felt that through their own efforts, they should **theoretically** be able to increase the probability of passing an examination to a level approaching unity. However, in this context it seemed that no amount of hard work, nor the possession of a firm understanding of the defined course content would guarantee an examination pass; there were too many chance variations. This was perceived as running counter to natural justice (see Frank in chapter 8). The actuarial students felt that those who worked hard and understood the material should pass, but that this would not necessarily happen.

Lack of control is likely to have been more difficult for these people as young professionals than it would have been when they were undergraduates. Lack of autonomy was not congruent with their image of their new status. This adversely affected the students' motivation, which of course increased the likelihood of failure and further demotivation. The demotivation was considerably exacerbated by the perception that the assessment demands amounted to the requirement of hitting the hidden target of points which comprised the examiners' solution (section 5.4). Gaining marks thus became synonymous

with the probability of naming enough of the examiners' points, rather than a matter of demonstrating the extent and quality of their knowledge and understanding.

The perception of a high level of chance being attached to the outcome of examination attempts reduced the esteem in which the students held the process of qualification. Many of them had been attracted to the profession by their perception of the prestige of the qualification. When they began to focus on the role of chance in success or failure their pride and satisfaction in success diminished. You cannot feel proud of winning a lottery. You can feel relieved, you can feel euphoric, but feeling that it is a great and worthy achievement is difficult.

5.6 Prestige

The perceived prestige of the actuarial qualification encouraged many actuarial trainees to select the profession in preference to others they considered (in particular, accountancy which has tended to suffer from a rather poor public image; Adams *et al*, 1993; Fisher & Murphy, 1995). When asked to rate on a six-point scale from (1) 'very important' to (6) 'not at all important', the importance of various influences on their decision to join the profession, 58% of those contributing to the cross-sectional survey or the longitudinal survey, rated the high status of the profession as very important or important (1 or 2). In addition, a further 19% of respondents cited as other entry influences, things which I have categorised as involving status or prestige, for example:

> *"Obtaining a high quality of qualification"* 121 Q'naire qual-med
>
> *"I believe it is the most highly respected professional qualification and therefore very marketable throughout the financial world."* 130 Q'naire student
>
> *"The challenge to become the first* [nationality] *actuary."*
>
> 159 Q'naire withdrawn

Qualification as an actuary was seen as prestigious because of:

- its relative rarity
- the perception of high status being accorded to actuaries by others in the financial sector, evidenced by their high salaries and their prevalence in senior jobs
- the perception of a high level of public confidence in the integrity of actuaries (Adams *et al*, 1993; Tait & Mair, 1994)
- the mystery surrounding the 'propositional knowledge' of the profession.

The actuarial students' expectation was of mastering this difficult, esoteric propositional knowledge, then using it altruistically on behalf of those not in possession of its mastery.

The actuarial students' experiences of the professional examinations called into question the notion of prestige in several ways. Once they developed the view that the assessment criteria for the examinations required the reproduction of lists (section 5.4), the learning of an 'imitation subject' (section 5.2); the prestige attached to passing the exams appeared ill-founded. Once they decided that the knowledge on which they were examined was neither conceptually difficult nor esoteric, its mystery appeared more like the power-seeking colonisation described by Becher (1994a) than akin to Beckman's (1990) description of authority grounding skills.

Some of the high status accorded to actuaries by the financially aware public, or even colleagues who did not understand their work, was associated with the image of actuarial work as highly mathematical. While investigating the teaching of mathematics, Cockcroft *et al* (1982) were surprised to discover that mathematical competence inspired awe and apprehension in most people, regardless of social class or educational achievement. They commissioned a survey to elicit information on the mathematical needs of adult life, but found that half the selected sample, chosen to reflect the Registrar General's classification of the population by occupational group, refused to participate. Later sampling was also difficult, even when the use of the word mathematics was avoided. The researchers concluded that there was a widespread perception that mathematics was a daunting subject:

> *"... the need to undertake even an apparently simple and straightforward piece of mathematics could induce feelings of anxiety, helplessness, fear and even guilt"*
>
> (Cockcroft, 1982, p7)

The actuarial students were aware of a respect for actuarial work, based on its mathematical demands, but since they perceived the mathematical demands to be far less than they had anticipated (section 5.3), they felt uncomfortable with this undeserved respect.

The prestige of the actuarial qualification which was due to its comparative rarity, was clearly important to some entrants. One might speculate that these people could have viewed high examination failure rates and high withdrawal rates as safeguarding that prestige. This would only have encouraged them to join the profession if they believed that they would not fall victim to its gatekeeping (Goodlad, 1984). Arguably, their high self-esteem and positive self-concepts, born of years of educational success, gave them the confidence and desire to tackle the actuarial examinations (Herriot, 1984; Kidd, 1982; Super, 1963, 1981); the opportunity to validate their personal constructs (Kelly, 1955).

Gatekeeping *per se* was often supported by the actuarial students as a proper means of safeguarding the profession's prestige. However, they developed the concern that the correct people might not be let through the gate. This was a disjunction with the expectation that people would pass through on the basis of merit.

> *"The standard should not drop out of fairness to people who have qualified, but people who are working well in an office environment still seem to fail exams. I also read that there is a significant bunching of candidates around the pass mark;* [the exams] *should be better at identifying people who know their subject and people who don't."* 146 Q'naire student

This student was expressing a widespread desire for criterion referenced examinations, the criterion being 'knowing' the examined subject. In fact the examinations were officially criterion-referenced, even if rather cryptically:

> *"... the criterion for passing is the fitness of the candidate to assume professional responsibilities in due course."* (Institute of Actuaries, 1993, p1)

However the suspicion was that the examinations were wholly norm-referenced, thereby achieving the gatekeeping which helped to safeguard the profession's prestige.

"The exams should be marked on the basis that, 'is this person qualified to be an Actuary?', not on 'what is the pass rate?'"[45] 831 Q'naire student

Gatekeeping is concerned with the role of professional examinations as a barrier. This will be the focus of the next section.

5.7 The professional examinations as a barrier

Three aspects of the role of actuarial examinations as a barrier between novice professionals (the actuarial students) and full professionals (the actuaries) will now be considered:

- the challenge of the barrier
- the perceived validity of the barrier
- professional socialisation.

Over a quarter of those who completed questionnaires, indicated that their desire for a challenge was an influential factor when they elected to join the actuarial profession. Herriot (1984) and Super (1963) would argue that they were expressing their ideal self concept: high achievers, successful people. One actuarial trainee, just beginning his second year of study with two first year passes in the early theoretical subjects, suggested that the examinations should be reformed:

"Make them tougher!! I do not want to be '2-a-penny' in 5 years!"

803 Q'naire student

Thus, there were senses in which the actuarial students wanted the barrier posed by the professional examinations to be difficult to pass through. They did not really want the market to become flooded, with the resultant losses in status, security and material rewards. In addition to these things, there was a sense that if the examination barrier was too easily negotiated, it would not provide motivation by being challenging, nor the satisfaction which follows from successfully completing a challenging task (Handy, 1985). However the

[45] Although the fluctuating pass rates shown in appendix II cast doubt on this widely held suspicion.

desired challenge was a fair meritocratic one, with clear consistent rules. A challenge in which those who worked the hardest and acquired the best understanding, would be rewarded with success. After some experience of the actuarial examinations, the actuarial students felt that the rules were not clear and consistent (section 5.4). They began to feel that the examinations would not necessarily give them the opportunity to display their understanding, nor necessarily fully reward their answers.

> [In degree exams] *"If you know a subject you are given a chance to show you know it, whereas in the actuarial exams you can know it and come out of the exam having not been able to show it."* 266 Tape qual-long

The element of chance attached to the examinations was felt to be too great; a lottery. Thus, the professional examinations were experienced as a challenge, but not the type of challenge which the actuarial students were seeking.

The challenge of divining unexplicit assessment criteria seemed unnecessary to the actuarial students. They did not see it as pertinent to professional practice. It was an irrelevant unprofessional barrier. They had no control over its imposition and found it annoying and demotivating. However, some experienced actuaries disagree with the students' perspective of the opaque assessment demands as an invalid barrier. They maintain that in professional practice clients bring messy ambiguous problems and will not necessarily be explicit about what they want. They argue that finding out what is really required is very much part of professional practice, (see the case study of Dave in chapter 8).

It is true that actuarial students needed to become aware of the complexity of the problems which they would encounter, including the political and communication aspects which ran parallel with the technical issues. However, I find it difficult to accept that increasing the challenge of the professional exams by not telling students what is required of them was the most effective and efficient form of training for this aspect of professional practice. It made the barrier posed by the examinations appear to the students as less valid than it should be. The face validity of an assessment system is important. If lacking, those who have contact with the system loose respect, confidence and commitment. Many actuarial students who contributed to this research had their morale weakened by aspects of the professional examinations which appeared to them to lack face validity. In these circumstances, their motivation to prepare for the examinations lessened. The task of negotiating the barrier of

the professional examinations was anyway far from trivial; with damaged morale it became gargantuan.

The preceding discussion on the role of unexplicit assessment criteria assumed that the challenge of divining assessment criteria was a deliberate part of the professional examinations. Some would argue that it was, but more would maintain that it was not. The dilemma for the students was that if the opaque assessment criteria were not deliberate, they must represent a failure to make explicit that which was intended to be explicit. In this case they represented a qualification system which was not working properly, and historically had not done so. The students felt that allowing this situation to continue was unprofessional of the profession. Another disorientating dilemma.

Lack of face validity led many students, including Colin, Dave and Emma in chapter 8, towards viewing the professional examinations as a barrier which had to be crossed, a matter of survival, an endurance test; rather like a very long rite of passage. Sometimes, arriving at this view followed periods of regarding the professional examinations as a valid barrier in the optimistic early days within the profession, then an invalid barrier with associated disillusionment and anger. Arriving at the perspective of the examinations as an endurance test barrier helped most of those actuarial students to do what was necessary. They stopped fighting the system and acquiescently did what they felt they must, to get past the barrier standing between them and qualified status. In Colin's terms, they became prepared to perjure their minds. It no longer mattered that the examinations were not an honourable challenge, that they were not proud of what they were doing to get through, getting through was all that mattered. A kind of prostitution.

The barrier of actuarial examinations generally held the students back from qualified status for much longer than they originally expected it would. During this time, professional socialisation occurred. The novice actuaries gradually internalised the values and ways of communication which are characteristic of the profession. If the professional examinations aided this process; perhaps they did not do so directly, but indirectly. Indirectly, by holding people at a position of low status long enough for them to learn and understand how their seniors, both colleagues and other members of the profession, operated and communicated.

Two people who contributed to this research reported that their unusually rapid progress through the professional examinations was considered problematic by their employers and more established actuaries. For example:

> *"People kept telling me to slow down. If I qualified too quickly no one would know what to do with me."* f 603 Obs

This is at one level, a concern about this woman gathering enough prior work experience to operate competently and confidently in the type of position allocated to qualified actuaries. However, it also seemed to be a concern about her not having fully internalised the values and customs of the profession. That she might not yet instinctively think like an actuary.

Although the profession has had the reduction of the time to qualification as an objective for many years (e.g. Dardis, 1990; Daykin, 1994; Daykin *et al*, 1987; Goodwin, 1993; Kennedy *et al*, 1984; Scurfield, 1990), the desired lower bound on this shortening appears to be three to four years. Three years being the length of the period of approved work experience required before fellowship of the professional body can be conferred. Unlike Australia, the professional bodies in the United Kingdom have not been prepared to entertain the idea of exemption from all the professional examinations being available from higher education courses. British actuaries must work nearly full-time and also study part-time at least for around half the qualifying examinations. The quotation on page ~~127~~ 136 stressed that practical experience would not be required to pass the examinations. However, virtually no one completes the professional examinations without having worked in actuarial practice for several years. During their years of student membership of the profession they are socialised into the culture of the company which employs them, and socialised into the culture of the profession.

5.8 Making sense of failure

The unfamiliar experience of failing examinations made it necessary for the actuarial students to reflect on the reasons for their lack of success. What had gone wrong? They always used to pass examinations! A few had no idea why they had failed:

"People get an FA[46] *and they are not really clear why they have failed because they've gone in there with the knowledge. There's nothing worse than knowing you know something and not passing. I'd have no complaints if I hadn't done the work, but when you've done the work, then you ought to pass. It's annoying that you don't know what you need to do to make sure you pass next time."*

266 Tape qual-long

However, most had formulated explanations. During the first two to three years of sitting actuarial examinations, there were two dominant themes:

- they had not entered the examination armed with sufficient knowledge or an adequate understanding, or;
- their knowledge and understanding was adequate but, their examination technique was lacking.

These both appear to be equivalent to the internal sense-making described by Arnold (1985).

Those who settled upon the former explanation inferred that they needed to work harder and to understand better. However they often experienced difficulties in checking their understanding, which one student expressed as:

"No proper guidance. You do not know whether your understanding for certain topics is correct and you do not have anyone to refer to." 139 Q'naire qual-long

He found that he could not get sufficient feedback on his work to enable him to evaluate its adequacy.

The position was different for those who settled upon the latter explanation, they evaluated their understanding of the course content as adequate, but judged that they needed to work on their examination technique; perhaps just better planning, perhaps tailoring examination answers to the particular requirements of actuarial examinations. But what were the particular requirements of these examinations? The assessment criteria were very unclear (section 5.4) and so, rather than simply respond to explicit direction, the actuarial students had to hunt for clues.

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[46] Examination failures are graded, FA, FB, FC and FD, in order to help students identify how much improvement is required to secure a pass.

"I don't think there is anything inherently difficult in the exams. The biggest test is working out what the examiners want." 130 Q'naire student

Working out what the examiners required will be the focus of the next chapter.

5.9 The interaction of themes

The actuarial students did not encounter the disjunctions which have been described and discussed in the preceding sections, singly. If they had, each in isolation may have seemed trivial, an irritant to be overcome. However, the cumulative effect of the coincidence of many disjunctions was, for most people, a sense of overload: lack of control, questioning of purpose. For a minority, the interaction of a series of disjunctions was morale breaking.

Some outcomes of the coincidence of disjunctions can be seen in Part III, where Dynamic Concept Analysis is applied to the experiences of seven actuarial students. These case studies show the relational nature of key aspects of the student experience of actuarial examinations. They also illustrate a variety of outcomes for people who began studying for the professional examinations with very similar prior educational experiences and levels of success. Here, I will note the general effect of a particularly common constellation of disjunctions:

The course content on which the professional examinations were based was not as expected:

- it was less internally consistent than the academic disciplines which they had studied at university (sections 4.5 and 5.3)
- it did not meet their expectation of being closely related to their experience of actuarial practice, neither the direct experience of their own office work, nor the indirect experience of their observations of the work of others (sections 5.2 and 5.3)
- for the vast majority, the course material was far more extensive and far less structured than anything they had previously encountered (sections 4.3, 4.4, and 4.5).

The assessment criteria:

- often appeared not to value an understanding of the actuarial practice within the actuarial students' experience (section 5.4)
- were perceived as not particularly rewarding an understanding of the course material (sections 5.2, 5.4 and 5.5)
- were equated with the reproduction of 'lists of points' (sections 5.4.1 and 5.4.2).

However, the students felt:

- that the professional examinations **should** be related to professional practice to justify their existence (sections 5.2 and 5.7)
- if they worked hard and understood the course content, **and** they perceived themselves to be competent and valued in the office, they **should** pass the professional examinations (sections 5.4 and 5.7)
- if their self-assessments of understanding and competence were correct, but they did not pass, something had to be wrong with the system (sections 5.4, 5.5 and 5.7)

The effect of these conflicts seemed multiplicative, rather than straightforwardly additive, and the outcomes were:

- anxiety, frustration and demotivation for all
- the adoption of a reproductive approach to learning by almost everyone, with its associated lack of satisfaction and increased risk of failure
- reduced self-esteem for the majority
- disenchantment and alienation for a minority.

5.10 Summary

Sections 5.2 to 5.7 contained a thematic consideration of sites of disjuncture between actuarial students' expectations and experiences of their professional examinations. These were broader and deeper than quibbles with the examinations themselves. For example, the discovery that the professional examinations were not concerned with the mastery of rigorous mathematics (section 5.3) caused questioning of the nature of both actuarial science

and actuarial practice. Then, deeper than that, it caused reflection on the nature of professionalism.

Disjunctions were considered separately to make them tractable for analysis and because, singly, they are not insurmountable problems. Much could be done to eliminate or ameliorate the effects of the individual disjunctions; if that were desired. However, I stressed that individual disjunctions tended not to be debilitating. Rather, most of the actuarial students were overwhelmed by the number, variety and interaction of the disjunctions which they encountered. A few were crippled by a single area of disjunction, such as the perceived requirement to rote-learn an 'imitation subject' (Sawyer, 1959; section 5.2). These reactions were consistent with the work of Jarvis (1987) and Mezirow (1994) who warned that if disjuncture is too great, it may prevent the construction of meaning and hence, not result in learning or personal growth. It can be observed that people are able to overcome considerable difficulties if these make sense. However, nonsensical barriers are more difficult to bear.

The disjunctions which dominated the student experience are tabulated at the end of Part II (page 199). It will be seen in Part III that students experienced the same disjunctures in different ways and hence, the effect of an individual disjunction varied between students. Overall, there were two senses in which the system of initial qualification was felt to be faulty:

- it was not functioning as it was intended
- it lacked natural justice.

An example of the former point was that the examiners indicated that they valued candidates' understanding and application of the professional curriculum, something with which the students concurred. However, the students believed that the assistant examiners searched their scripts for the reproduction of specific knowledge and thus, felt compelled to provide this, if necessary without 'wasting time' demonstrating the extent of their understanding (section 5.4 and Alan in chapter 7).

The system was seen to lack natural justice in that those who were regarded as understanding the concepts within the professional curriculum, and as successful in the office context, did not necessarily pass the professional examinations. Failures in the

screening of examination questions reduced the actuarial students' trust in examiners: trust in their competence and professionalism, trust in them as supporters of student success. It fuelled the suspicions of gatekeeping. Thus, the system did not seem meritocratic, certainly not on criteria which the actuarial students felt to be valid. This gave rise to the notion of a lottery (section 5.5). While gatekeeping based on merit was expected and desired by the actuarial students, gatekeeping by means of a lottery was regarded as unprofessional (sections 5.6 and 5.7).

In all cases, the professional examinations were experienced as very demanding. However, demanding of tenacity and resilience, more than demanding of flair or intellectual excellence. In this context, it should be remembered that entrants to the profession were all academically successful in relation to the general population. Thus, their perception of intellectual difficulty probably has a high base line. Nevertheless, there was not felt to be a positive correlation between effort combined with understanding, and examination success. This ran counter to ideals of natural justice and of professionalism. It caused the actuarial students to question whether they wanted to continue striving for success in the professional examinations, in the light of their evolving understanding of the nature and value of such success.

Chapter 6: Finding and Decoding the Clues

6.1 Introduction

The previous chapter drew attention to actuarial students' experience of opaque assessment criteria. However:

> *"Sussing out the assessment system is probably the most important aspect for students: it is almost a necessary condition for their survival."*
>
> (Morgan, 1993, p104)

Morgan observed that this process is necessarily slower in distance education than for traditional students: one reason why the face-to-face elements of distance education courses tend to be highly prized.

Most learners can approach learning tasks in more than one way and further, they respond to changes in their perception of task demands by modifying their approach (e.g. Crooks, 1988; Entwistle & Ramsden, 1983; Laurillard, 1979; Marton & Säljö, 1976b; Miller & Parlett, 1974). Perceptions of task demands are a product of:

- learners' expectations, based on prior learning experiences
- the instructions which they are given; and
- their interpretation of the clues which exist in relation to the task.

The effect of clues can be very significant. In their early work in this field, Miller & Parlett (1974) termed awareness of such clues as 'cue consciousness', and labelled those students who actively sought out clues as 'cue seekers'.

I noted in section 4.4 that the primary formal source of feedback on performance was the comments supplied by correspondence course tutors. Other formal sources of feedback included: company mentors; in-house tutorials; and for some, tutorial classes run by one tuition provider. The terminal course feedback of examination success or failure, along with the extra feedback received by some failing students,[47] should also have provided important

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[47] During the data collection for this research, students receiving a grade FA were automatically sent a very brief report on their examination attempt. Those answers which (continued...)

formative feedback to aid students in honing their approach to subsequent years of study and examinations. However, the actuarial students found the official sources of feedback to be inadequate at all levels of the system. The view of the majority was summarised by this man who did 'pass them':

> *"Your only gauge is basically whether you are passing them or not. If you are passing them you know you must be doing something right and if you are failing them, well you don't know. You don't know what you are doing wrong."*
>
> 602 Tape qual-med

Therefore, the actuarial students found that it was necessary to search for implicit feedback within what was offered, that is, to look for clues.

The actuarial students' need for clues was very great and a minority were alert to this from the beginning. Initially, others were oblivious of their need because they were confident that they knew how to study and how to pass examinations (section 4.2). At this stage they tended to be 'cue deaf' (Miller & Parlett, 1974). Once they became 'cue conscious' or began 'cue seeking', they discovered a dearth of clues and experienced some difficulty with confusing clues.

In the following sections four sources of clues will be considered, and students' use of clues will be discussed.

(...continued)
did not reach the *"pass standard"* were categorised as *"'slightly below standard', 42-49%; 'weak', 30-41%; 'showed little knowledge', under 30%"*. (Note the emphasis on showing knowledge.) In addition, failing students could pay for an appointment with a Staff Tutor to discuss an examination attempt. The Staff Tutor would have a copy of the candidate's 'virgin' script, i.e. with all examiners' marking removed, and would not have access to the examiners' marking schedule. This 'Examination Counselling' was not highly regarded by the actuarial students, largely because they sensed that the Staff Tutors were fellow sufferers with respect to lack of clarity about the assessment criteria.

6.2 Sources of clues

The actuarial students' four principal sources of clues were:

- tuition course information and feedback
- examination information and feedback
- the actuarial folklore
- illicit feedback.

The order of consideration of these sources reflects the chronological order in which they were generally encountered, although they did not necessarily form a neat sequence. There was some overlap in the progression and not every student could use every source.

In the following subsections I will present the actuarial students' perspective of the type of information they obtained from each source considered. In addition, I will discuss the students' perspective, suggesting some points of contact and some points of divergence with the institutional perspective.

6.2.1 Tuition course information and feedback

This section presents a summary of the changing role of tuition courses over the last decade.

The data I collected from new actuarial students, and the reflections of more experienced people upon their early days as actuarial students, revealed that they had initially expected the profession's tuition courses to be oriented towards meeting the demands of the examination assessments. They had expected the content which would later be examined to be presented to them in a structured form which made explicit what had to be learnt and in what depth (perhaps like the university lecture courses they had experienced?). Further, (like at university) they expected feedback on the problems which they attempted during the course, to be positively correlated with examination performance. They were used to tempering the expected level of this correlation by taking into account both effort expended on the in-course problems, and the extent to which these were solved without reference to the tuition materials or assistance from others. These expectations were at variance with the profession's view of the role of its tuition courses.

During the early part of this research study, the syllabus for each of the professional examinations was a brief list of subject areas which might be examined, the extreme case being Subject 5 - Applied Statistics, whose syllabus included only eleven words. These gave no clues about the depth or breadth of what had to be learnt under the four subject areas of the syllabus. Instead, the syllabus to be prepared for examination was effectively defined by the 'Course of Reading'. This was a list of references which:

> *"... should provide adequate reading for the examinations"*
>
> (Institute of Actuaries, 1987a, p18),

although it was stressed that alternative sources could provide a satisfactory preparation.

The then current tuition prospectus stated:

> *"To prepare adequately for the examinations a student must thoroughly understand the course of reading. The tuition course lesson notes are intended to assist by throwing light on aspects of the reading which may be difficult to grasp."*
>
> (Institute of Actuaries (AES), 1987b, p11)

Subtly, students were being told that the tuition material was not intended to be a comprehensive preparation for the professional examinations. Most new actuarial students missed this clue. Expecting the tuition courses to lead them neatly towards the requirements of the examinations, they were significantly hampered by:

> *"Out of date texts coupled with an ill-defined course."* 130 Q'naire student

and *"Exams and courses which did not always quite match up."*

167 Q'naire qual-med

Many students felt that the courses:

> *"... are generally not aimed enough at getting people through exams. They fail to emphasise what is important, and likely to be asked."* 709 Q'naire qual-med

The courses did not provide them with sufficient, or sufficiently accurate clues about the assessment criteria.

Within the tuition prospectus current at the time of the cross-sectional survey, students were told that

> *"... the most valuable part of the tuition course is the facility to work the tests and submit them for marking."* (Institute of Actuaries, 1987b, p11)

Most of the new actuarial students agreed with this statement unreflectively. They tried to answer the test problems and submitted their answers for marking: for evaluation by someone else. They tended not to evaluate their own work (perhaps like at university), despite official warnings about the variability of test feedback. Initially, the actuarial students expected high quality, reliable, helpful feedback. The majority were dissatisfied with what they received, for example:

> *"Attempted tests but feedback from tutors was extremely poor, i.e. see test solutions! Test questions do not seem to bear much resemblance to exam questions for final subjects."* 162 Q'naire qual-long

and the student who complained of a:

> *"Lack of real reason for doing tests (when comments are few and useless and marks appear erratic without proper comments. It is impossible to know if it is ignorance of material, format or both)."* 195 Q'naire qual-med

There are two unrealised expectations embedded in the first quotation:

- He expected his tutor to give him more information about his work than was contained in the tuition provider's specimen answer which was returned with his marked test. He wanted personal clues.
- He expected course questions to be practice examination questions (like at university?). By implication, the feedback from course questions would amount to clues about the examination criteria. A difficulty with this expectation was posed by the official isolation of examiners from tuition providers (see page 143).

The second quotation raises three issues:

- He did tests in order to have his work evaluated by someone else. To be given clues about its adequacy. He did not want to evaluate his own work and he did not see doing questions as intrinsically beneficial.
- The feedback he received contained insufficient clues, and clues he was unable to use.
- He applied external sense-making (Arnold, 1985) to the surprise of not having his expectations about test marking met: he professed a lack of confidence in the tutorial system.

In 1989 a competing tuition provider, Hazell Carr Training (HCT), began operating. Initially it provided revision courses, but was soon offering a full range of tuition courses. The philosophy behind these competing courses was quite different to that of the professional body's courses. The new tuition service concentrated on making explicit to students what was required to prepare adequately for the examinations. They were clearly **training** people. This was manna from heaven for students who had notched up several failures and still had:

"No idea why I failed" 183 Q'naire qual-long

There would be no more searching for faint clues, they would see clearly what had to be done. Students found the new style of courses much easier to follow. They were:

"Good (HCT) - geared to passing exams (no waffle)." 803 Q'naire student

and initially, the pass rates from them were very high.[48]

Naturally, the profession's own tuition provider, the Actuarial Education Service (AES) responded to the competition and modified its material and procedures, although it stood firmly by its espoused mission to **educate** actuaries of the future. As one senior policy maker commented disparagingly:

"I think there is a place for a 'Letts Key Facts Guide to Actuarial Exams', but that's not what the profession should be doing." 609 Obs

The profession also responded to changes in students' preparation for the examinations and, perhaps just coincidentally, the clues published in examiners' reports shifted in emphasis (section 6.2.2, page 175).

After the introduction of an objectives-based syllabus in 1993-94, to replace the Course of Reading, tuition courses acquired a different role: interpreting the objectives. The profession asked examiners to interpret the objectives when they set examination questions. For the ongoing development of their courses, tuition providers interpreted the objectives, interpreted specimen and past examination questions, and interpreted examiners' reports. To prepare for examinations, students interpreted the tuition courses, specimen and past

[48] I am not implying a simple causal relationship here, there were several contributory factors. Detailed consideration of the full impact of the competing tuition provider upon the profession and upon the student experience (1989-1995) would be fascinating, and could comprise another thesis.

examination questions and examiners' reports, and occasionally the objectives. Each group expressed uncertainty about the reliability of its interpretations. Everyone was looking for clues. The air of confusion and anxiety was palpable.[49]

From the students' perspective, it was crucial that if they were to invest money, time and energy on the tuition courses, that they could be confident that the tuition providers' interpretations were correct. However, student confidence in the ability of the tuition providers to portray accurately the examiners' expectations was traditionally low (section 5.4). In fact, their confidence was appropriately low at this stage, the lack of familiarity and confidence with the objectives-based syllabus made the tuition providers' role very difficult. It also yielded some unanticipated examination questions and examination emphases. Sensibly, to reduce the risk of acting upon potentially unreliable clues from the tuition courses, the students cross-checked them with clues from other sources.

6.2.2 Examination information and feedback

The opaque nature of the assessment criteria in the actuarial examinations, and the defence of 'Chinese walls' between the examiners and other stakeholders, were discussed in section 5.4. These factors made it imperative that students paid heed to any clues which might be found in past examination papers and examiners' reports. Some students realised this almost immediately and always scoured this source of clues very strategically (e.g. Colin in chapter 8). Others took longer to tune in to the importance of this source but ultimately, virtually all the actuarial students accorded it higher status than the tuition courses as a source of clues.

It is informative to look at some clues within examiners' reports, and to trace shifts in emphasis since 1980. Tracing this source of clues over a substantial period is appropriate because clues which passed into the actuarial folklore (section 6.2.3) often remained in circulation for many years, influencing several cohorts of students. In addition, 23% of

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[49] This situation improved as experience with the new syllabus increased, but not sufficiently. In 1995 the profession intervened and introduced 'Core Reading'. This was *"... intended to give a clearer shared understanding of the requirements of the syllabus between tutors, students and examiners."* (Goodwin, 1995)

those responding to the cross-sectional survey had taken some actuarial examinations by 1980.

At the beginning of this period, examiners' reports were extremely critical of candidates, for example:

> *"The general standard of answers was again poor, and most candidates were unable to apply bookwork to practical problems. Answers were often badly planned with the result that essential elements were frequently omitted and much irrelevance was evident."* (Institute of Actuaries, 1980, Institutional Investment)

The following clues about this prose-based examination might have been divined:

- The general standard of answers was not high, which tallied with the pass rate of 24%.
- Bookwork was important **and** it had to be applied to practical problems.
- Candidates tended not to supply examiners with the content they were seeking in answers, both omitting what was required, and including what was not required.

The student perspective was that frequently, they could not supply the desired answers because they could not find sufficient clues about what was actually wanted, only annual confirmations that once again candidates had got it wrong. Both students and examiners have continued to be preoccupied with 'bookwork', although the emphasis on the application of knowledge receded for several years after this report.

For several years up to 1986 examiners' reports were introduced with the following sentence:

> *"The following comments on examination technique apply in general to all the subjects and are emphasised for the benefit of future candidates who wish to do themselves justice in the examinations."* (e.g. Institute of Actuaries, 1986, p1)

It was followed by exhortation to read the questions properly and answer what was asked, to check answers, not to write too much and not to write too little, and to attempt all the questions. The implication that some candidates did not wish to do themselves justice was not seen as helpful or supportive by the students. They often felt thwarted by ambiguous questions and frequently ran out of time before they could commit to paper all they wanted to say. This was due to the:

- examiners' tendency to set very long papers; and
- students' inability to decipher clues about the type of answer required.

During this period, students were informed that:

> *"... the criterion of passing is the fitness of the candidates to proceed to further subjects and in due course to assume professional responsibilities."*
>
> (e.g. Institute of Actuaries, 1986, p1)

There were no further clues about how fitness to proceed and fitness to assume professional responsibilities were judged. The students did not dwell on interpreting this clue, except as possibly indicative of gatekeeping (sections 5.4, 5.5 and 5.6). Some reasoned that fitness to proceed could be a flexible quantity, related to supply and demand. Fitness to proceed to later examinations was also an unexpected criterion since there was no restriction on the order in which subjects were taken. Nearly everyone saw the criterion of passing as exceeding a particular mark. The location and fluctuation of this mark will be discussed in section 6.2.3.

Historically, the individual subject reports had been quite terse, concentrating on candidates' failings without giving much information to help those preparing for the next set of examinations. For example, the preamble to the report on subject A1 - Probability and Elementary Statistics for September 1983 read:

> *"There is further evidence that students are entering the examination before they are ready. ... Despite comments in previous reports concerning the number of arithmetic errors, they continue to increase. It is important this trend is halted. ... The majority of candidates would achieve better results if they had looked at their answers and checked the method and calculations of any that were obviously incorrect. The presentation of the answers leaves a great deal to be desired ..."*
>
> (Institute of Actuaries, 1983, p2)

Poor setting out of calculations often increases the incidence of errors and the difficulty of tracing these, but perhaps the time pressures experienced by examination candidates and the arithmetical errors which the examiners deplored were linked.

Reports on the individual questions from this paper tended to be slightly more complimentary to students. However they did not give many clues to those who had failed

and wanted to understand where they had gone wrong, nor to subsequent students practising on past papers and evaluating their attempts against the examiners' reports. For example, the full comments on question one were:

> *"Part (i) was usually well answered. Part (ii) which was an application of Bayes Theorem was badly answered. This was probably because candidates had not grasped the fundamentals of Bayes Theorem."*
>
> (Institute of Actuaries, 1983, p2)

The terse nature of examiners' reports, which students perceived as unhelpful and uncaring, passed into the actuarial folklore (section 6.2.3) and coloured actuarial students' views of the professional examinations even after the style of the reports became more learner-centred.

By 1985 the tone had changed. The general introduction to the 'Group B' examiners' report (Institute of Actuaries, 1985, p1) concluded:

> *"The following subject reports are made in detail in order to be helpful to candidates. However, they should not be regarded as representing model solutions."*

Then the first subject report opened:

> *"The following comments give a brief outline of the solutions expected, it is emphasised that only the main points are mentioned and more detail would be expected from examination candidates."* (Institute of Actuaries, 1985, p2)

The pages which followed contained examples of what the examiners were looking for and no comment on candidates' inadequacies. There were also some references to the Course of Reading.

Students felt that the veil surrounding the assessment criteria was substantially lifted, but they still had to look for clues in what they were given. It had been stressed that these were not model solutions: more would be required. The students noticed the emphasis on *"points"* and *"detail"*. They inferred that all the points in the examiners' reports needed to be listed, then some added (see also section 5.4). This oriented them towards reproducing information rather than reasoning based on general principles, or discussion of relative merits, or applications of theory to practice.

In 1987,[50] the first specific advice about how marks were awarded appeared:

> *"... candidates should recognise that the instructions "list", "state", "name" would normally imply one mark for each item. On the other hand the instructions "describe", "discuss", "give with reasons" indicate considerably more marks are available, though 'briefly' is used specifically to limit the marks for "describe" etc."* (Institute of Actuaries, 1987c, p1)

So the interpretation of the clues now became a matter of deciding how many items, each worth one mark, to put in a list, and how much time to give to parts of the paper where *"considerably more marks are available"* - or was that just more marks per point?

Candidates' frequent experience of time pressure was acknowledged in this report on the prose-based applied subjects, simultaneously with an attempt to curb a growing tendency for answers to be produced as lists of points, rather than continuous prose:

> *"Giving answers in note form may be acceptable for part of one question under time pressure but would not gain the maximum marks for the points made. In these subjects, the examiners do have regard to the candidate's ability to communicate."* (Institute of Actuaries, 1987c, p1)

Students did not need to score *maximum* marks, they needed sufficient marks to pass. Would answering in note form score sufficient marks to get them through? How much regard was given to the ability to communicate? This source would not help them to answer these questions, but the actuarial folklore (section 6.2.3), or even illicit feedback (section 6.2.4), might.

The following year, candidates were informed that:

> *"The Examiners are working closely with the Education Service to ensure that the 1988/89 courses provide the best preparation for candidates."* (Institute of Actuaries, 1988, p1)

Was this a clue that the Chinese walls between the examiners and everyone else had been breached by the profession's own tuition provider?

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[50] A time of rapid expansion for the profession.

However in this year there was no need to search hard to verify the suggestions from other sources that the reproduction of bookwork was all important in some subjects:

> *"Question 1. Parts (I), (iii) and (iv) were straightforward bookwork but part (ii) required candidates to use knowledge gained elsewhere in the examination courses to list the items found in the balance sheet of a directly invested pension scheme. Candidates who listed the items in an actuarial valuation sheet were unlikely to obtain marks in this part of the question. Candidates who calculated an investment return based on book values rather than market values lost marks.*
>
> *Question 2. Both parts of this question were taken from chapters 11 and 24 of Lee.*
> ...
> *The overall impression of the examiners was that most well prepared candidates scored high marks because all four questions were largely bookwork."*
>
> (Institute of Actuaries, 1988, Pension Funds - ordinary level)

The message about reproducing material was abundantly clear, but let us look closely at the help offered with the more difficult part (*ii*):

- "*knowledge gained elsewhere in the examination courses*" - that is, a drawing on material from the 'theoretical' subjects, knowledge of which can be assumed in the later 'applied' subjects. My experience is that students never like being asked to transfer knowledge from one course to another. In the actuarial context it could be a particularly exacting demand. Actuarial students study for many years and the subject on which the examiners were drawing may have been passed several years earlier, the content would not necessarily form part of everyday work, and a new syllabus had just been introduced. Thus sometimes, the examiners may have been assuming a knowledge of something not previously studied by candidates, effectively enlarging the (already huge) syllabus for the 'applied' subject.
- "*list the items found in the balance sheet of a directly invested pension scheme*" - nothing ambiguous here, straightforward reproduction.
- "*Candidates who listed the items in an actuarial valuation sheet were unlikely to obtain marks in this part of the question.*" - unlikely or didn't?
- "*Candidates who calculated an investment return based on book values rather than market values lost marks*" - what proportion of the marks?

The messages about reproducing material continued for several years. For example,

> "*Question 1 The full answer to this question is stated in Guidance Note GN12, and the student is advised to study this carefully.*

Question 2 The answer to this question is found on the latest Notes on Taxation. The main points required are: ... "

(Institute of Actuaries, 1989, General insurance - specialist level)

In 1991,[51] there were signals that candidates had now cracked the bookwork, but that its primacy was no longer assured (Institute of Actuaries, 1991):

> *"Question 3. ... The answer to Q2 showed that most students understood the principles behind technical reserves. The answer to this question showed that few could apply those principles in a practical situation. ...* "
>
> (General insurance - ordinary level)

> *"As ever, candidates showed a good knowledge of bookwork but were again disappointing when asked to apply the bookwork to practical questions.* "
>
> (Pension funds - ordinary level)

Was this notification clue that the goal posts had shifted?

An objectives-based syllabus was introduced in 1993, to replace the former syllabus and Course of Reading (see page 168). After a year of student experience with this syllabus, a small window was opened in the 'Chinese wall' surrounding the examiners. They met with tuition providers (AES, HCT and the universities) and discussed the professional examinations. I attended as an observer. The tone was set by a member of the Board of Examiners who asserted that it shared a common objective with the tuition providers; student success. However, the Board:

> *"... must not shrink from being firm when faced with inadequate scripts.* "
>
> 613 Obs

In discussion it was asserted that candidates could often reproduce course content, while appearing not to understand it and being unable to interpret or apply it. This was regarded as unsatisfactory by the Board, whose main criticism of candidates' answers was their superficiality.

When the discussion focused on the status of the examiners' reports, since it was still being made clear that they were not model solutions, the position was explained as:

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[51] Two years after the arrival of HCT.

"All the things in the report earned credit, but not everything that earned credit was in the report." 613 Obs

Later, when pressed to give candidates more guidance about how much was expected in a satisfactory answer, perhaps by publishing the marking schedules and pass mark, the Board completely ruled out these suggestions, but suggested that candidates:

"... could be told that the reports contain approximately twice what is required to pass." 613 Obs[52]

An invaluable new clue for tuition providers to pass on to their students.

The evolution of examiners' reports continued. The lack of clarity in the objectives-based syllabus was acknowledged, for example the report for the 'theoretical' subjects stated:

"The examiners have given credit for any reasonable interpretation of what the syllabus may have required, in their view."

(Institute & Faculty of Actuaries, 1995a, p1)

For the 'applied' subjects, candidates were clearly told that the reports did not constitute specimen solutions. They were also informed:

"... on balance they normally represent substantially more than would be necessary to obtain a clear pass." (Institute & Faculty of Actuaries, 1995b, p1)

In both sets of reports, a higher proportion of the material was presented as connected prose than had previously been the norm. There were examples of discussion. However there was still a preponderance of bullet points with little or no elaboration.

Some senior examiners opted to set out their stall very clearly. For example:

"The first 14 questions on Paper 1 were mainly straightforward bookwork, and these were generally well answered.

*The last two questions on Paper 1, and the four questions on Paper 2, were designed to test candidates' **understanding** of the topics covered by the syllabus, and their ability to apply actuarial principles to solve relatively straightforward, but possibly unfamiliar, problems. In answering these questions, many candidates exhibited a thorough knowledge of the factual parts of the syllabus, but relatively little ability to*

- *decide which facts and principles were relevant to a particular situation described in the question*

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[52] cf. the earlier indication of the nature of the content of examiners' reports on page 165.

- *draw on their knowledge and understanding to determine an appropriate response.*

The examiners do not expect candidates to have any practical knowledge beyond what is covered by the syllabus, but they do expect successful candidates to demonstrate some understanding of what they have learned."
(Institute & Faculty of Actuaries, 1995b, Life Insurance)

The reproduction of knowledge is still very much part of the actuarial examinations, but no longer sufficient to gain examination passes. Evidence of understanding is required. It is paradoxical that examiners believe that candidates lack understanding, while actuarial students believe that they understand the material but the examination papers do not give them scope to prove this (section 6.2).

Investigating examiners' reports and comments since 1980 made visible the shifts in emphasis. In addition, the existence of conflicting messages was shown.

Actuarial students use past papers and examiners' reports as part of their examination preparation. Those who contributed to this research tended to look back about four or five years and, thus, their view of what the examiners' were looking for was an amalgam of the messages projected over this period. The examiners' emphasis is generally consistent at an individual sitting across the theoretical subjects or across the applied subjects. However the amalgam of messages encountered during examination preparation can be confusing. The pace of change has been variable and so the degree to which individual students found the messages from consecutive years to be inconsistent depended upon the exact period in which they were preparing for an examination. It was noted that examiners' reports have become more student-centred over the years, which has been appreciated by students.

Beyond direct contact with examiners' messages in reports they studied, students had indirect contact with earlier messages which had passed into the actuarial folklore. Further, the folklore was a forum for the interpretation of contemporary messages. This source of clues will now be considered.

6.2.3 The actuarial folklore

I will use the term 'actuarial folklore' to describe the rumour and legendary tales which circulate in relation to the professional examinations. All except the most geographically isolated students are exposed to this. It exists in the workplace, where students talk with each other and to qualified colleagues. It exists where students meet for training or tuition and compare notes on their understanding of the working and requirements of the system. It exists where actuarial students socialise together. It was apparent to me when I observed recruiters (sometimes actuaries, but more often personnel officers) selecting recruits to the profession.

I will give some examples of the actuarial folklore relating to different aspects of the professional examinations, and discuss their implications. The examples have each been derived from several different sources which, as far as I can tell, are independent of each other. This is so that I can be confident that the examples were genuinely circulating within the folklore, rather than being isolated stories. This does not mean that the examples are an accurate portrayal of reality, only that they were widely spoken of and influenced people who did not interact with each other directly. It does not matter whether the examples are true. It only matters that some of the students who heard them, thought that they were true and reacted accordingly: and that others thought they might be true and considered whether to modify their approach. The aspects considered will be:

- passmarks and the distribution of candidates' marks
- inadequate screening of examination questions
- the process of marking examination scripts.

First, the pass marks are never published, which seems reasonable in view of the criteria for passing quoted in the previous section. Arguably, it is also a reasonable practice where there are acknowledged difficulties in ensuring that the difficulty of papers is steady from year to year. However, dozens of people told me that the pass mark is 50%[53] give or take

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[53] Perhaps the source of this is notes on grades of failure which are sent to candidates with their examination results. For most of this research study candidates were told:

> *"These grades are normally defined by marks in the following ranges where the pass mark is 50%, and proportionately for other pass marks: FA 42-49%, FB 30-41%, FC under 30%."*

(continued...)

a few marks and that there is significant bunching of candidates around the pass mark, resulting in a high proportion of borderline fails. Irrespective of whether this was true, it influenced students. It gave them a target for which to aim. If they believed that say, 60% of the marks would secure a pass, perhaps they had the scope to answer examination questions strategically. More importantly, the belief in a high proportion of borderline fails tended to have an adverse effect on the actuarial students' confidence and motivation. This situation allows maximum scope for errors in the assessment process, fuelling the lottery theory (sections 5.4 and 5.5).

Secondly, I have encountered a range of legendary tales which relate to inadequate screening of examination questions. It seemed that everyone 'knew' that in the past examination questions had appeared which were ambiguous or which were 'off the syllabus'[54], even if they had no direct experience of this (section 5.5). Further, for about two years of this research project a rumour circulated that a senior policy-maker had argued that setting ambiguous questions was acceptable because clients ask ambiguous questions. Some students expressed anger at what as they saw as both a complete lack of understanding of the difference between sitting examinations and practising as an actuary, and a callous disregard for students' needs as human beings.

In a similar vein, for many years a story circulated to the effect that after one examination, the examining team met and failed to agree on the solution to a particular question because they themselves found it so ambiguous. Eventually, they referred to the scripts and were guided by the candidates' interpretations. This tale was nearly always recounted an illustration of the perception that the examiners were often not as competent as the students would have liked to feel that they were. However, I was also offered the story as evidence of the extent to which the examiners really were 'on the students' side', because they would

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(...continued)
Now there are four grades of failure, FA to FD, and the example in the candidates' notes includes a notional pass mark of 55%. If this is the source, the folklore should soon catch up with the raising of the barrier.

[54] Prior to the introduction of the objectives-based syllabus in 1993, it was often difficult to state categorically that something was not part of the examinable syllabus.

accommodate the students' perceptions of a question when it became apparent that legitimate, but unforeseen interpretations were possible.

The folklore relating to how examination scripts were marked was very influential. The consensus view (probably heavily influenced by Purchase, 1981) was:

- That every script was fully double marked by two assistant examiners who recorded a certain number of marks for each item on the script which matched the items on their marking schedule. The assistant examiners were unlikely to spot and reward alternative, valid solutions.
- Then the scripts were placed in descending order of merit. A top slice (various estimates for the size of this, but always less than 20%) passed, an equal bottom slice failed and the middle portion was remarked by more senior examiners. These examiners might adjust the marks given by the assistant examiners, particularly if they spotted an alternative, correct solution. This would create a new descending order of merit.
- The middle band of remarked scripts fell within a narrow range of marks, because the papers did not discriminate well between candidates.
- After remarking and discussion of the middle band, a consensus would be reached about the pass mark. This decided the fate of each script.
- The consensus about the pass mark would be influenced by previous years' pass marks and also by the consequent pass rate. It was felt that examiners tried to prevent the pass rates from fluctuating very much from year to year.[55]

Consequently, the actuarial students had a sense of striving to be at least within the narrow band of marks which would earn them a remark from the more senior examiners. Therefore, they had to 'hit' enough of the points on the assistant examiners' marking schedule to lift themselves out of the bottom slice. Thus, the initial priority was to score points by correctly guessing what the examiners' solution contained. The beliefs that the middle scripts were closely bunched and that the pass rates were not allowed to fluctuate very much, combined to produce the perception that the difference between many passing and failing candidates was both very small and rather arbitrary. Another aspect of the perception of a lottery.

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[55] However, the pass rates in appendix II do not seem to support this.

For several years, I served as an assistant examiner for one of the theoretical subjects, thereby gaining an insight into the profession's examining processes. I have also discussed examining with examiners across the range of subjects. I feel that the process is less rigid than actuarial students tend to believe. In this small profession with a high proportion of student members, the burden of examining is substantial. The profession relies heavily on people's willingness to give service by contributing to the examining process. There is no denying that the majority of the examiners are amateurs in the field of assessment.[56] Collectively, they seem to lack a clear vision of what should be achieved through the professional examinations. Individually, many cannot see clearly the relationship between their personal contribution and the whole of the assessment system leading to qualification. This lack of clarity generates the conflicting and shifting messages which unsettle students. The Chinese walls which have been erected to protect examiners from undue influence by interested parties, have created and perpetuated a secret garden in which a shifting muddle flourishes and into which students try to peer. The students do manage to see over the walls and through the gate, but they are never certain that they have not missed something. That uncertainty keeps them checking for clues and cross-checking against information from other sources.

Many stories circulating within the actuarial folklore were attributed to examiners as off the record comments and advice. Thus, they were felt to be indirect contact with illicit feedback.

6.2.4 Illicit feedback

A further aspect of the actuarial folklore, discussed in the previous section, was a belief that some students received information directly from examiners which was not generally available. Some students, mainly those without access, regarded all information which was passed only to some students as illicit. The majority were sanguine about the lottery of access to general advice and hints from a known insider, such as an examiner. They only viewed as illicit feedback the passing on of things which were specifically confidential, such

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[56] Even those examiners who work in universities will not necessarily have undertaken professional training in the field of assessment, although unlike actuaries in insurance companies and consultancies, the assessment of students is an integral part of their professional practice.

as actual examination marking schedules. It is the narrower definition of illicit feedback which I will use in this section.

A few of those who contributed to this research claimed to have seen confidential marking schedules and mark distributions. I will give two examples, one student who found this helpful and one who did not. Firstly:

> *"We had a couple of guys who marked the exams and we used to have tutorials with them every few weeks. We used to go through an examination paper with them and they would sometimes have the model solutions.*[57] *One, I mean a couple wouldn't show us them because they thought it was against the rules, which I suppose is fair enough. But some of the guys did show us them in fact and then you got a bit more of an idea of what sort of thing they were after."* 602 Tape qual-med

This man was happy to tailor his approach to the professional examinations to fit the requirements of the examiners. The examinations were only a barrier between him and his goal of becoming a qualified actuary. He wanted to take the line of least resistance. Seeing the marking schedules enabled him to give the examiners the *"sort of thing they were after"* more accurately.

In contrast to this, the woman quoted below found that seeing examiners' marking schedules increased her frustration and decreased her confidence in the examining process:

> *"When you see a marking schedule for the subject that you work in, you think, well yes, but there are all these other points. That's when you get dissatisfied. You think, well I could put this down and they're going to ignore it."*
>
> f203 Tape qual-med

She believed that the assessment process should reward the depth and breadth of her understanding of subjects named on the syllabus. In the subject relating to the area in which she had gained all her professional experience, her knowledge was substantially greater than was required for examination purposes. She felt that, far from being a benefit to her, it could count against her because of the increased risk that she would not supply the answer that the examiners expected. For her, the professional examinations had lost face-validity.

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[57] He is referring to an examiner's marking schedule.

The general experience of students who reported seeing marking schedules was that it was helpful. For some it confirmed what they already thought and gave them confidence to continue, perhaps more vigorously, with an approach which they had already adopted. For some, it confirmed what they suspected or had heard, but did not have the confidence fully to act upon earlier, (e.g. Dave, chapter 8). For others it was a revelation which enabled them to alter their approach radically. Those who did not find it helpful found it difficult to accept the assessment criteria which were implied by what they saw. The criteria did not fit with their views of the nature of professional knowledge and the appropriate relationship between the professional examinations and professional practice (sections 5.2 and 5.4).

It should be remembered that it was not only the recipients of illicit feedback who were affected by it. The information so derived percolated into the actuarial folklore and influenced many others. Like all gossip, stories changed as they passed from person to person, so it was necessary for recipients to assess the quality of intelligence before considering its use.

6.3 Using the clues

Students had to interpret clues before deciding how to use them. That is, they had to ask themselves:

- 'What am I really being told here?'
- 'How am I going to respond to what I think I am being told?'

They received clues from more than one source and, thus, had the opportunity to compare messages from different types of informants; a kind of triangulation.

The two official sources of clues, which all of those contributing to this research could compare, were: information emanating from the tuition courses and formal information arising from the professional examinations. It was seen on page 166 that the students felt that these did not always match up. Assuming that the examiners felt they examined the syllabus, as defined by the Course of Reading, and the tuition providers felt their material interpreted and expanded upon the Course of Reading, how were students to interpret the mismatch which they perceived? The most common interpretation of this was an inadequate

level of competence from one or both parties (section 5.4), an example of external sense-making (Arnold, 1985). This interpretation made the students anxious since there was no means of exercising control in such a situation, they became frustrated and their motivation decreased.

A means of reducing their anxiety was for the students to reconceptualise the mismatch as predominantly a problem of poor tuition materials or a poor tuition service. This helped because they had to pass through the barrier posed by the examinations, whatever the nature of that barrier. Therefore, not dwelling on the potentially erratic nature of the examinations was best. From the second or third year onwards, the actuarial students tended to concentrate on clues arising from the examinations when there was conflict between these and those from the tuition system. Ultimately, they had to satisfy the examiners.

At this point it is worth reflecting upon the conflict between feedback from tutors and feedback from the examining process in terms of the way the tutors viewed their role. I collected data from 24 actuaries who had acted as tuition course tutors. Most of these saw their role as either:

- explaining the course content to students where they appeared to have misunderstood it; or
- indicating the position of errors in the student's response and referring the student to appropriate content so that the student might correct his or her own work.

Thus, they were content-focused, which was consistent with the official view of the role of tuition courses (page 166). However, a handful of tutors said that when they were students, they had not found their tutors' content-focused approach helpful. Consequently, they now saw their role as helping students to develop an appropriate technique for the professional examinations. They tended to comment on the style of the answer and particularly its length, since they acknowledged the time pressure in examinations of which actuarial students complained (sections 5.4 and 6.2.2). As one tutor remarked:

> *"I was trying to be an encouraging sort of marker because, what I think is lacking is that nobody teaches you technique. A lot of people, you can see that they know what they are doing, but instead of putting it in three sides of A4, they've done it on 16. They are just not going to be able to do that in an exam. ... It's OK to say*

'yes you got 20 out of 20, well done', but what you should be saying is 'look, fine you got everything right, but... '. Technique." 602 Tape qual-med

Whether students were allocated a content-focused tutor or a technique-focused tutor was another manifestation of the actuarial examination lottery (section 5.5). Further, tutors were not necessarily consciously adopting either focus, and where they were, they did not necessarily see a need to make this explicit to their students. Some mismatches between tutor-approach and the student's desired tutor-approach were evident in my data. For example the frustrated first year student who complained of the:

"Arrogant nature (at times) of tutors remarks/marks ie. if I get a question in [subject] *exactly right I expect to get 20/20 and not 15/20. I trust tutors not to let off steam on their students' scripts and take out their temper on the students."*

221 Q'naire withdrawn

This reaction appears to be a misreading of the technique-focused tutor's message. The tutor seems to have thought that the answer was not 'exactly right', particularly in terms of format, but has failed to convince the content-focused student of this.

The actuarial students also engaged in triangulation of their interpretations of the clues from formal sources by comparing them with informal sources, primarily the actuarial folklore. By listening to the folklore and interrogating its distributors they could test their understanding of the demands of the professional examinations. Up to a point, they could measure their achievement against the implied norms. The people with whom they discussed the folklore served a similar role to members of their peer group at university. This partially compensated for the lack of face-to-face contact inherent in being a distance learner, and to which the actuarial students had experienced difficulty in adjusting (section 4.4). In addition, indirect contact with other people via their appearance within the folklore, such as the experiences of a friend of a friend, allowed the actuarial students to learn from of others whom they never likely to meet. In these times of increasing familiarity with 'virtual reality' technology, an untechnological sort of 'virtual peer group'. Likewise, the advice from examiners which circulated within the folklore could be utilised almost as it if it were advice from 'virtual tutors'.

The main curb on the use of clues from the actuarial folklore was the need to assess its reliability, since all stories which pass from person to person get modified along the way. However, particularly where the folklore seemed to substantiate tentative interpretations of the clues from the examination process, both were strengthened in the students' perspective. The mutually reinforcing interpretations and grapevine tales did not necessarily have to be accurate to help the actuarial students. If they only provided a means of constructing a more meaningful view of the situation that was helpful (Jarvis, 1983).

The folklore also helped the actuarial students to choose between apparently conflicting messages such as those reproduced below, from the same examiners' report. The general comments included:

> *"A number of candidates adopt a "blanket" approach to answering the questions, hoping that the correct answer will be included somewhere albeit alongside many other points which are irrelevant to the question asked. Such an approach not only wastes time, but does not find favour with the examiners."*

while comments on individual questions included:

> *"Candidates' answers tended to mix parts (I) and (ii). So long as all the points were covered somewhere the candidates were not penalised."*
>
> (Institute of Actuaries, 1991, Pension funds - ordinary level)

The first quotation indicated that not answering the question asked, and no more, was likely to incur a penalty from the examiners. The second quotation suggested that the examiners searched for and rewarded correct content wherever they found it. What were future candidates to do? Which message should they heed? There was precious little formal direction on this issue. However, the folklore provided the informal answer that the assessment process rewarded correct content highly, did not penalise incorrect content, and only marginally rewarded time spent on the presentation of answers, although there was an indirect penalty for concentration on presentation through running out of time in which to record further content. However inaccurate this might have been, it gave the actuarial students a way forward. They were confident that they should continue to concentrate on the reproduction of content.

Direct contact with illicit feedback generally obviated the need for searching out and interpreting clues. However, to use the intelligence it was still necessary for the affected

actuarial students to be confident about making inferences from other circumstances: different subjects, different years' examinations. They could not be completely sure that what they had seen or heard would subsequently hold true. That would be extrapolating beyond the range of the data, something against which the content of their statistical courses warned.

A small minority of those contributing to this research seemed unable to pick up clues from the sources I have discussed, or if they dimly perceived them, to be unable to interpret or respond to them. These people often remained students for many years. Occasionally, they would eventually pass the examinations without necessarily understanding what distinguished their passes from their failed attempts at the examinations. More often, they remained student members of the profession but stopped trying to pass the examinations. Eventually most withdrew from the profession. Frank and Geoff in chapter 8 are examples of people who did not manage to find sufficient clues, or respond successfully to those they found.

6.4 Discussion

It has been seen that, because the requirements of the professional examinations were not clear to the actuarial students, they looked for clues to illuminate the criteria which they needed to satisfy. The clues came from a variety of sources which might be used singly, but more often clues from different sources were considered together. The joint consideration provided a more complete and more stable view of the situation than would have been possible from a single source.

It will be interesting to see whether the recent introduction of 'Core Reading' (footnote 49), will end this cross-checking and looking for veiled messages by fulfilling its advertised role:

> *"Through Core Reading the depth of understanding required in the syllabus is made clear. ... The Core Reading manuals thus provide a good account of the profession's intentions for the requirements of the qualifying examinations for FIA or FFA."* (Goodwin, 1995, p1)

I do not expect this to happen in the short term. Being cautious is very much part of actuarial practice, after all the financial consequences of inadequate caution can be catastrophic. Students are likely to reserve judgement until they have accumulated evidence of the examiners' understanding and use of the Core Reading. However, each step which increases the proportion of the requirements of the professional examinations which are explicit to students, helps those who have difficulty spotting or interpreting clues.

It was clear throughout my study, that most informants shared a belief in the idea that the large employers of actuarial trainees had higher examination pass rates than the average. While retaining an awareness that averages can be manipulated easily, it is worth speculating that there may be an element of truth in this part of the actuarial folklore. If this phenomenon does occur, its causes will be many faceted and will include the selection of trainees and the training resources available. However, an interaction of the actuarial folklore and illicit feedback could be important. If illicit feedback helps most recipients to progress with the examinations, up to some limit, those with greatest exposure to it should be helped most. The environments containing the largest number of people with inside knowledge of covert examination criteria are likely to be the large employers. Environments providing the student with the largest pool of fellow sufferers with whom to reflect on strategy, are the large employers. Simply, there is likely to be more opportunity to benefit from both the actuarial folklore and illicit feedback within a large employer. This would give actuarial students in these places an edge over more isolated students, whose exposure to clues is likely to have been more limited and concentrated in the two formal sources described in sections 6.2.1 and 6.2.2.

The profession's view, expressed by one of its senior policy-makers was:

> *"Being judged by your practising colleagues is one of the strengths of the profession."* 613 Obs

There is face-validity in this sentiment. However, the students' perspective was that the examination syllabus was not closely related to professional practice (sections 5.2 and 5.4). The course content lacked face-validity for the students, and since they expected to be assessed on the course content, the examinations lost face-validity. This is likely to have been more important to the young professionals than it would have been while they were undergraduates. At university there is no compelling need to agree with one's tutor and the

atmosphere is supportive of diversity. However, if one's competence to practise is being judged and certified, it is important that one has faith in the appropriateness and accuracy of the judgements being made.

On the other hand, perhaps it was the expectation of the course content being assessed which was a source of the students difficulties. Another policy-maker commenting on the pre-1993 syllabus told me:

> *"Of course the problem was that no examiner in their right mind would have examined that syllabus."* 609 Obs

Perhaps examiners had been examining the elements of professional practice, as the actuarial students thought should have been the case, but thought was not so. Perhaps there was a problem of faulty decoding and use of clues, but if so, behind that, problems of lack of openness and lack of clarity.

6.5 Summary

Actuarial students needed to search for clues about how they should approach the professional examinations, to mitigate the problems of unexplicit assessment criteria, learning at a distance, and deficiencies in the formal information and feedback provided for students. In addition, most actuarial students also looked for clues to help them judge the level of their performance. Unfortunately, some messages they received about their attainment were experienced as misleading.

Four sources of clues were described and discussed:

- two formal sources,
  - tuition courses (section 6.2.1); and
  - official examination publications or announcements (section 6.2.2)
- two informal sources,
  - the actuarial folklore (section 6.2.3); and
  - illicit feedback (section 6.2.4).

In section 6.3 it was seen that the actuarial students interpreted and acted upon the clues they discovered in a variety of ways. Judgements were made about the reliability of different sources. Triangulation was attempted between clues from different sources. Gradually, the majority of students built up a picture of what was required of them, which enabled them to plan their subsequent examination preparation. Thus, they felt that they had gained some control over a situation in which they had previously lacked autonomy. Unfortunately, some students did not seem able to improve their level of control, or likelihood of passing the examinations through capitalising upon the existence of clues. They tended not to qualify, or occasionally to do so very slowly.

The clues within examinations publications of various kinds preoccupied those who contributed to this research (section 6.2.2). Announcements were given the status of clues because they were rarely unequivocal statements, and sometimes appeared ambiguous. Further, explicit statements tended not to be taken at face value, but were interpreted by the students, often in conjunction with clues from other sources. Most frequently, the interpretation was with reference to the actuarial folklore (section 6.2.3). Clues derived from the examiners' reports, if they passed into the actuarial folklore, tended to remain in circulation for many years, influencing several cohorts of students.

A constant quest within the students' searching for and decoding of clues was the assessment of the degree to which the reproduction of knowledge was required. There was also searching for direction about which knowledge should be reproduced. The examiners' reports (section 6.2.2) constantly declared that candidates had misjudged this. However the changing emphases within the reports suggested that candidates were not simply failing to hit a stationary target. The candidates were taking penalties blindfolded and, while they were trying to improve their chances by looking under the blindfold, they encountered the added challenge of slowly moving goal posts.

The perceived gulf between the professional examinations and professional practice, which was discussed in the previous chapter, was briefly revisited in section 6.3. The possibility was considered that students' perception of the course content lacking relevance to professional practice, was accurate; while their perception that therefore the examinations would lack relevance to professional practice, might have been largely in error. The

examiners have been signalling increasingly strongly that they want answers from candidates which are more closely related to professional practice than the mere reproduction of bookwork without adequate consideration of the practical application of that bookwork knowledge. I feel that candidates will begin to provide this emphasis *en masse* when the actuarial folklore catches up with this as a critical assessment criterion. There will then be triangulation of the message from both official and unofficial sources.

Discussion and Summary of Part II: Dominant Concerns in the Actuarial Students' Experience

Reflection upon entry influences and expectations

To set the scene for consideration of the student experience of actuarial examinations, I outlined the joining influences and entry expectations described by those who contributed to this study. Many of these were very similar to those previously identified by PWMC (1985).

I expressed concern about the emphasis on extrinsically motivating factors such as high remuneration and status, since they are 'hygiene factors' rather than 'motivation factors' (Herzberg, 1959). On the other hand, the perception of significant opportunities to apply mathematics, noted by over half the actuarial students, amounted to an expectation of a particular type of intrinsic reward in actuarial work. However, reality often fell short of expectation in this area (section 5.3).

The widespread perception of opportunities for rapid promotion is very interesting. I was repeatedly told that qualification as an actuary was a 'fast-track' into senior management, or for example:

> *"The actuarial qualification is the best all-round preparation for insurance management."* 266 Tape qual-long

This would have been promotion out of a technical actuarial role (away from applying mathematics?) into management and policy-making. Burrage *et al* (1990) suggested that the upwards, managerial 'exit' route is the 'Achilles' heel' of the engineering profession, undermining members' solidarity and the profession's ideology.

> *"Strong professions, we may suggest, have no alternative career outside the profession, no exit."* (Burrage *et al*, 1990, p214)

While those most attracted by the possibility of rapid promotion may have simply been extrinsically motivated by the associated prestige and material rewards, perhaps some were management oriented, expecting to find intrinsic rewards in the practice of management skills rather than necessarily in the practice of their specialised professional skills. Since

promotion to management was often available without examination passes (see section 4.3.3 and later, Frank and Geoff in chapter 8), entrants with this orientation who experienced difficulty with the professional examinations might be particularly likely to withdraw.

The influences of high remuneration and high status, which in this context were almost the same thing, along with the expression of desire for a challenge, could also be seen as expressions of an ideal self-concept and of high self-esteem (Super, 1963). These factors are all linked with gatekeeping, since qualification must not be too easy, nor the market get flooded. However, believing in one's ability to avoid being excluded by the gate-keeping would be necessary. The new actuarial students in this study all believed that they would pass the actuarial examinations. They had accumulated years of successful study and examination experience. The high self-esteem and perception of inner-direction which followed from this success, increased the likelihood of their aspiration to a highly prestigious occupation and decreased their attention to perceptions of others' satisfaction (Herriot, 1984). Thus, prior to joining the profession, they were unlikely to have been particularly concerned about other actuarial students' experiences of the professional examinations.

The influence of the perception of a wide range of career paths, which would supply opportunities for choices, could be seen as an expression of the desire for control over one's life. Those joining the profession valued the perceived scope to become different kinds of actuary. In Kelly's (1955) terms, choosing this occupation would represent both opportunity for validation of existing personal constructs, and opportunity for the extension of one's system of personal constructs.

Transition, disjuncture and cue-seeking

The three chapters in Part II comprised a thematic consideration of the dominant concerns which emerged from my data. Their order mirrored the sequence in which the themes usually dominated the students' experience. However, this was not always a neat progression.

Many concerns which I presented had been noted by others researching actuarial education and assessment (section 3.2), particularly the themes of overload, and conflict between study and office work (e.g. Driver, 1989; Hardy *et al* 1988). Other themes, such as difficult transitions to learning in the actuarial context (chapter 4), appear to be present in these authors' work, and that of others who have given some consideration to the student experience of actuarial examinations (e.g. Brundin, 1988; DiDonato, 1991). However these transitions have not previously been seen as meriting serious attention. Prior to this research study, facets of the student experience had not been teased out to reveal their constituent parts and interrelations. As a result it had been difficult to see where and how to intervene in this complex system to best improve its functioning and fitness for purpose.

The major themes which emerged from my data are not peculiar to the actuarial profession and therefore, the presented analyses will be of interest in other spheres. For example, the difficulty of transitions to part-time learning and distance learning (chapter 4), have been noted in many other contexts (e.g. Hutchison, 1980; Kember & Murphy, 1992; Lunneborg, 1994). Nevertheless, professional bodies and embryonic professionals alike, seem to pay little attention to planning the management of these transitions. Perhaps this is because, contrary to the evidence from research into learning (section 3.4), skill in learning tends to be seen as context-free. Thus, when learners have substantial successful educational experience, as is the case for graduate entrants to the professions, the need to develop learning skills for the new context is all too easily overlooked.

A degree of disjuncture between expectation and experience at the beginning of a career (chapter 5), is inevitable because anticipatory socialization is never perfect (Arnold, 1986; Herriot, 1984). Disjuncture is positive in signalling a need to learn and creating readiness for that (Jarvis, 1987; Knowles, 1990; Mezirow, 1981). However, these authors also draw attention to the fact that excessive disjuncture may prevent the construction of meaning and cause anxiety; both of which may prevent learning, or precipitate faulty learning. Excessive disjuncture has also been associated with disenchantment and withdrawal from the learning situation (Phillips, 1987; Wankowski, 1991; Wanous, 1973). For the actuarial students, although individual disjunctions were generally not sufficient to prevent meaningful learning, the dominant experience was of overload. Thus, it was the cumulative effect of many unmet

expectations and unanticipated challenges that prevented some students from learning effectively, and sapped the motivation of all.

Coming to terms with the hidden curriculum through cue seeking (chapter 6) is an activity which can be observed in all formal learning environments (e.g. Becker *et al*, 1968; Bruce, 1994; Bunton, 1994; Miller & Parlett, 1974). This is more difficult to achieve in distance education, where clues can be sparse and there are limited opportunities for checking one's interpretation of them (Kember & Murphy, 1992; Morgan, 1991b). It was particularly difficult to achieve for the learners who contributed to this study, since the actuarial context suffers an extreme paucity of clues, made more difficult to interpret by conflicting messages and shifting goalposts. It was felt that divining the assessment criteria employed by the profession's examiners was itself, an assessment criterion.

Coping with unfavourable odds

As appendix II illustrates, actuarial students have to learn to cope with unfavourable odds of passing examinations. For most of those contributing to this research, the strategy of working harder, so easily advocated by those around them, did not seem to be a viable option. They felt that they were working as hard as they could, but this was not necessarily leading to examination passes. They had to find other ways to cope, and we observed them doing this in several ways:

- downgrading theory, relative to practice
- questioning the assessment process
- stressing the 'lottery' effects
- strategic responses, based around finding and decoding clues.

The student experience was of difficulty in studying the advised material, and difficulty in passing the examinations. One coping strategy was to label the advised material 'theory', assume knowledge of the 'theory' was assessed by the examinations, but construct the 'theory' as lacking relevance to day-to-day practice. This meant that success in the examinations was no longer seen as central to the individual's ability to contribute to the life of the profession or the financial world more generally. This led some to obtain almost all

their success and satisfaction from their office work. Eventually, these people tended to abandon the actuarial examinations in favour of a different career, often with the same employer, not infrequently from the same desk. On the other hand, the downgrading of the 'theory' encapsulated in the material examined by the profession was, for many students, a necessary precursor to approaching the examinations strategically: practising 'studentmanship' (Olesen & Whittaker, 1968). It allowed them to 'play the game' of passing actuarial examinations without becoming distressed about the intellectual prostitution they felt it required. It gave them a sense of some control.

The deliberate intellectual separation of 'examination theory' from 'practice knowledge' had its dangers. As a student's office experience and hence knowledge of practice increased, so did the perception of risk from not giving examiners the answers they sought. This was the fear of the actuary quoted on page 182, who felt that the breadth and depth of her practice knowledge, far from being an asset, could have hindered her examination progress. For her, the professional examinations had lost face-validity. A sentiment echoed by this student:

> *"You see partly qualified people around, after a while their knowledge of their company and what they do overtakes their bookwork knowledge and it becomes very difficult for them to differentiate between the two when they are answering questions. ... It helps if you can box away separately all the bookwork stuff"*
>
> 266 Tape qual-long

A short-term means of coping with examination failure was to question the assessment process. This involved questioning the:

- relevance of the material examined
- fairness of the examination papers
- expertise of the examiners
- hidden agendas of examiners and other policy-makers.

These are all examples of external sense-making (Arnold, 1985). They explained lack of progress with the professional examinations without damaging the actuarial students' self-concepts as competent learners. However, these forms of sense-making placed examination success beyond the control of the students: they felt very vulnerable to the quirks of the actuarial examinations 'lottery'. For a few, this lack of control was deeply alienating and

demotivating. On the other hand, most students, while experiencing periods of demotivation, managed in a variety of ways to overcome the feelings of helplessness.

The concept of a lottery remained a useful coping strategy throughout the time to qualification of many actuarial students. Failure rates were sufficiently high that the vast majority of students failed examinations on their way to qualification. This contrasted sharply with their experiences of school and higher education, where failure rates were lower and there was more certainty about who would fail. Most actuarial students had very little prior personal experience of examination failure and tended to view it as shameful. However, in an environment where failure was commonplace and they were not very likely to avoid personal experience of it, there was a need to become more philosophical about failing examinations. Since individuals found it difficult to attain confidence that they had performed adequately to pass, it was helpful to attribute to chance the difference between attaining a FA grade[58] and a pass: the 'lottery'. This rendered failure an inconvenient frustrating injustice, and limited damage to the self-concept. However for some individuals, there was a sense that this was the rationalisation required in the learning and working milieux, but it was not fully believed. In these cases, their examination failures were personally damaging but they tried not to let it show.

The lack of control implied by complete surrender to the 'lottery' was unacceptable to most actuarial students. They needed to find ways of tipping the odds in their favour. Doing well in the office environment and studying diligently was perceived as insufficient to ensure examination success. Most saw a need to study very strategically by searching out, interpreting and acting upon information from a variety of sources (chapter 6). Through this process they came to focus upon the reproduction of knowledge in bullet-point format. Successful students did not see this as all that was required of them, but the ability to note key and subsidiary points very quickly was seen as pivotal to examination success. There was ambivalence about the degree to which such swift noting of issues for consideration was central to professional practice and appropriately assessed through the examinations.

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[58] See page 145.

The need to build defences to cope with unfavourable odds varied between students, since some were much more defensive and easily threatened than others.

Strength and timing of concerns

The presentation of the dominant concerns in the student experience of actuarial examinations drew mainly on data relating to the first year as an actuarial student. This was the period of most rapid discovery and accommodation to the demands of the context. However when the data were partitioned according to stage of professional education, most of the concerns recurred at different stages.

The following table summarises the issues considered in Part II, grouped under the headings of: 'intrinsic rewards', 'extrinsic rewards', and 'learning environment'. It shows the strength of the concerns at four stages: *viz* prior to, or within one month of joining the profession as an actuarial trainee; during the first study year; in later years of sitting actuarial examinations; and after ceasing to take actuarial examinations. The concerns were categorised according to the extent and nature of responses to questionnaire and interview questions, and unsolicited comments.

Key:	✓✓	People felt very positively about the issue at this stage
	✓	People felt positively about the issue at this stage
	✓×	Ambivalent or variable responses
	×	People felt negatively about the issue at this stage
	××	People felt very negatively about the issue at this stage
	?	Unknown or doubtful

Issue	Joining	First Year	Later Years	Retrospect
Intrinsic Rewards				
Actuarial practice is interesting and varied	✓✓	××	✓×	✓✓
Challenge/intellectual stimulation	✓✓	××	✓×	✓
Demand for mathematical/statistical expertise	✓	×	✓×	✓×
Extrinsic Rewards				
Prestige of the profession	✓✓	×	✓×	✓
Prestige of the qualification	✓✓	×	✓×	✓×
Learning Environment				
Being a part-time student	✓	××	×	✓×
Learning at a distance	✓	××	×	✓×
Overload and tiredness	?	××	✓×	✓×
Balancing demands of work and study	✓	××	✓×	✓
Relevance of study to professional practice	✓✓	×	×	✓×
Administration of the education and assessment systems	✓	×	✓×	✓×
Degree of interest in course content	✓✓	×	×	✓×
Degree of chance in examination success	?	×	×	✓×
The assessment criteria	✓	✓×	×	✓×
Feedback	✓	×	×	✓×
Student support	✓✓	×	✓×	✓×

Addressing the concerns

The table shows that the actuarial students were, relative to other phases, feeling rather negative during their first year of actuarial examinations. To some extent, this is the manifestation of 'occupational reality shock' (Hughes, 1958; Lortie, 1966). This does not diminish the importance of the problem areas identified by the actuarial students, but helps to prioritise areas for action.

The facets of the student experience which were extremely negatively viewed (××) during the first year are most likely to be associated with withdrawal from the profession. If it is considered a priority to stem the flow of well-qualified entrants who leave within say, two years of joining the profession, attention should be focused upon the nature of office work given to new entrants, and ways of supporting students through the transitions to part-time learner and distance learner. Concentration on these areas would also benefit those students who remain within the profession, probably qualifying as actuaries in five to seven years, but who experience a chequered first two years.

Aspects of the student experience of actuarial examinations which, in retrospect, are viewed with ambivalence (✓×) might also be prioritised for action. Again, attention is drawn to supporting students through the transitions to part-time and distance learning, or perhaps exploring possibilities for more face-to-face learning and more concentrated periods of study, such as 'block release'. Beyond the initial transition to the learning milieu, there is a felt need for improved student support, particularly through improving the quality of feedback at all levels of the education and assessment system.

Ambivalence about the demand for mathematical and statistical expertise is partly an unmet expectation. In reality there is considerable variation within actuarial employment. Some positions require substantial mathematical flair and expertise; most require numeracy, the ability to interpret computer-based statistical analyses, and knowledge of the assumptions and limitations of these analyses. The prevalence of the latter type of position is a disappointment to a few, but most find ample interesting challenges to compensate for the rarity of sophisticated mathematics. This is perfectly satisfactory for the vast majority of those who join the profession. However, addressing the persistent image of actuarial

practice as substantially comprising esoteric mathematics might be useful, if only for concern about the able, but not necessarily mathematically creative, who are discouraged from attempting to become actuaries.

Ambivalence surrounding the following issues was amplified by their interrelation:

- the prestige of the actuarial qualification
- the relevance of study to professional practice
- degree of interest in the course content
- administration of the education and assessment systems
- the assessment criteria
- degree of chance associated with examination success.

Interest in the course content (and consequently motivation to study) was mainly linked to the perceived relevance for professional practice. Everyone judged the syllabuses to contain irrelevant material. Pruning this is an obvious step towards reducing the ubiquitous perceptions of overload.

It has been acknowledged by the profession that completing the examinations only produces an 'embryonic' actuary (Daykin *et al*, 1987) and that the time to qualification is too long for those who wish to use it to launch a general business career, particularly in the field of investment (Nowell *et al*, 1995). Nevertheless, within the financial sector the prestige of the actuarial profession remains high now. However, about two fifths of those who contributed to this research expressed concern that this prestige might be under threat and/or undeserved. There was a strong sense that the kind of learning which the majority perceived as necessary for success in actuarial examinations was not meaningful learning. There were doubts about the quality of tuition materials, student support, and examining. Further, the fitness-for-purpose of the examinations was questioned.

Part III:

Exploring the Student Experience with Dynamic Concept Analysis

The two chapters which form this Part of the thesis are concerned with understanding holistically, individual students' experiences of actuarial examinations. This complements the approach taken in Part II, where issues were explored thematically to make them tractable for analysis. I stressed that the facets of the student experience which were presented individually and sequentially, occurred simultaneously and interacted with one another. It was the cumulative effect of several demands and many areas of disjuncture, which resulted in the students' perceptions of overload and lack of control. The dynamic and relational nature of critical aspects of learning in the actuarial context, are best presented by using a dynamic and relational technique such as Dynamic Concept Analysis (Kontiainen, 1989, 1991).

I became aware of Dynamic Concept Analysis (DCA) in 1989, finding the approach interesting and satisfying. However, I did not then appreciate its potential contribution to my work. Later, while striving to understand and illustrate the compounding effects of the themes from Part II as they were simultaneously experienced by individuals, I returned to DCA. I corresponded with Seppo Kontiainen and, in 1995, travelled to Helsinki to learn from him and his colleagues. Quantifying the degree of their influence on what follows is impossible, but I must acknowledge and express my gratitude for their interest and assistance.

Educational researchers in the United Kingdom are not generally familiar with Dynamic Concept Analysis. Therefore, in chapter 7 I will describe the technique in detail, then demonstrate its application through a case study, in which each stage of the construction of a conceptual model is made explicit. I have modified Kontiainen's (1991) model of adult learning, to improve its explanatory power in the context of professional education at a distance. This is also described in chapter 7.

In chapter 8, the modified adult learning model will be used in the presentation of six case studies which make visible the coincidence and interaction of themes in Part II. These people commenced actuarial examinations with very similar prior educational experiences

and levels of success. The strikingly different personal experiences and professional outcomes which followed, are shown to be the outcomes of differing combinations of the attributes of adult learning which were identified by Kontiainen (1991) and modified for this study.

Chapter 7: Dynamic Concept Analysis of Adult Learning

7.1 Introduction

Ramsden (1987) argued forcibly for a 'relational perspective' of teaching and learning. For example:

> *"... one must think about the processes of teaching and learning holistically. ... If we focus separately on students' experiences, learning skills, students' characteristics, what teachers do, and what subject content consists of, we fail to understand some of the important things which happen when people learn in educational settings. We cannot reduce a relational view to one which concentrates on the parts of the process."* (Ramsden, 1987, p276)

The basis of Dynamic Concept Analysis (DCA) is a careful definition and reflection upon the relationships between key factors within a complex phenomenon; in this case adult learning in the context of actuarial examinations. The relational nature of the methodology is important for deepening understanding of the students' experiences. The structure which DCA provides helps to make the description of individual cases more integrated, less subjective and less eclectic. Further, DCA permits the simulation of alternative scenarios for consideration.

Within this chapter, the history and rationale of Dynamic Concept Analysis will be described. Kontiainen's (1991) model of adult learning will be discussed, then an empirical form of this model will be described (Kontiainen & Manninen, 1995). A demonstration case study will be presented in section 7.6.

For the purposes of this research study, I have modified Kontiainen's adult learning model. The modifications, which improved the model's explanatory power, will be presented in section 7.5.

7.2 Dynamic Concept Analysis

7.2.1 History and rationale

"Conceptual models can be considered as structured simplifications of a reality and as hypothetical structures of actual life." (Kontiainen, 1991, p43)

Dynamic Concept Analysis was developed by Seppo Kontiainen, appearing in its embryonic form in his doctoral thesis (1973). At this stage it was a 'compromise' between the approaches of nomothetic psychology, which tends to overlook the individual, and idiographic psychology, where the uniqueness of each case is paramount. His view was that: *"The idea of general laws should also be of use in describing individual behaviour."* (1973, p30). He argued that behaviour could be described by concepts, and that relationships between concepts could be found. This provided a structure both for the analysis of behaviour, and for its description. Kontiainen has refined and developed the methodology of Dynamic Concept Analysis (1989, 1991) and continues to work on it today.

When Kontiainen formally introduced DCA (1989) his concerns were fourfold; that:

- research studies too often sought either generalisations, or understanding of individual behaviour, and too seldom sought to combine the nomothetic and idiographic approaches
- accepting human behaviour to be a complex network of processes, set within a complex environment, produced a need for a means of illustrating the dynamic nature of behaviour. In particular there was a need to show how the relationships between 'parts' make a 'whole'
- as research within a field expanded there was often a proliferation of terminology, including the inconsistent definition of concepts. This resulted in confusion and the need for a means of integrating findings within that field
- there was a need to provide greater structure and to reduce subjectivity in the use of data on human behaviour, thereby improving the application of research findings to practice.

Dynamic Concept Analysis is a powerful flexible technique. It aims to generate a holistic view of a complex phenomenon by analysing the relationships between key concepts

associated with that phenomenon, assuming that a whole is greater than the sum of its constituent parts. DCA highlights that key concepts do not contribute to the outcome of a phenomenon in a simple additive manner. Patterns of concepts and the relations between them, are much more important than their mere presence or absence.

7.2.2 Performing a Dynamic Concept Analysis

First, theoretical and empirical evidence considered important for understanding the phenomenon, are scrutinised to identify key components of the situation. From this, a list of **concepts** emerges. For example, it will be seen in section 7.3 that Kontiainen's (1991) model of adult learning contains twelve concepts: autonomy, involvement, motivation, relevance of content, social interaction, learning climate, approach to learning, reflectivity, memorisation, learning outcome, change and evaluation.

The appropriate definition of concepts is central to the success of Dynamic Concept Analysis. For the technique to be useful for interpretation, yielding deeper insights, the selected concepts must adequately represent, and accurately describe, the range of influences upon the phenomenon under consideration. This is not a trivial matter. It requires careful consideration of existing theoretical frameworks and empirical evidence. However, DCA is sufficiently flexible to permit the addition or deletion of concepts after initial analysis, should that prove necessary.

An indication of the degree of presence, or form taken, by each concept is obtained by ascribing it a number of categories, called '**attributes**'. Defining each concept is then necessary, including variations within it (the attributes), so that the bases for any subsequently derived conceptual model are available for scrutiny. For example, the concept and attribute definitions for Kontiainen's (1991) model of adult learning are presented and discussed in section 7.3.

The next stage is to define links between concepts (**concept relations**) which take the form; concept B supports or influences concept A, (A←B). Kontiainen (1989) defined this (A←B) link as a 'type II relation'. This is illustrated in figure 7.1, along with the other four types of concept relation. The type II relationships can be obtained from quantitative or qualitative empirical studies. Alternatively, concept relations may be statements of research

hypotheses. The hypotheses could result from theoretical analysis of the selected concepts, or from consultation with a panel of experts. Additionally, combining empirical results and research hypotheses within the same model is possible.

A complete set of type II relationships defines the '**information matrix**'[59] for the phenomenon under consideration. For example, figure 7.2 on page 214, is the information matrix for Kontiainen's adult learning model. It contains the twelve concepts listed above, each split into three levels or forms (the attributes). Each cell within the matrix describes the nature of the type II link (if any) between two concepts, being read as a description of how the concept in that column supports or influences the concept in that row. Thus, for example, cell 3/8 (row 3, column 8), depicts the influence of concept 8, reflectivity, on concept 3, motivation. It shows a positive linear relationship between reflectivity and motivation, asserting that high levels of reflectivity support, perhaps cause, high levels of motivation. Further, it asserts that moderate levels of the two concepts will occur together, and that low levels of the two concepts will occur together. Verbal statements of the relationships depicted in figure 7.2 can be found in appendix V.

The strength of an information matrix lies in the quality of evidence used to define concept relations. It also relies on the rigour and expertise of those building it. Since it is possible for the information matrix to be affected by the builders' views, the bases for decisions should be made explicit. Further, the potential problems of bias and undue subjectivity might be partially mitigated by integrating information from as many different sources as possible.

The process of building an information matrix tends to be iterative. The information matrix is defined in relation to existing theory and empirical evidence. It is used to interpret data, and its success in doing so indicates something of the extent to which the original definition was satisfactory. This may lead to modification of the information matrix and further testing against data.

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[59] Originally, Kontiainen used the term 'information structure', but he now feels that this gives a less dynamic impression than is desirable.

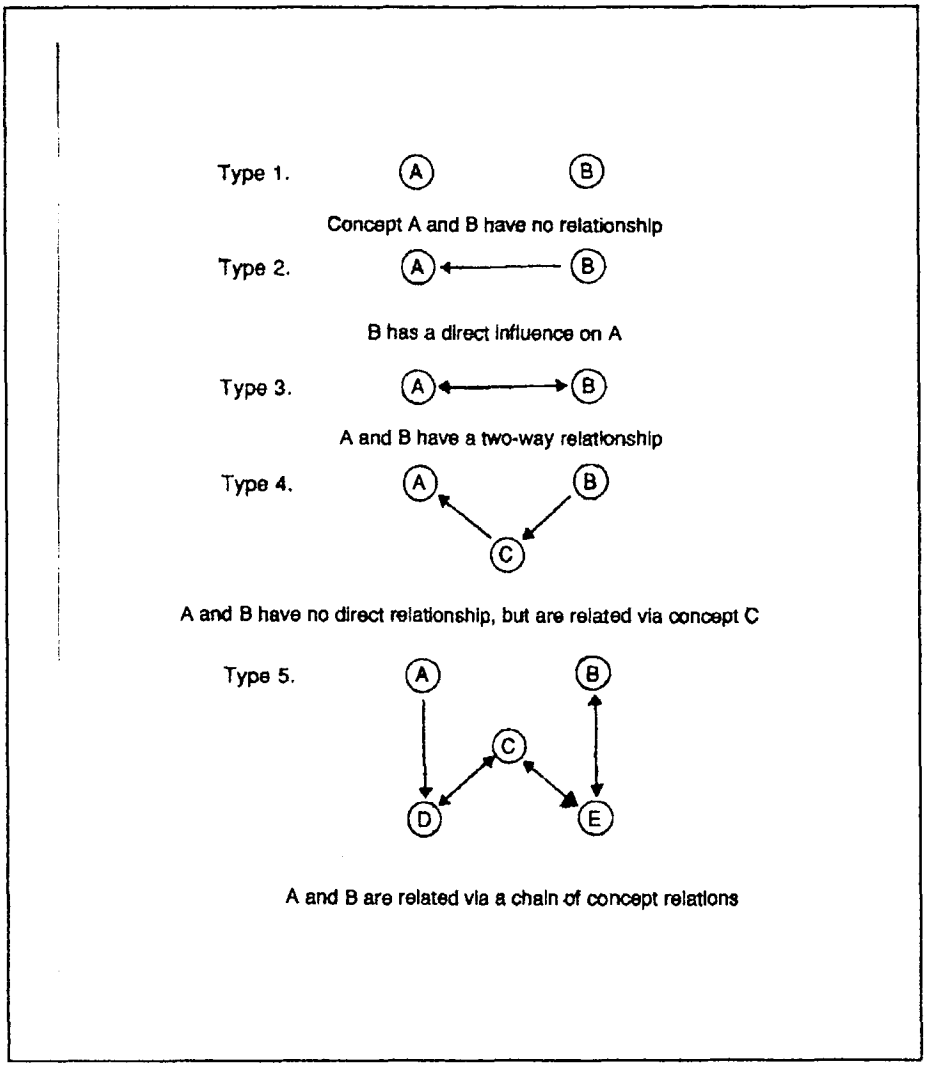


Figure 7.1: Concept relations
Source: Kontiainen (1991) p63

Once the information matrix is complete, it is possible to describe individual occurrences of the phenomenon under consideration, by drawing '**conceptual models**'. A conceptual model is a diagrammatic representation of an instance of the phenomenon, showing the particular attributes which pertain to that instance, and how those attributes are linked by the relations defined within the information matrix (see, for example, figure 7.5 on page 234). Essentially, this is a hypothesis of how the attributes are likely to be interrelated in real life.

Within the framework of concepts selected for a study, the conceptual model allows **simultaneous** consideration of all the influences on the phenomenon. Therefore, it is a powerful tool for structuring analysis and description. While giving scope for individual

interpretation, a conceptual model reduces subjectivity in seeing how different influences are interrelated. This is largely because the relations between concepts are fully described by the information matrix and are available for scrutiny.

The information matrix may be regarded as an implicit 'general theory' (too complex to be adequately and succinctly described verbally), from which 'sub-theories' may be illustrated with conceptual models of typical, or most probable, attribute combinations. Additionally, models of individual behaviour can be found for any combination of the concept attributes. Thus, for the 12 concepts of the Adult Learning Model (section 7.3), which each has three attributes, 3^{12} (= 531 441) combinations of attributes could be illustrated.

An individual conceptual model can be regarded as a hypothetical model of actual behaviour, which can be tested for its accuracy in representing that behaviour. Once its accuracy is accepted as adequate, it becomes a means of interpreting the behaviour and, a means of simulating the likely effect of altering a particular aspect of the situation being modelled. The latter usage may permit the planning of change such that it occurs in the most effective and efficient manner possible.

Kontiainen (1989, pp 32-33) stressed that within an information matrix:

> *"Although relations between concepts can be regarded as general, i.e. as common to most individuals, it does not necessarily mean that the behaviour of each individual could be equally well described by common concept relations. ... the relationships between concepts can be considered logical, but the behaviour of an individual can be illogical or contradictory; ... an individual may have a different conceptual framework or a different way of seeing the relations between concepts."*

He noted that in these circumstances a broken model may result, drawing attention to a potential need for further information about that particular case. Additionally, it is possible that there may be cultural differences in concept relations. Therefore, care must be taken to investigate the relevance of concepts and their relations before applying an information matrix in a new context.

7.2.3 Typical concept relations

I will now consider the detail of some typical concept relations within figure 7.2 (page 214); the information matrix for Kontiainen's (1991) model of adult learning.

The third and fourth concepts specified in Kontiainen's model of adult learning are 'motivation' and 'content relevance', each with three sub-concepts or 'attributes'. Thus, motivation was described as (3a) 'high', (3n) 'medium' or (3b) 'low'; while content relevance was allocated the attributes (4a) 'meaningful', (4n) 'neutral' and (4b) 'meaningless'. Based on judgement of the evidence from educational and psychological research, Kontiainen (1991, p92) linked these concepts with the statement: *"The more meaningful content the higher the motivation."* (Appendix V). This one-way relationship appears as a cell in the matrix of concept relations as shown below:

			Concept 4 (content)		
			meaning-ful 4a	neutral 4n	meaning-less 4b
	high	3a	a		
Concept 3 (motivation)	medium	3n		n	
	low	3b			b

Negative correlation, such as Kontiainen's statement (1991, p91) *"The less reflectivity the more memorisation"* appears in the information matrix of adult learning as:

			Concept 8 (reflectivity)		
			reflective	medium	non-reflective
			8a	8n	8b
Concept 9 (memorisation)	high	9a			b
	medium	9n		n	
	low	9b	a		

Initially, I found this aspect of Kontiainen's work difficult. As a researcher who originally specialised in statistics more than educational theory, I found his representation counterintuitive. The arrangement of letters within cells representing positive correlation has a negative slope, and *vice versa.* On several occasions I have glanced at a published information matrix, read on, and a few minutes later become aware of having subconsciously made connections in the wrong direction. This has been useful in that each time, I have received a powerful reminder of the strength and danger of habitual assumptions of which I am only dimly aware. This has strengthened the qualitative data analysis presented in earlier chapters, by making me more watchful of my own value judgements and intuitive assumptions. Precisely because I have found it difficult to think in Kontiainen's terms, Dynamic Concept Analysis has produced insights that I may otherwise have missed.

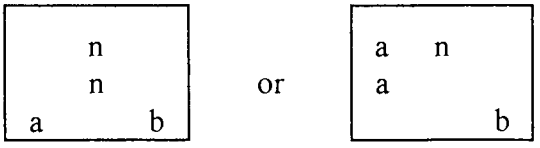
In addition to the linear type II relationships illustrated above, the method permits the representation of a trend towards a stated relationship as, for example:

a	n	
	n	
	n	b

or

	n	b
	n	
a	n	

Also, nonlinear relationships can be expressed in various ways, such as:



7.3 Kontiainen's model of adult learning

It is necessary to describe Kontiainen's (1991) model in some detail here, since I have extended it (section 7.5.4) and employed my modified model in case studies of the experiences of seven actuarial students (section 7.6 and chapter 8). The information matrix (figure 7.2) contains twelve concepts derived from the literature, and concept relations in the form of hypotheses proposed by Kontiainen (appendix V). The hypotheses could be regarded as a personal interpretation and synthesis of earlier research findings and his extensive experience with adult learners. They were tested in discussion with other researchers and with adult learners. More recently, Kontiainen and Manninen (1995) have partially tested the hypothetical information matrix by producing an empirical matrix. This will be presented in section 7.4.

Although the learning experience used to test and illustrate Kontiainen's model took place in Finland, the concepts should still be valid for my study. Much of the theoretical influence on the identification and definition of concepts was British, or previously validated in a British context. Additionally, a comparative study (Kontiainen, 1995b) of Finnish and British students appears to support the transcultural nature of his concepts.

		1			2			3			4			5			6			7			8			9			10			11			12		
		a	n	b	a	n	b	a	n	b	a	n	b	a	n	b	a	n	b	a	n	b	a	n	b	a	n	b	a	n	b	a	n	b	a	n	b
	1a autonomous	a			a			a			a			a	n		a				n	b	a					b								
1.AUTONOMY	1n medium		n			n			n			n			n			n			n			n			n									
	1b non-autonomous			b			b			b			b			b			b	a				b		a										
	2a active	a	n		a			a			a			a			a				n	b	a					b								
2.INVOLVEMENT	2n medium		n			n			n			n			n			n			n			n			n									
	2b passive		n	b			b			b			b			b			b	a	n			b		a										
	3a high	a	n					a			a			a			a				n	b	a				n	b								
3.MOTIVATION	3n medium		n						n			n			n			n			n			n			n									
	3b low		n	b						b			b			b			b	a	n			b		a	n									
	4a meaningful																						a					b								
4.RELEVANCE	4n neutral																							n			n									
	4b meaningless																								b	a										
	5a active	a			a			a			a			a			a	n			n	b	a					b								
5.INTERACTION	5n medium		n			n			n			n			n		a				n			n			n									
	5b passive			b			b			b			b			b			b	a				b		a										
	6a informal	a			a			a			a				n		a					b	a					b								
6.CLIMATE	6n non-formal		n			n			n		a	n		a	n			n			n			n			n									
	6b formal			b			b			b			b			b			b	a				b		a										
	7a theoretical																		b	a				b		a										
7.APPROACH	7n neutral																	n			n			n			n									
	7b practical																a					b	a					b								
	8a reflective	a			a			a			a			a			a	n			n	b	a					b								
8.REFLECTIVITY	8n medium		n			n			n			n			n			n			n			n			n									
	8b non-reflective			b			b			b			b			b			b	a	n			b		a										
	9a high																		b	a				b		a										
9.MEMORISATION	9n medium																	n			n			n			n									
	9b low																a					b	a					b								
	10a innovative	a			a			a			a			a				n			n		a					b	a							
10.Learning Type	10n neutral		n			n			n			n			n		a	n			n			n			n			n						
	10b conformist			b			b			b			b			b			b	a		b			b	a				b						
	11a high	a			a			a			a			a			a	n				b	a					b	a			a				
11.CHANGE	11n medium		n			n			n			n			n			n			n			n			n			n			n			
	11b low			b			b			b			b			b			b	a				b		a				b			b			
	12a positive	a	n		a			a			a			a			a	n			n	b	a					b	a			a			a	
12.EVALUATION	12n neutral		n			n			n			n			n			n			n			n			n			n			n			n	
	12b negative		n	b			b			b			b			b			b	a				b		a				b			b			b

Figure 7.2: Information matrix for Kontiainen's model of adult learning
Source: Kontiainen (1991) p66

Kontiainen used his model to produce (different) conceptual maps for each of the sixteen participants in a particular course at the University of Helsinki. At the end of the course, the participants individually selected their own attributes, having studied the concepts and attributes of the adult learning model as a group. Kontiainen wrote a description of each conceptual model that was by inference, a description of the learning process. Each participant received their conceptual model with its accompanying description. They were

asked to indicate their level of agreement with the description, and to comment further. The level of agreement was very high and the issues raised by the models and descriptions were generally seen by the participants as valid and relevant. Reflecting on these models and descriptions seemed to increase these students' self-knowledge with respect to their learning. This may have made them aware of aspects which might usefully be changed and, should have made them better prepared to change effectively.

Primarily, Kontiainen selected his concepts from the model of adult learning developed by Jarvis (1987) which had nine elements: the person; the situation; experience; two types of learning outcome or degree of change; practice and experimentation; memorisation; reasoning and reflecting; and evaluation. These elements were seen by Kontiainen as a useful and reasonably complete list from which to begin a 'discussion' with theory. However, Jarvis' model of nine 'routes' from a learning experience (section 3.4.4), was not used to any great extent in the construction of Kontiainen's information matrix (figure 7.2). Other important sources that influenced Kontiainen's conceptual framework appear to have been: Argyris (1982), Botkin *et al* (1979), Boud *et al* (1985), Dewey (1933), Engeström (1987), Freire (1972), Kidd (1976), Knowles *et al* (1984), Mezirow (1981) and Schön (1983). This could be viewed as an eclectic selection of earlier work. It is perhaps surprising that Kontiainen did not discuss the Swedish and British work relating to perceived task demands, the learning milieu and conceptions of knowledge, which was reviewed in sections 3.4.2 and 3.4.3.

Following Kidd (1976), the concepts selected by Kontiainen were divided into five categories:

(A) Learner/Practitioner

(B) Learning Environment

(C) Learning/Teaching

(D) Outcome, and

(E) Evaluation.

The concept definitions, grouped under these headings, will be described below. In each case, the neutral or medium position on the attribute scale represents either neutrality towards the quality under consideration, or ambivalence. Thus, Kontiainen's attributes define broad divisions **within a continuum** for each concept.

Category A: Learner/Practitioner

Kontiainen placed four concepts in this category: 'Autonomy', 'Involvement', 'Motivation' and 'Relevance of Content'. The first three were considered to be the characteristics of an individual's orientation to learning. In addition, the ultimate judgement of 'Content Relevance' was thought to be the prerogative of the learner.

(1) **Autonomy** (autonomous - medium - non-autonomous)

This is concerned with the extent to which the student is able to create his or her own learning situation, or whether the student simply reacts to the impositions of others. It is close to the distinctions of self-directed/other-directed and agent/reactor, discussed by Jarvis (1987, p66). Jarvis points out that the same person may be agent or reactor, according to circumstances, arguing that pro-activity does not ensure significant learning, and nor does reactivity preclude it. The non-autonomous position is close to Freire's (1972) idea of an oppressed person. Kontiainen asserts (1991, p57) that the role taken by the learner will depend upon a combination of his or her self-perception, institutional constraints and the expectations of significant others.

(2) **Involvement**[60] (active - medium - passive)

This, like autonomy, is concerned with the extent to which a learner is pro-active or reactive, but is included separately on the assumption that: *"... even a non-autonomous learner can be actively involved in a learning process, and an autonomous learner can adopt a passive role."* (Kontiainen, 1991, p57).

(3) **Motivation** (high - medium - low)

Kontiainen (1994) defines motivation as the: *"... degree of personal interest towards the matters to be studied."*

(4) **Relevance of Content** (meaningful - neutral - meaningless)

This refers to the learner's judgement of the content. The inclusion of this concept arises from the view that adult learners are meaning-seeking beings.

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[60]Kontiainen also uses the term 'learner role' for this concept.

Category B: Learning Environment

There are two concepts in this category: 'Social Interaction' and the 'Learning Climate'.

(5) **Social Interaction** (active - medium - passive)

> *"Social interaction refers to the qualities of social processes in learning (group processes, tutoring etc.). An individual learning process may be promoted by positive, supportive cooperation with others. In contrast, conflict or lack of interaction may have (often) a negative, preventive influence on learning. ... It is assumed, that also an independent learner can have a social environment of learning."* (Kontiainen, 1991, p58)

For me, this definition is problematic. It argues that cooperative social interaction has a beneficial effect on learning, while hostile social interaction or lack of social interaction tend to have a negative effect on learning. The attribute 'active' encompasses both cooperation and conflict with their opposing effects, while Kontiainen's research hypotheses relate to the beneficial effects of cooperation. Additionally, the detrimental effect of passive social interaction is not certain. Some students simply do not desire a high level of social interaction within a learning situation, perhaps reserving this for other spheres of life. When this is the learner's choice, passive interaction may be a successful mode of working (Holmberg, 1982; Lawton, 1994). Perhaps the attribute continuum should have been 'supportive - medium - unsupportive', or 'helpful - medium - unhelpful', these being viewed from the perspective of the learner.

A further form of social interaction that needs to be considered is competition. Some students find competition with fellow learners motivating, and will actively seek out the type of social interaction that provides it. Other students are uninterested in competition with their peers, and a few prefer actively to avoid it. The type of social interaction related to competition does not fit well within Kontiainen's continuum of 'active - passive', since both poles are possible both for those wanting competition and those seeking to avoid it. However, the type of social interaction experienced, including that part which was a reaction to competition, could be described on a continuum 'helpful-unhelpful'.

This concept will be discussed further in section 7.5.2.

(6) **Learning Climate** (informal - non-formal - formal)

Jarvis (1987, pp 68-70), following Coombs and Ahmed (1974, pp8 & 16-24), describes three types of social environment in which learning may take place: 'informal', 'non-formal' and 'formal'. An 'informal' environment is defined as social interaction within the family, and between friends and acquaintances. He defines a 'formal' environment as *"... any bureaucratic or 'official' situation in which people play roles within organisations."* (p68). This could be, for example, a school or other educational establishment. The intermediate environment, 'non-formal', is used for systematic education, aimed at a particular group or individual, conducted without a formal educational setting. For example, trainees receive 'non-formal' education from their supervisors, within the workplace. Within each of these environments the learner may be pro-active or reactive, that is, all attribute combinations are possible between this concept and the concept 'Involvement'. Jarvis goes on to discuss the subjectivity of experience (pp 70-77), stating that learning *"... experiences do not have meaning in themselves and that the participants seek to define their situations and to impose meaning upon them."* Therefore, the same learning situation can be experienced differently by each participant, since each brings a unique biography of prior experience. Kontiainen's use of this concept (1991, p59) reflects this. The ascribed attributes describe the learner's perception of the learning situation. They are not an objective assessment of the type of learning environment.

Category C: Learning/Teaching

The three concepts in this category describe strategies used for learning or teaching. Both learners and teachers are involved in the development of these strategies, although the degree of cooperation between the parties varies.

(7) **Approach to Learning** (theoretical - neutral - practical)

"The approach to learning regulates how much an adult learner is able to build new knowledge, skills and attitudes on his or her previous experiences."

(Kontiainen, 1991, p60)

Initially, I had difficulty in interpreting the definition and role of this concept. Through correspondence with Seppo Kontiainen, I came to understand that he

regards 'neutral' as the optimum position for this concept, and that it measures the student's perception of the approach dictated by the course or teacher.

"Theoretical approach concentrates on general principles and knowledge with little or no connection to the practice (this may often happen in a traditional lecture). Neutral refers to a situation in which 'theory' and 'practice' are integrated in studies. A practical approach concentrates primarily on plain practical questions with little or no connection to wider understanding or theoretical principles." (Kontiainen, 1995a)

Perhaps renaming the attribute 'neutral' as 'integrated' might help to convey its meaning and to stress its importance. This would give the continuum 'theoretical - integrated - practical', which might best be considered triangular, with 'integrated' at its apex. While this continuum is at first sight attractive, it does not meet Kontiainen's requirement that the central position can accommodate ambivalence. The only way to accommodate courses which students perceived to be a **mixture** of theory and practice, but not an **integration** of theory and practice, would be to decide whether, on balance, the course was more theoretical or more practical.

While theoretical, integrated and practical approaches to learning do not form a satisfactory continuum, perhaps it could be argued that they are mutually exclusive and exhaustive. They could be used satisfactorily within a model of adult learning, by treating them as three one-attribute concepts. The type II relations defined as hypotheses for the information matrix, would be different from those in Kontiainen's (1991) model. However, I have not adjusted the original matrix to address this issue, since I did not find the categories, 'theoretical', 'integrated' and 'practical' to be useful for my data, although they seem to have been for Kontiainen's students. The alternative categories employed for this research study will be described in section 7.5.1.

(8) **Reflectivity** (reflective - medium - non-reflective)

This concerns the depth of thought applied to the learning task, linking it to previous knowledge and experience, pondering over alternative solutions and reasoning through their implications. It is related to Schön's (1983) definition of the 'reflective practitioner' and to Mezirow's (1981) theory of adult learning. The 'non-reflective' attribute does not denote a complete absence of reflection, since Kontiainen (1991, p60) assumes that *"... even in a non-reflective learning process, an individual is*

likely to bring at least some 'reflections' into the learning process, to think in terms of his or her previous experience and knowledge."

(9) **Memorisation** (high - medium - low)

Within Kontiainen's model of adult learning (1991, p60) this *"... refers to degree of reproducing of information in a learning situation. 'High' memorisation means, that learners are expected to acquire and to remember the information with which they have been presented."* In Kontiainen's empirical work, the attributes of this concept relate to the learner's perception of what is required by the institution, course or teacher, rather than the institutional expectation, or the teacher's expectation. Perhaps, like 'approach to learning', the central attribute may be the optimum position.

Category D: Outcome

There are two concepts in this category; 'Type of Learning' and 'Change'.

(10) **Type of Learning** (innovative - neutral - conformist)

Kontiainen (1994) differentiates between innovative and conformist learning as follows: *"Innovative learning helps to see things in a new way, results in new insights or new ideas. Conformist learning rather strengthens old ideas and routines of understanding than produces new creative ideas or insight."*

(11) **Change** (high - medium - low)

Kontiainen (1991, p61) *"Change can be understood as new forms of practice, knowledge and skills. The concept also refers to personal development and growth."*

Category E: Evaluation

The model of adult learning is completed with the concept 'Evaluation'.

(12) **Evaluation** (positive - neutral - negative)

This is an overall assessment of the learning experience and may be carried out by several different actors, for example the students, the teachers or external assessors. Kontiainen (1991) used the students' evaluations.

7.4 An empirical information matrix for the adult learning concepts

Kontiainen and Manninen (1995) produced an empirical information matrix (figure 7.3, page 222) of relations among the twelve concepts of Kontiainen's (1991) adult learning model. The methodology was developed by Manninen (1993), during earlier work that used Dynamic Concept Analysis to model the affective experience of unemployment. His procedure was to assign attributes for a large sample of individuals ($n = 272$) and then investigate the empirical distribution by cross-tabulating each pair of concepts. Thus each pair of concepts yielded a (3 × 3) table of observed frequencies (obs), expected frequencies (exp) and adjusted residuals (aj res), similar to the one below:

			Concept 1		
			high 1a	med 1n	low 1b
Concept 2	high	2a	obs exp aj res	obs exp aj res	obs exp aj res
	med	2n	obs exp aj res	obs exp aj res	obs exp aj res
	low	2b	obs exp aj res	obs exp aj res	obs exp aj res

The adjusted residuals were compared with the standard normal distribution and those greater than 1.64 ($p < 0.05$) were taken as suggesting a significant discrepancy between observed and expected frequencies. In these cases, hypotheses were formed which linked the two concepts. Additionally, adjusted residuals greater than 0.5 ($p < 0.3085$) were taken as indicative of a tendency to interaction. Together, the hypotheses resulting from the investigation of cross-tabulations form the empirical information matrix in figure 7.3.

The striking feature of this empirical matrix, is the absence of type II relationships (x←7) for the concept 'approach to learning'. Manninen (1995) feels that this is because approach to learning is predominantly defined by the teacher. His discovery strengthened my existing unease with the role of this concept within the adult learning model (section 7.3). This will be discussed further in section 7.5.1.

		1			2			3			4			5			6			7			8			9			10			11			12		
		a	n	b	a	n	b	a	n	b	a	n	b	a	n	b	a	n	b	a	n	b	a	n	b	a	n	b	a	n	b	a	n	b	a	n	b
1.ROLE	1a autonomous																a																				
	1n medium																a									n											
	1b non-autonomous																	n	b								b										
2.INVOLVEMENT	2a active	a						a			a			a									a					a								
	2n medium								n			n			n										n					n							
	2b passive			b					n	b		n	b			b			b						b					b							
3.MOTIVATION	3a high	a									a			a			a				n		a						a							
	3n medium			b								n	b					n	b			b		n	b					b							
	3b low			b									b			b			b						b					b							
4.CONTENT	4a meaningful	a	n											a			a						a			n			a							
	4n medium			b											n	b		n						n			b			n	b						
	4b meaningless			b												b			b						b			b			b						
5.INTERACTION	5a active	a			a			a			a						a					b	a						a							
	5n medium			b		n			n			n						n			n				n					n							
	5b passive						b			b		n	b						b	a					b					b							
6.CLIMATE	6a informal	a	n					a																													
	6n medium			b					n																													
	6b formal			b			b			n	b																										
7.APPROACH	7a theoretical																																				
	7n medium																																				
	7b practical																																				
8.REFLECTIVITY	8a reflective	a			a			a			a			a			a			a									a							
	8n medium		n			n			n			n			n			n			n									n							
	8b non-reflective			b			b			b			b			b			b			b									b						
9.MEMORISATION	9a high																																				
	9n medium																			a																	
	9b low																					b															
10 LEARNING_TYPE	10a innovative	a			a			a			a			a			a						a													
	10n medium		n			n						n			n			n						n													
	10b conformist			b			b		n	b		n	b			b			b						b												
11.CHANGE	11a high	a			a			a			a			a			a			a			a						a							
	11n medium		n			n			n						n			n				b		n						n							
	11b low			b			b		n	b		n	b			b			b						b						b						
12.EVALUATION	12a positive	a			a			a			a			a			a						a						a			a				
	12n medium			b		n	b		n	b		n	b		n	b		n	b						n	b					n	b			n	b	
	12b negative			b			b		n	b			b			b			b						b						b				b		

Figure 7.3: Empirical information matrix for the concepts from Kontiainen's adult learning model
Source: Kontiainen and Manninen (1995)

I considered using the empirical matrix for the case studies that follow (section 7.6 and chapter 8). However, concerning the possibility of cultural differences in concept relations (sections 7.2 and 7.3), the empirical matrix raised more doubts than the original, theoretical matrix. Kontiainen and Manninen (1995) collected their data from 347 unemployed Finnish professionals who were attending extramural courses at the University of Helsinki, designed to help them return to work. The learning experiences for which these adults selected

attributes, were dissimilar to the experiences of the actuarial students in this study. Therefore, the next section considers the modification of Kontiainen's original (1991) adult learning model to suit the context of this research study better.

7.5 Modifying the adult learning model for this study

The originally modelled learning experience (Kontiainen, 1991) was not overtly vocational and took place within a university. This is rather different from the learning situations of the actuarial students with whom this research study is concerned. Therefore, it is not surprising that some modifications to the original model have been required. These are detailed in the four subsections that follow.

The modification of the adult learning model was an iterative process. Firstly, consideration was given to the theoretical basis of Kontiainen's model, the circumstances of its development and its applicability to the context of this research study. Problems were anticipated with the concept 'social interaction', and suspected for some concept relations discussed in section 7.5.3. Conceptual models were constructed for three cases, which confirmed the anticipated and suspected problems. They demonstrated the inapplicability of Kontiainen's definition of the concept 'approach to learning' to my data. Using my knowledge of the relevant literature and of the context of actuarial examinations, I iteratively modified the information matrix and remodelled the original three cases. The adequacy of the modified information matrix was assessed in three ways, by:

- comparing the conceptual models with all the other information relating to these cases and judging their accuracy and explanatory power
- comparing the conceptual models from the modified information matrix with those from the original model, and with conceptual models obtained from the empirical matrix. Again judgements were made about explanatory power
- the modified information matrix and its accompanying research hypotheses (appendix VI) were debated with fellow researchers.

Once it was felt that an adequate information matrix had been obtained for the first three cases, a fourth case was modelled. This resulted in some minor changes. Conceptual

models were constructed in turn for further cases, chosen to be as varied as possible. No further modifications to the information matrix resulted.

After obtaining the modified information matrix that will be presented in section 7.5.4, conceptual models were constructed for the case presented in section 7.6 and the six cases in the next chapter. These were not only assessed for their accuracy and explanatory power, but for the additional insights which they brought to consideration of each student's experience. Ideally, the conceptual models would each have ben returned to the individual who provided the data for assessment of the accuracy and illumination of the analysis. Unfortunately, this was not possible. One individual did study his models and commented that it was *"creepy"* that I knew so much about him. He found that the models helped him to understand the complexity of learning.

7.5.1 Redefining 'Approach to Learning'

The most significant modification made to Kontiainen's model was the redefinition of the seventh concept, approach to learning.

It will be remembered from section 7.3 that 'neutral' was seen as the optimum position for this concept and that the approach was that of the course or teacher, as perceived by the student. It was established that the attribute 'neutral' might benefit from being renamed 'integrated', and that the attributes 'theoretical', 'integrated' and 'practical' did not form a satisfactory continuum. Although the research hypotheses encapsulated by the information matrix could have been rewritten, treating the three attributes as mutually exclusive and exhaustive, this did not seem to be the best course of action for this research study.

The focus of this research study is the student experience of actuarial examinations. Therefore, it is more useful for the concept 'approach to learning' to describe the student's approach to learning. The concepts 'deep approach', 'strategic approach' and 'surface approach', developed by Marton's and Entwistle's teams in Sweden and England (see section 3.4.2), have been selected as appropriate for this study. These categories form an adequate description of the approach to learning in that, for a particular learning incident, they may be considered both mutually exclusive and exhaustive. That is, a learner will adopt one of the listed approaches. This does not preclude the adoption of a different approach at a

different time, or in different circumstances. 'Deep', 'strategic' and 'surface' approaches do not form a continuum. They are distinct strategies, and this is reflected in the way the research hypotheses have been stated in appendix VI. Since the approach taken by a student will be influenced by the student's perception of the requirements and emphasis of the course (Marton & Säljö, 1976b), this description of the approach to learning may subsume much of Kontiainen's original definition. However, this redefinition shifts 'approach to learning' from being an external factor to become an internal process.

In the case studies that follow (section 7.6 and chapter 8) the type of approach to learning ascribed has been based on the student's description of his or her **actions.** This may not be the same as the individual's preferred approach. For example, Cox (1987, pp 20-21) showed that students can hold *"... an amazingly broad and sophisticated view of the nature of knowledge and learning"*, while feeling pressurised by the demands of a course to concentrate on assimilating knowledge rather than creating personal meaning. This approach, which they perceived as forced upon them, frequently did not work well.

The modification of this 'approach to learning' is supported by the resultant conceptual models that are more integrated, more dynamic, and have greater explanatory power than conceptual models derived from the original information matrix.

7.5.2 Redefining 'Social Interaction'

It will be remembered from section 7.3 that Kontiainen's (1991, p58) definition of social interaction was problematic. I suggested that the attribute continuum might more usefully have been, 'helpful - medium - unhelpful'. That is, a measure of the degree to which student felt that the social interaction occurring within the learning environment was helpful to his or her learning. This is not an absolute measure, but relates to the individual's desire for social interaction. Thus 'helpful' is ascribed when the student considered that the level and type of interaction was **as helpful as desired**. This could include a very low level of social interaction for those students who prefer to learn that way (Lawton, 1994).

The revised type II relationships postulated for this concept are listed in appendix IV and appear within figure 7.4 (page 227).

7.5.3 Minor modifications

In three cells (1/3, 1/4, and 6/8) the originally defined relationships were removed completely, since they were not well supported by the literature. Further, the empirical matrix described in section 7.4, does not have entries in these cells.

In cells 2/3, 6/1, 6/2, 6/3, 6/9, 8/3, 10/3, 10/4, 11/1 and 11/3, assertions of definite linear relationships have been replaced with suggestions of a tendency to that relationship. Additionally, in cell 10/6, the nonlinear relationship has been replaced with a tendency to that relationship. This is indicative of my lower level of confidence than Kontiainen in strong simple relationships of probabilistic cause. In particular, I am equivocal about the power of different levels of motivation to influence other concepts in a straightforward way (x-3). The type II relationships influencing motivation (3-x) seem much less problematic. Therefore, the asserted tendency in cell 3/9 has been strengthened to a negative linear relationship between memorisation and motivation. This change is supported by the findings of Svensson (1976) that students adopting an 'atomistic approach' (later subsumed by the concept 'surface approach') progressively spend less time studying.

It will be remembered from the discussion on page 220 that Kontiainen's definition of memorisation (1991, p60) relates learners' perceptions of what is expected from them by the institution, the course or the teacher. Thus, it is not necessarily a measure of the amount of memorisation that actually occurs. A student may feel that memorisation is all that is required, but may not feel able to learn in this way, like the engineering students studied by Cox (1987), or the actuarial student who described herself as:

"... *unprepared to learn parrot-fashion.*" f 278 Q'naire

The adult learners for whom Kontiainen produced conceptual models, chose their own attributes. I would suggest that the level they chose probably reflected a combination of their perception of what was expected **and** the amount of memorisation they did. That is, an unexplicit combination of perception and action. Within this research study, I have ascribed the attributes included in the conceptual models. Therefore, it was necessary to clarify the basis for ascribing the attributes of 'memorisation'. Continuing the convention established in section 7.5.1, the attributes included in the conceptual models of section 7.6 and chapter 8, have been ascribed to illustrate the **action** of the learner. This generated new hypotheses for cells 9/1 and 9/2, and caused the removal of cell 4/9.

7.5.4 The modified adult learning model

The information matrix developed for this research study is shown in figure 7.4. Statements of the hypothesised concept relations that form this matrix are listed in appendix VI.

		1	2	3	4	5	6	7	8	9	10	11	12
		a n b	a n b	a n b	a n b	a n b	a n b	a n b	a n b	a n b	a n b	a n b	a n b
1.AUTONOMY	1a autonomous		a			a n	a	a n	a	b			
	1n medium		n			n	n	n	n	n			
	1b non-autonomous		b			n b	b	b	b	a			
2.INVOLVEMENT	2a active	a n		a n	a	a	a	a n	a	b			
	2n medium	n		a n	n	n	n	n	n	n			
	2b passive	n b		n b	b	b	b	b	b	a			
3.MOTIVATION	3a high	a n			a	a	a	a n	a	b			
	3n medium	n			n	n	n	n	n	n			
	3b low	n b			b	b	b	b	b	a			
4.RELEVANCE	4a meaningful					a		a	a				
	4n neutral					a n b		n	n				
	4b meaningless					b		a	b				
5.INTERACTION	5a helpful						a n						
	5n medium						a n b						
	5b unhelpful						n b						
6.CLIMATE	6a informal	a	a	a n	a	a n		a		b			
	6n non-formal	a n	a n	a n	a n	n		a		n b			
	6b formal	b	b	n b	b	n b			b	a			
7.APPROACH	7a deep	a	a	a	a	a	a		a n	n b			
	7n strategic	a	a n	a	n	a	b		n	n			
	7b surface	b	b	b	b	b	b		b	a			
8.REFLECTIVITY	8a reflective	a	a	a	a	a	a n	a n		b			
	8n medium	n	n	a n b	n	a n b	n	n		n			
	8b non-reflective	b	b	b	b	b	b	b		a			
9.MEMORISATION	9a high	b	b			b	b	b	b				
	9n medium	a n b	a n b			a n b	n		n				
	9b low	a	a			a	a	a	a				
10.LEARNING TYPE	10a innovative	a	a	a	a	a	a n	a	a	b			
	10n neutral	n	n	a n	a n	a n b	a n	n	n	n			
	10b conformist	b	b	b	b	b	b	n b	b	a			
11.CHANGE	11a high	a	a	a	a	a	a n	a	a	b	a		
	11n medium	a n b	n	a n b	n	a n b	n	a n	n	n	n		
	11b low	b	b	b	b	b	b	n b	b	a	b		
12.EVALUATION	12a positive	a n	a	a	a	a	a n	a	a	b	a	a	
	12n neutral	n	n	n	n	n	n		n	n	n	n	
	12b negative	n b	b	b	b	b	b	b	b	a	b	b	

Figure 7.4: Information matrix for the modified adult learning model

7.6 A demonstration of the construction of conceptual models

Having discussed the methodology of Dynamic Concept Analysis, then described Kontiainen's (1991) model of adult learning and its modification, it is time to illustrate the application of the technique to an actual case; Alan. This case study will be presented in detail, making explicit the bases for assigning each attribute. In chapter 8, DCA will be applied to a range of further cases. These will be presented in summary form; the process of their construction being identical to that of Alan's case.

7.6.1 The demonstration case study: Alan

The data drawn on here comprise: the transcript of a tape-recorded interview that lasted approximately 80 minutes; and field notes of two lengthy conversations. The depicted learning experience is the 'steady state' which Alan attained after *"one or two years"* of studying for actuarial examinations. However, its development was not dramatic, all the elements were present during his first year of actuarial study, he just fine-tuned the technique.

Alan is a British man. He qualified in six years which, then, was close to the profession's median time to qualification. His mathematics degree from a provincial, nineteenth century university, secured him one exemption (which he later lost because of a syllabus change) and he took the remaining actuarial examinations two at a time. Although he failed several papers, he secured at least one pass per year, which was important to him from a motivational perspective. He began his career in a small life office, switching to general insurance just after qualification. He is still working as an actuary within general insurance.

The attributes ascribed in this case are listed in the table within figure 7.5 on page 234. The selection of these will now be discussed, beginning with 1n, moderate autonomy.

Alan was a **moderately autonomous** learner (**1n**). While he felt constrained to learn in a way that enabled him to provide the examiners with that which he perceived they wanted

(lists of key points), he devised several strategies for attaining this. The variety of personal strategies was his way of exercising some control over the situation. For example:

> *"I never took any notice of guidelines as to when they* [course tests] *were being done by, just tried to do them as quickly as I could."* Tape

He was **moderately involved** in the learning process (**2n**). Although Alan responded to the advice of senior colleagues (current and former examiners) who indicated that the optimum form of examination answer was a list of bullet points, he held the view that this *"was probably not a great way of doing it"*. Alan was pro-active in seeking ways to increase his probability of passing the examinations. Thus, having decided after his first year of actuarial study that the syllabus was defined by the examination papers, rather than by the correspondence courses, he concentrated his efforts on past examination papers, often practising under examination conditions:

> *"I always used to make sure I'd done a lot of exam papers, as many as I could, because I thought that was the key."* Tape

Alan was moderately motivated (**3n**) to succeed with his studies. He had rather fallen into taking the actuarial examinations, having *"fired off"* applications for both accountancy and actuarial positions because of a vague desire to obtain a professional qualification that used mathematics. He happened to be offered, and accepted, an actuarial position. He found actuarial work congenial and experienced a reasonable level of examination success, both providing some intrinsic motivation. He responded to the extrinsic motivation of his company's pay structure that valued examination success more highly than outstanding contributions to the work of the office. Alan found the pass/fail nature of the professional examinations more extrinsically motivating than his graded BSc degree. As an undergraduate, he felt that varying the effort he expended could have resulted in the award of either an upper second class degree or a lower second class. Since the latter was acceptable to him, he worked accordingly and was satisfied with that outcome. However, he felt that varying the effort expended on the professional examinations would make the difference between passing and failing. He did not want to fail and so worked harder than he had done as an undergraduate. Nevertheless, he expressed the view that had this effort not been rewarded with examination passes, he would have become demotivated and

withdrawn. While working hard at his studies, Alan was unwilling to let the professional examinations completely dominate his life:

> *"I used to make sure that I wasn't working every day and try and enjoy what I was doing as well."* Tape

Alan was **neutral** with respect to the **relevance of the content** of the subjects in which he was examined, (**4n**). On balance, he saw the first six theoretical subjects as having general relevance to professional practice, but the later applied subjects as generally irrelevant, particularly those subjects outside an individual's field of work. He saw some merit in acquiring a minimal knowledge of other fields of actuarial employment, which perhaps the requirement to take four applied papers met. However, he viewed as unrealistic, the notion of the generally qualified actuary, able to switch field of employment. He felt that all the correspondence courses contained excessive detail and therefore, that the ability to distil the relevant and the important was crucial. He felt that this ability was relevant to professional practice, but that simply overloading syllabuses was not necessarily the best way for the profession to develop this ability.

Alan found the **social interaction** that he experienced to be **helpful** to his learning, (**5a**). He valued being one of a group of ten actuarial trainees, which occurred by chance since the company he joined was expanding. This peer group provided both cooperative support and motivation in the form of competition. He felt that being more isolated would have been detrimental to his learning. His company designated 'tutors' who helped the actuarial students with their studies, and they were often current or former examiners. He found the tutors to be accessible, pleased to help, and knowledgable. He vested great authority in their advice, upon which he acted diligently. He did not particularly value interaction with the professional body, characterising much of the official institutional feedback and advice as *"a waste of time."* However, while being aware that many fellow students found interaction with the profession's official tuition service to be less helpful than they wished, for his own part he had no particular complaint since he was not looking for positive social interaction from this source.

"I don't think the actual marking was that helpful. ... to me it was setting the target of doing the test; doing the work, then doing the test and sending it off. I didn't care whether they marked it or not because that wasn't why I was doing it."

Tape

He perceived the **learning climate** to be **non-formal**, **(6n)**. He saw the institutional education and assessment systems as very formal with unnecessarily firm divisions between examiners and tutors, and examiners and students. However, the environment within his company was informal and helpful. The two worlds overlapped, with some of the people with whom he had regular contact belonging to both. This allowed him to use the informal company environment to gain insights into the formal institutional environment, rendering it non-formal.

His **approach to learning** was **strategic**, **(7n)**. He did not want to fail the professional examinations and he did not want them to take over his life. Therefore, he sought efficient ways of approaching his studies and the examinations. His primary source of information was that he was very 'cue-conscious' in his contacts with company tutors whom he knew to be insiders with respect to the examining process. He also searched past examination papers and examiners' reports for clues as to what was considered important. To a lesser extent, he did this with the solutions returned with his marked tests, although he viewed these as less authoritative sources of information. He believed that examination technique was all important.

"I couldn't be bothered to write essays, just the points, because that's not the way I assumed they were going to be marked." Tape

Alan was **moderately reflective** while studying, **(8n)**. Part of his reflectivity was strategic, linked to 7n: he was pondering on the examination game and how he could play to win. Another part of his reflectivity was linked to neutral view of content relevance, 4n. Throughout his studies he reflected upon the material in order to separate what he regarded as the important issues from the distracting detail. He then saw the distilled issues as relevant and worthy of consideration.

His study technique involved a **high level of memorisation (9a)**. He recorded his revision notes onto a cassette and played this for 40 or 50 minutes each day as he drove between home and work. Before the examination period he knew the tape by heart, including coughs and background noises. He also made extensive use of mnemonics:

> *"I used to do notes of my course and end up with mnemonics ... as soon as I got in the exam I used to write them down, put them all in, they used to work."* Tape

His **type of learning** was **conformist (10b)** since he filtered out from the course material that which was widely held to be important, and learnt this. His view of the examining process as requiring students to hit the concealed target of naming an uncertain number of points from a list drawn up by a panel of experts (the examiners) made it inappropriate to strive for novel, creative solutions or arguments. It was essential that he gave back to the examiners the things they were looking for in a form that they would easily recognise.

The process of studying for and sitting the professional examinations resulted in a **low level of change** in his view of actuarial practice and very little personal development **(11b)**. He seemed to view the qualification process as fairly separate from practising as an actuary, except in its role as a rite of passage. He spoke about friends who made competent, valued contributions to the actuarial work of their offices, but repeatedly failed the professional examinations and therefore, were limited in terms of further career progression.

> *"I think doing the job after you have qualified is interesting, it's what you make of it basically, but I think the exams are the main hurdle and that's the thing to think very carefully about. ... It's not easy."* Tape

His **overall evaluation** of the learning process is **neutral (12n)**. He qualified and was pleased about that because he now enjoys being an actuary, but views the period he spent qualifying as representing too much wasted time. Alan did not expect passing the examinations to be as difficult as it proved to be, but he found a way through which suited him. He was content because his strategic approach required less time and effort than fellow actuarial students were expending to no greater effect, leaving space for other things in his life.

> *"I don't think it's a very good system. Having been through all of it, I need to say that I'm happy with it all now, because I've gone through it, I don't have to do it*

again. But I wouldn't wish the system on other people. ... I wouldn't advise my children to do it. ... I think there are easier things to do with life than take the exams. Tie up your life for four or five years." Tape

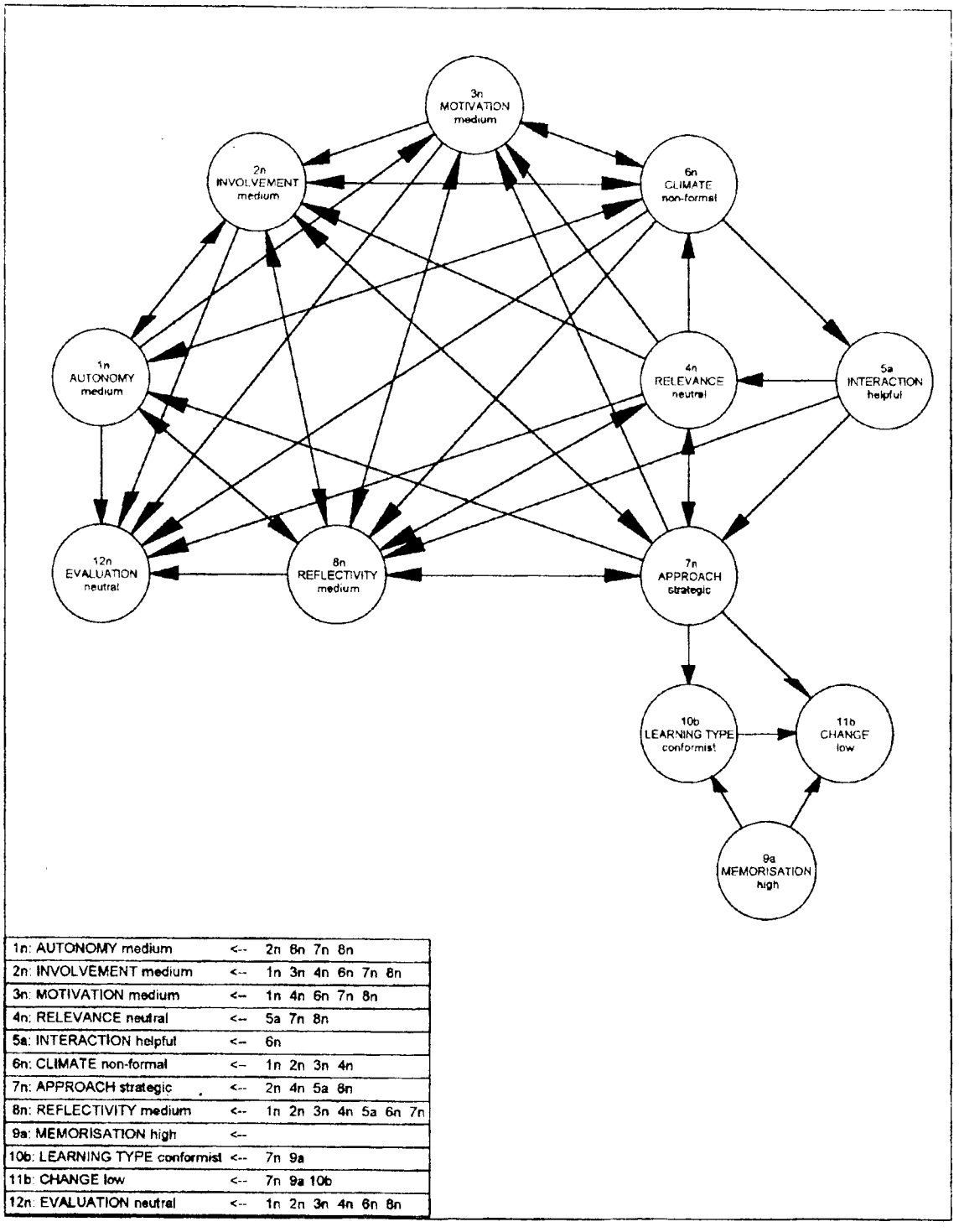
The conceptual model of this man's learning (figure 7.5) contains two linked clusters: the triangle containing the two outcomes of low change and conformist learning type, both supported by high memorisation; and a larger, more integrated cluster containing the other nine concepts. The strategic approach to learning is the bridge between the clusters. It is through this concept that the internal learning factors of moderate autonomy, moderate involvement, moderate motivation and moderate reflectivity, along with the external factors of neutral content relevance and helpful social interaction, are linked to the outcomes of low change and conformist learning. The adoption of a strategic approach prevented the learning from producing innovation and substantial change or personal growth.

Within the larger cluster, moderate reflectivity has an important position. As discussed on page 231, this was very much part of his strategic approach to learning and included responding to the cues derived from the helpful social interaction which was available from the non-formal learning climate. The attributes moderate autonomy, moderate involvement, moderate motivation and neutral content relevance each have a type III relationship with moderate reflectivity. That is, taken as pairs with reflectivity, these processes are mutually reinforcing. Similarly, Alan's moderate motivation and involvement have many type III relationships within the large cluster.

Alan's perception of a non-formal learning environment is also important, directly influencing six of the other attributes, and indirectly influencing the remainder, apart from high memorisation. Alan's moderate autonomy and ambivalence towards the material to be studied, hold similar positions within the conceptual model.

Within the large cluster, helpful social interaction is the most weakly supported attribute. Only the non-formal climate has a type II relationship towards it. However, this attribute directly supports three attributes and indirectly supports all remaining attributes except 9a, high memorisation. In particular, helpful social interaction enabled his successful execution

of a strategic approach to his studies, it encouraged a moderate level of reflectivity and a neutral view of the relevance of the course content.



1n: AUTONOMY medium	<--	2n 6n 7n 8n
2n: INVOLVEMENT medium	<--	1n 3n 4n 6n 7n 8n
3n: MOTIVATION medium	<--	1n 4n 6n 7n 8n
4n: RELEVANCE neutral	<--	5a 7n 8n
5a: INTERACTION helpful	<--	6n
6n: CLIMATE non-formal	<--	1n 2n 3n 4n
7n: APPROACH strategic	<--	2n 4n 5a 8n
8n: REFLECTIVITY medium	<--	1n 2n 3n 4n 5a 6n 7n
9a: MEMORISATION high	<--	
10b: LEARNING TYPE conformist	<--	7n 9a
11b: CHANGE low	<--	7n 9a 10b
12n: EVALUATION neutral	<--	1n 2n 3n 4n 6n 8n

Figure 7.5: Conceptual model for Alan

All the attributes within the larger cluster support the neutral overall evaluation. Moderate autonomy, moderate involvement, moderate motivation, neutral content relevance, the non-formal climate and moderate reflectivity do so directly, while helpful social interaction and the strategic approach to learning are linked to the neutral evaluation via several type IV and type V relations.

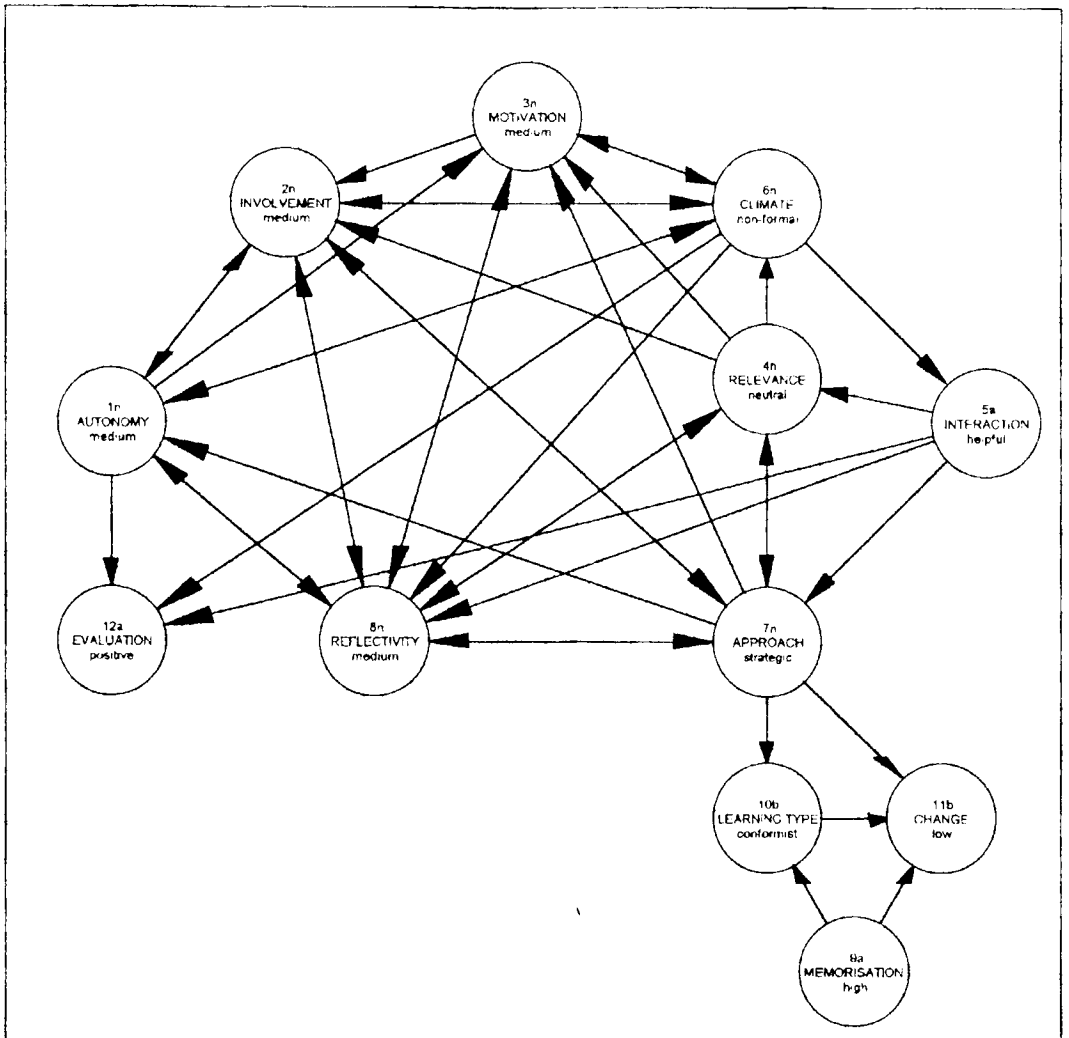
7.6.2 Alternative conceptual models for Alan

While illustrating how Dynamic Concept Analysis can improve the understanding of case studies, it is interesting to evaluate Alan's learning from other perspectives.

Considering only the objective measure of successfully completing the professional examinations within a reasonable time, one might substitute a positive evaluation, 12a, for Alan's neutral evaluation, 12n. Arguably, this could be the perspective of both the professional body and his employer. This substitution results in the conceptual model shown in figure 7.6.

The modified conceptual model is similar to figure 7.5, with moderate reflectivity and his strategic approach to learning still occupying critical positions. However, only three attributes now directly support the overall evaluation: that is, helpful social interaction (5a) within the non-formal climate (6n) and his moderate autonomy (1n). The other elements of the larger cluster only indirectly support a positive evaluation, via type IV relationships.

This learning experience cannot really be viewed as positive. Alan's strategic approach to the professional examinations was effective, but it caused him to separate the chore of qualifying from the real, rewarding activity of being an actuary. His learning was conformist and caused little change in his professional practice. For him, the best aspect of his learning experience was that it occurred in a supportive environment which supplied sufficient 'cues' for him to devise an effective strategic response. It worked. He qualified.



1n: AUTONOMY medium	<--	2n 6n 7n 8n
2n: INVOLVEMENT medium	<--	1n 3n 4n 6n 7n 8n
3n: MOTIVATION medium	<--	1n 4n 6n 7n 8n
4n: RELEVANCE neutral	<--	5a 7n 8n
5a: INTERACTION helpful	<--	6n
6n: CLIMATE non-formal	<--	1n 2n 3n 4n
7n: APPROACH strategic	<--	2n 4n 5a 8n
8n: REFLECTIVITY medium	<--	1n 2n 3n 4n 5a 6n 7n
9a: MEMORISATION high	<--	
10b: LEARNING TYPE conformist	<--	7n 9a
11b: CHANGE low	<--	7n 9a 10b
12a: EVALUATION positive	<--	1n 5a 8n

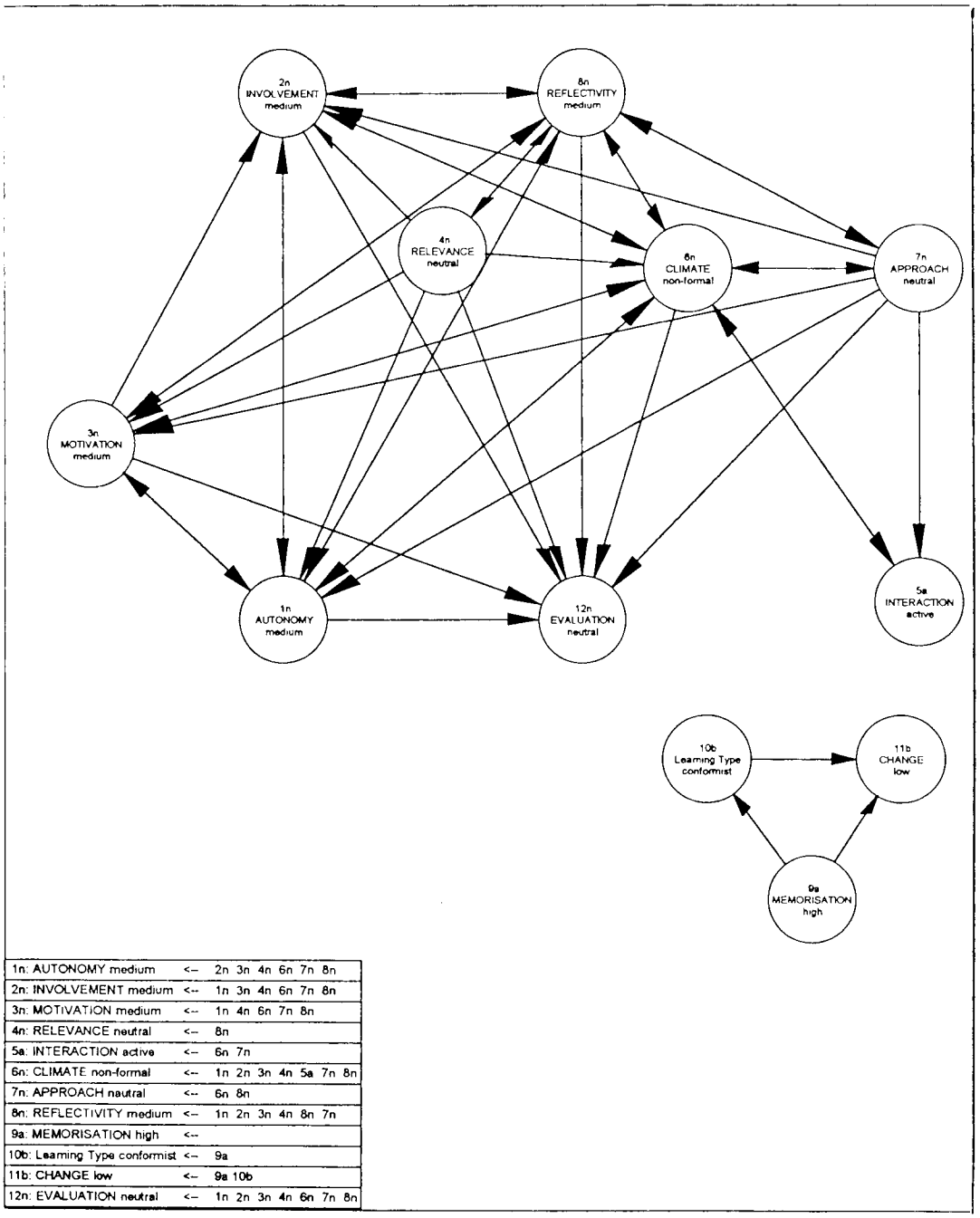
Figure 7.6: Simulated conceptual model for Alan, with positive evaluation (12a)

I will consider one further conceptual model for Alan: that resulting from Kontiainen's information matrix (section 7.3). This requires the selection of attributes for the two concepts whose definitions differ between Kontiainen's (1991) model and the model developed for this research study (section 7.5). Firstly, his social interaction was clearly

active in Kontiainen's terms, since he deliberately sought contact with those he knew had information that would help him. He is a 'cue-seeker' (Miller & Parlett, 1974). Secondly, I have ascribed the attribute 'neutral', for the concept 'approach to learning', since Alan perceived some aspects of the course requirements to have practical relevance and other aspects to be theoretical. This is not wholly satisfactory because of the problems with the neutral position, 7n, which were discussed on page 219. An alternative could have been to eliminate this concept from the resultant conceptual model (figure 7.7, page 238). This can be imagined by covering the circle labelled 'approach' and ignoring the links radiating from it. Such action leaves the attribute 5a, active social interaction, more isolated. It is linked to the main cluster only through its type III relationship with the non-formal climate.

This model is broken. The conformist learning outcome and low level of change, supported by a high level of memorisation, which were previously linked to the main cluster through his strategic approach to learning, are now separate. Within the main cluster, the non-formal climate holds a critical position, being directly linked with all the other elements. The internal processes of moderate autonomy, moderate involvement and moderate motivation are closely interrelated and each is supported by the perception of neutral content relevance. This illustrates that Alan's internal learning processes were harmonious and effective. The overall neutral evaluation is supported by each of these elements, in addition to the external factors of a non-formal learning climate and a neutral approach to learning.

This conceptual model places very little emphasis on his active social interaction and yet, this was the key to Alan's success. Responding to the hints of more senior colleagues, allowed him to navigate the professional examinations with relatively little wasted time or energy. Because this model undervalues the role of social interaction for Alan, it is less illuminating than the first one I presented (figure 7.5, page 234). It has lower explanatory power because the conformist learning outcome and low level of change are not linked to the majority of concepts, although they are a consequence of the way he approached his studies.



1n: AUTONOMY medium	<--	2n 3n 4n 6n 7n 8n
2n: INVOLVEMENT medium	<--	1n 3n 4n 6n 7n 8n
3n: MOTIVATION medium	<--	1n 4n 6n 7n 8n
4n: RELEVANCE neutral	<--	8n
5a: INTERACTION active	<--	6n 7n
6n: CLIMATE non-formal	<--	1n 2n 3n 4n 5a 7n 8n
7n: APPROACH nautral	<--	6n 8n
8n: REFLECTIVITY medium	<--	1n 2n 3n 4n 8n 7n
9a: MEMORISATION high	<--	
10b: Learning Type conformist	<--	9a
11b: CHANGE low	<--	9a 10b
12n: EVALUATION neutral	<--	1n 2n 3n 4n 6n 7n 8n

Figure 7.7: Conceptual model for Alan from Kontiainen's (1991) model

7.7 Summary

In this chapter the history and rationale of Dynamic Concept Analysis were explained. It is a powerful and flexible technique, which aims to produce a holistic and dynamic view of a complex phenomenon. The structure DCA provides helps to reduce subjectivity in description and analysis, also synthesising pertinent knowledge from theoretical and empirical sources. DCA simplifies consideration of multifaceted issues, which may otherwise prove intractable.

In section 7.3 Kontiainen's (1991) model of adult learning was introduced and discussed. I identified problems within two of his concept definitions: 'social interaction' and 'approach to learning'. In section 7.4 I briefly discussed the construction of an empirical information matrix for adult learning (Kontiainen & Manninen, 1995) which utilised a methodology developed by Manninen (1993). The empirical matrix added weight to my concerns about the definition of the concept 'approach to learning'.

Section 7.5 described the iterative modification of Kontiainen's adult learning model to improve its explanatory power in the context of this research study. Most significantly, the concepts 'approach to learning' and 'social interaction' were redefined. Drawing on the work of Marton's and Entwistle's teams, 'approach to learning' became three one-attribute concepts: 'deep approach', 'strategic approach' and 'surface approach'. The attributes associated with 'social interaction' were changed from Kontiainen's active-medium-passive, to the more satisfactory continuum of helpful-medium-unhelpful, judged from the perspective of the learner. A number of minor modifications were also made (section 7.5.3).

Finally, a demonstration case study was presented to explicitly illustrate the application of Dynamic Concept Analysis to a student's experience of learning for actuarial examinations. My modified information matrix (figure 7.4, page 227) was employed for this. The bases for assigning attributes were discussed, as was the resultant conceptual model. Two further conceptual models were presented: figure 7.6 (page 236) a simulated model of Alan's learning in which the attribute associated with the concept 'evaluation' had been changed; and figure 7.7 (page 238) which employed Kontiainen's (1991) information matrix. Figure

7.4 was shown to be the superior model for describing and analysing Alan's learning in the context of actuarial examinations.

Chapter 8: Case Studies using Dynamic Concept Analysis

8.1 Introduction

A series of case studies, utilising Dynamic Concept Analysis, will be presented in this chapter. They describe the learning of six actuarial students, selected to illustrate three different types of outcome, and different types of experience within each outcome. The outcomes are categorised: 'passing quickly', 'learning to pass' and 'not learning to pass'. The experiences of these actuarial students contain many of the elements discussed thematically in Part II.

Each of the actuarial students in this chapter had excellent school and university records. They all studied actuarial science at City University, three at undergraduate level and three as postgraduates. Each 'started' the professional examinations with at least five exemptions and in this respect they differ from Alan in the previous chapter. Despite strong similarities in their educational experiences before actuarial examinations, their experiences of the remaining professional examinations were very different.

These case studies have benefitted from the application of Dynamic Concept Analysis in several ways. Firstly, the same key components of learning have been considered in each case. The common structure aids the comparison of different cases and circumstances. It also makes the descriptions of the cases less eclectic and less subjective. Further, for three cases multiple models have been constructed. This was to depict change over time (Dave, page 251; Emma, page 258), or to explore coexisting scenarios (Colin, page 246).

8.2 Passing quickly

The contrasting learning experiences of two men who, unusually, qualified as actuaries without failing an examination will be presented. Both are now very happy to be on the far side of the barrier of actuarial examinations. For each, qualification as an actuary has been

the route to a challenging and rewarding career. However, they feel differently about the price they had to pay to negotiate this barrier successfully.

8.2.1 Ben: 'I made it, but it really hurt'

The data drawn on here comprise: his questionnaire response to the cross-sectional survey; field notes of a presentation he made to potential actuarial students in which he described the profession and the qualification process; and field notes of two other meetings at which he discussed actuarial education and qualification.

Ben is a British man. He qualified quickly, initially working for a large life office then transferring into general insurance. He is still an actuary, working for an insurance company within the general insurance part of the business. Following an upper second class degree in mathematics from a 'red brick' university, which entitled him to one exemption, he secured sponsorship for a postgraduate course in actuarial science. He gained maximum exemptions from the Diploma course and then completed the remaining four professional examinations in two years. Thus, he became a member of the elite group who have completed the actuarial examinations without having to resit any subjects. As a record of achievement this is untainted success, but the experience was certainly not unmitigated joy. His studying was effective, but he felt that he had to pay a very high personal price for success. The overall neutral evaluation (12n) is a compromise between these two aspects of his learning experience.

The unique feature of this case is the degree to which Ben was determined to take a deep approach to learning (7a). It was essential for him to restructure the material until it had personal meaning. He repeatedly talked of *"hooks"* and *"hooking things on"* to existing knowledge and conceptual frameworks. Interestingly, he never mentioned linking his studies to his office work. He seemed to form the course content into a whole that was coherent to him and allowed him to satisfy the examiners of his grasp of the relevant issues. Simultaneously, he was learning how to practise as an actuary within his company, swiftly becoming a valued and respected employee. He did not claim that his studies and office work were irrelevant to each other, but the absence of 'hooks' linking these was unexpected from a man who devoted so much energy to integration. It seems that the learning experience caused little change in the development of his professional practice (11b) and

despite successfully striving to 'hook' things together, he did not appear to have achieved substantially new insights (hence 10n). At best, he could be regarded as ambivalent about the relevance of the course content (4n).

Ben was highly motivated to qualify as an actuary (3a) and talked of finding the:

> *"... resilience and determination to pay the price necessary."* Obs

These qualities were found from three sources: his strong desire to have an actuarial career; his religious faith; and support from friends, most of whom were not members of the profession but were linked with the practice of his faith. For example, he vividly described walking the streets around his home throughout a cold, dark, January evening, asking himself:

> *"Why am I doing this? Do I really want to do this? Do I really want to be an actuary?"* Obs

Since the answer to the third question was unequivocally, yes, he returned home to continue studying and praying.

He did not find the profession's tuition system to be supportive, talking of the *"tyranny"* of test deadlines that interfered with *"really learning"* the subjects. Ben's response was to ignore the pacing of study implied by the structure of the courses and the in-house assistance. He chose to have very little social interaction (5b) within the learning climate, which he perceived as formal (6b). However, reflecting after qualification, he regrets that he did not:

> *"... talk to people more and look at books less."* Obs

Nevertheless, the ability to choose to disregard much of the institutional provision and to study in a way that worked for him, is indicative of Ben's position as a highly autonomous learner (1a). His active involvement (2a), high level of reflectivity (8a) and low emphasis on memorisation (9b) are a natural consequence of him exercising his autonomy by learning in the way he wanted to at that time.

Ben talked of the strain of balancing the demands of work and study and stressed the importance he attached to his exemptions:

> *"Essential. I doubt very much if I would have continued with my studies when I discovered the pressure of evening study on top of a full time job. 'Starting' with*

few exams left made me far more positive than if I had to start work facing 10 exams." Q'naire

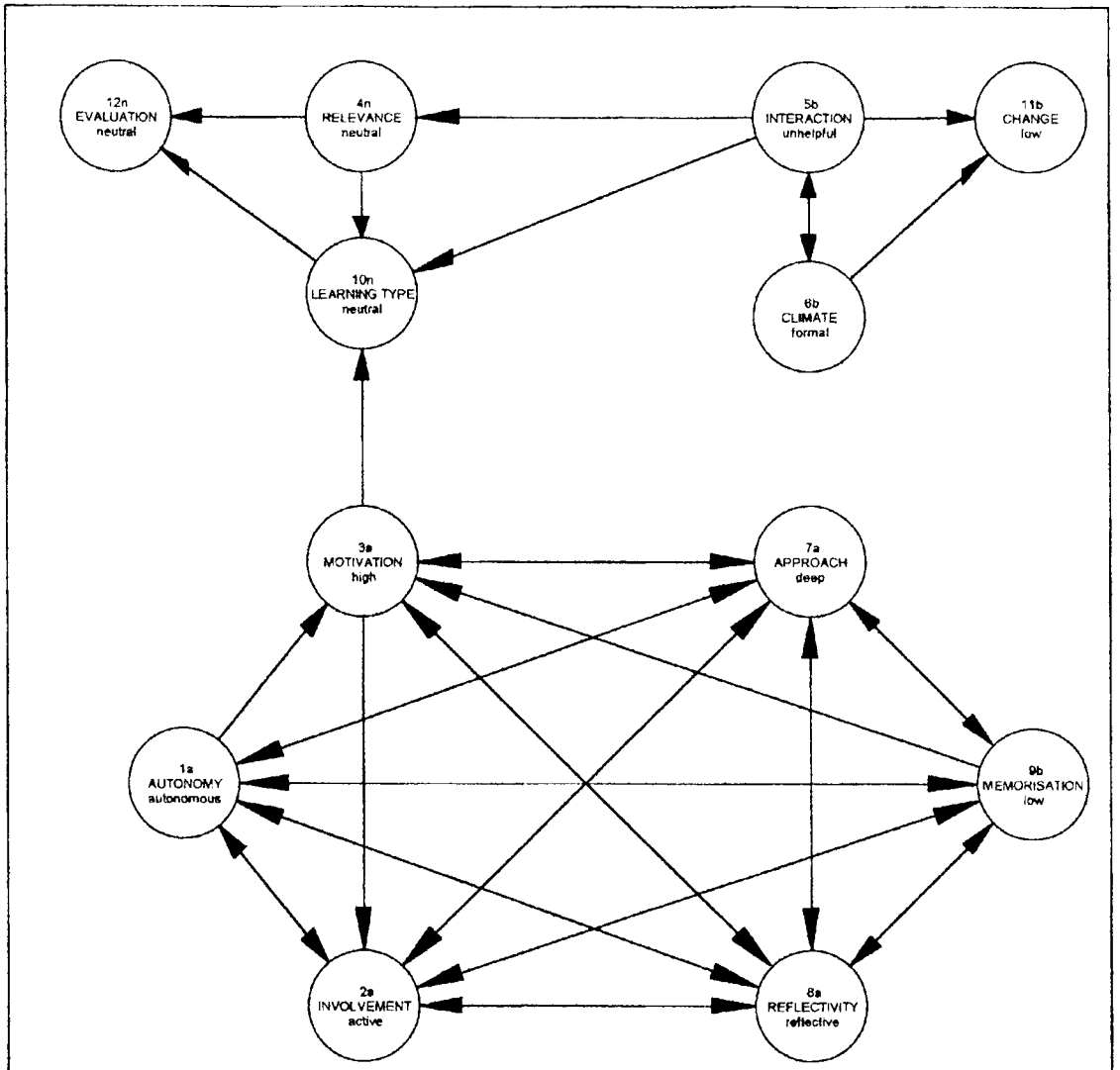
He talked of *"easing the pain"* by seeking out ways to introduce variety in his studying and by giving himself morale boosting treats. This prevented the actuarial examinations from becoming *"all consuming"*, which he saw as the situation for some of his peers. The pain killing strategies included rewarding himself with rests, taking a week's leave in January or February to devote full-time to study, and background reading from the financial press *"in order to bring some of the textbook issues to life"*.

The conceptual model of Ben's learning experience (Figure 8.1, page 245), contains three loosely connected clusters in which personal and institutional factors are largely separated. He cut himself off from the unhelpful institutional social interaction, which is closely linked to his perception of a formal learning climate. He chose to be very much alone while addressing the task of making sense of the subject matter, largely confining social interaction to a different sphere of his life. This may have been the only way in which he could adopt his strongly preferred deep approach to learning within the formal climate. The distancing of himself from the formal system is illustrated in the conceptual model by the absence of links between the triangle containing unhelpful social interaction, formal climate and low change, and the large integrated cluster of internal learning processes.

The lower cluster of six closely interrelated attributes are the internal processes involved in Ben's learning. His deep approach and high level of reflectivity have the greatest effect, each supporting and being supported by every other element in the cluster (i.e. they have five type III relationships). It is only through his high motivation to succeed that these harmonious internal processes are linked to the upper left triangle that contains two outcomes from the learning experience: the neutral type of learning and the neutral evaluation. These are both directly supported by the institutional factor of neutral content relevance.

Thus, the conceptual model shows a paradox: the highly effective, integrated internal learning Ben achieved was only possible because he distanced himself from institutional influences. The single bridge between Ben's internal learning processes and external features of his learning is his indefatigable will to succeed in order to reach the rewards beyond the

barrier of qualification. He succeeded and has derived considerable pleasure and fulfilment from that, but several years on, he has not forgotten that getting there hurt him.



1a: AUTONOMY autonomous	<--	2a 7a 8a 9b
2a: INVOLVEMENT active	<--	1a 3a 7a 8a 9b
3a: MOTIVATION high	<--	1a 7a 8a 9b
4n: RELEVANCE neutral	<--	5b
5b: INTERACTION unhelpful	<--	6b
6b: CLIMATE formal	<--	5b
7a: APPROACH deep	<--	1a 2a 3a 8a 9b
8a: REFLECTIVITY reflective	<--	1a 2a 3a 7a 9b
9b: MEMORISATION low	<--	1a 2a 7a 8a
10n: LEARNING TYPE neutral	<--	3a 4n 5b
11b: CHANGE low	<--	5b 6b
12n: EVALUATION neutral	<--	4n 10n

Figure 8.1: Conceptual model of Ben's learning

8.2.2 Colin: 'I just did what I had to do'

The data drawn on here comprise: his questionnaire response to the cross-sectional survey; a tape recorded interview lasting 45 minutes; and field notes made after a lengthy conversation with him.

Colin is a British man who, like Ben, qualified without failing a paper. After completing his 'Oxbridge' mathematics degree he took a Diploma in Actuarial Science, securing the then maximum five exemptions. While working for the life office that sponsored him during his Diploma course, he passed the remaining five actuarial examinations in two years. He is still working within life insurance.

This man wanted, above all else, to qualify as an actuary. Therefore, the professional examinations had to be conquered, however uninspiring their nature.

> *"Viewing the exams as an academic exercise would prevent you from doing what is necessary, viewing them as a hurdle makes you willing to do anything - willing to perjure your mind."* Tape

The perjury to him was the *"come down"* from the mathematics of his final undergraduate year; *"all pretty way-out, hi-tech stuff"*; to the necessity of memorising a large amount of information for later reproduction. He had enjoyed the challenge of his degree and did not view it as having been hard work. However, he repeatedly stressed the amount of hard work necessary to pass the actuarial examinations.

> *"It doesn't matter how good you are at grasping difficult concepts, that's not a lot of good for the actuarial exams if you are not going to put the work in. There is nothing inherently difficult in the exams, nothing where you need to have a particularly high powered undergraduate brain, there is just a lot of leg work, a lot of hard grind and learning."* Tape

He was highly motivated (3a) and adopted a strategic approach to learning (7n) which involved a high level of memorisation (9a).

Like many other actuarial students (section 5.3), Colin had expected office work to be more mathematical. Indeed, he had rejected accountancy as a career, feeling that would not be sufficiently mathematical to satisfy him. Although he expressed some disappointment at not being able to do more statistical analysis, he was pragmatic in asserting that his company did

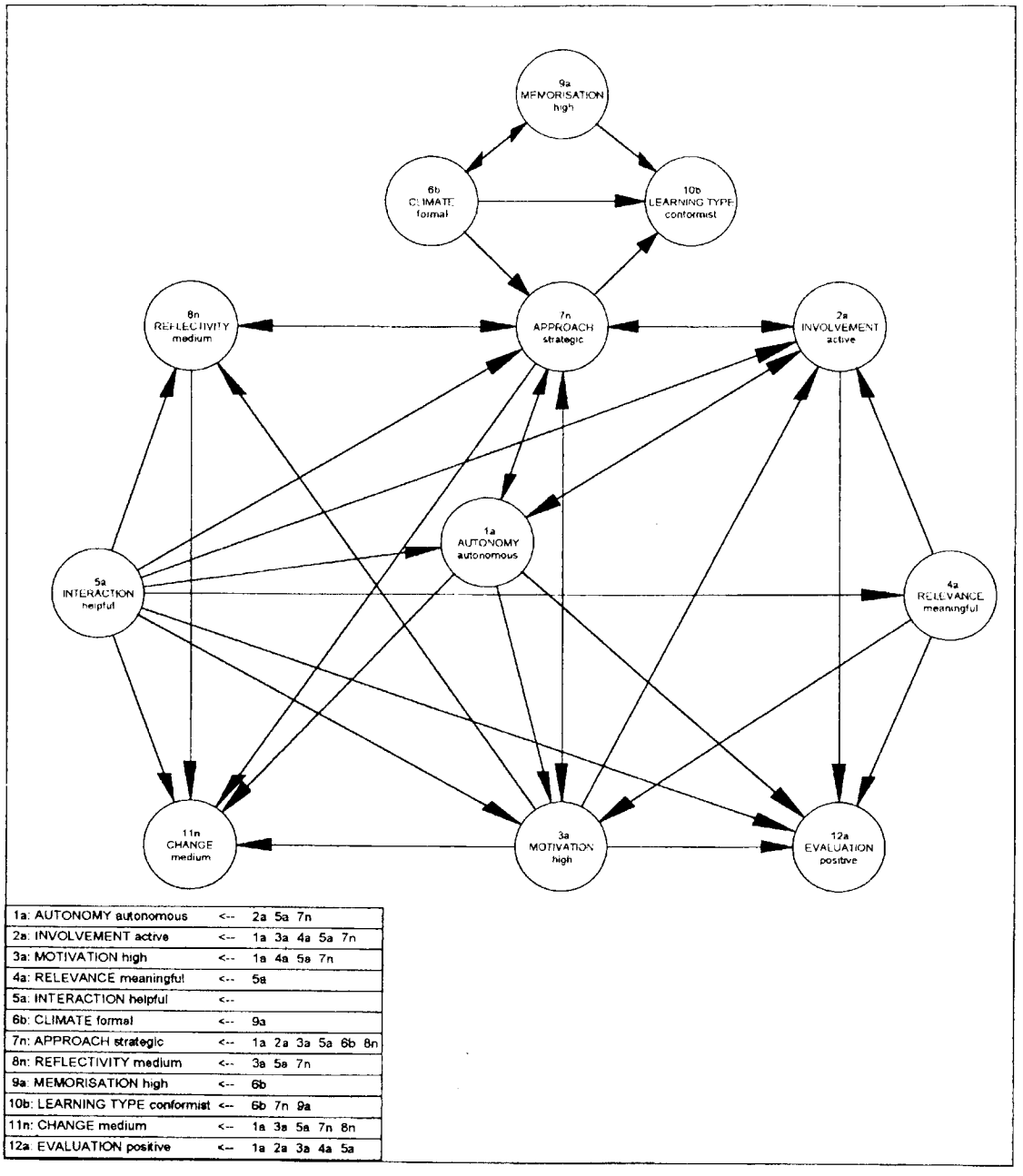
not need such analyses and that the available data were not sufficiently reliable to warrant them. Colin had quickly realised that his company did not want *"anorak mathematicians"* with social skills commensurate with train spotting. The company wanted to take his mathematical skills for granted, as a baseline. He would be valued for problem solving, lateral thinking and his ability to become involved in management. He responded willingly and successfully to this unexpected challenge.

Colin is highly autonomous (1a). Although he was reacting to the formal learning climate (6b) by concentrating on the reproduction of knowledge (9a), and reacting to employer demands by significantly shifting his outlook on professional practice, he felt he had the freedom to choose to do those things. He felt in control, and this helped him to view the whole learning experience positively (12a). The importance of his autonomy can be seen in the conceptual model of his learning, (figure 8.2, page 248), where it supports the outcomes of moderate change and positive evaluation, along with the internal processes of active involvement in the learning, high motivation and the adoption of a strategic approach.

Colin's preparation for the professional examinations was entirely strategic. Making use of some helpful social interaction (5a) with company tutors, who were often current or past examiners, he elected to reduce the course material to lists of points. This involved a moderate amount of reflection (8n) since the lists were very much his own, because he felt that *"you have to have a basic understanding to be able to reproduce the lists."* This basic understanding was an overview derived from skimming the whole course before concentrating on the details of his lists. Colin was actively involved in the learning process (2a), completing many past papers to check that he could produce *"lists for all different circumstances"*, although he also indulged in question spotting. He scoured the examiner's reports to check his understanding of what was required, and devised mnemonics to aid reproduction of his lists.

Colin perceived that he was required to state **all** possibly relevant points, not just the most important ones, with virtually no need to expand on the importance of individual points. Although this was 'intellectual perjury' he could see a link to professional practice. He feels that in actuarial practice it is important to think of **all** the problems in a given situation, not

not just a few obvious ones. The actuarial examinations were relevant (4a) in the sense that they rewarded the exhaustive enumeration of relevant issues (see section 5.4.2).



1a: AUTONOMY autonomous	<--	2a 5a 7n
2a: INVOLVEMENT active	<--	1a 3a 4a 5a 7n
3a: MOTIVATION high	<--	1a 4a 5a 7n
4a: RELEVANCE meaningful	<--	5a
5a: INTERACTION helpful	<--	
6b: CLIMATE formal	<--	9a
7n: APPROACH strategic	<--	1a 2a 3a 5a 6b 8n
8n: REFLECTIVITY medium	<--	3a 5a 7n
9a: MEMORISATION high	<--	6b
10b: LEARNING TYPE conformist	<--	6b 7n 9a
11n: CHANGE medium	<--	1a 3a 5a 7n 8n
12a: EVALUATION positive	<--	1a 2a 3a 4a 5a

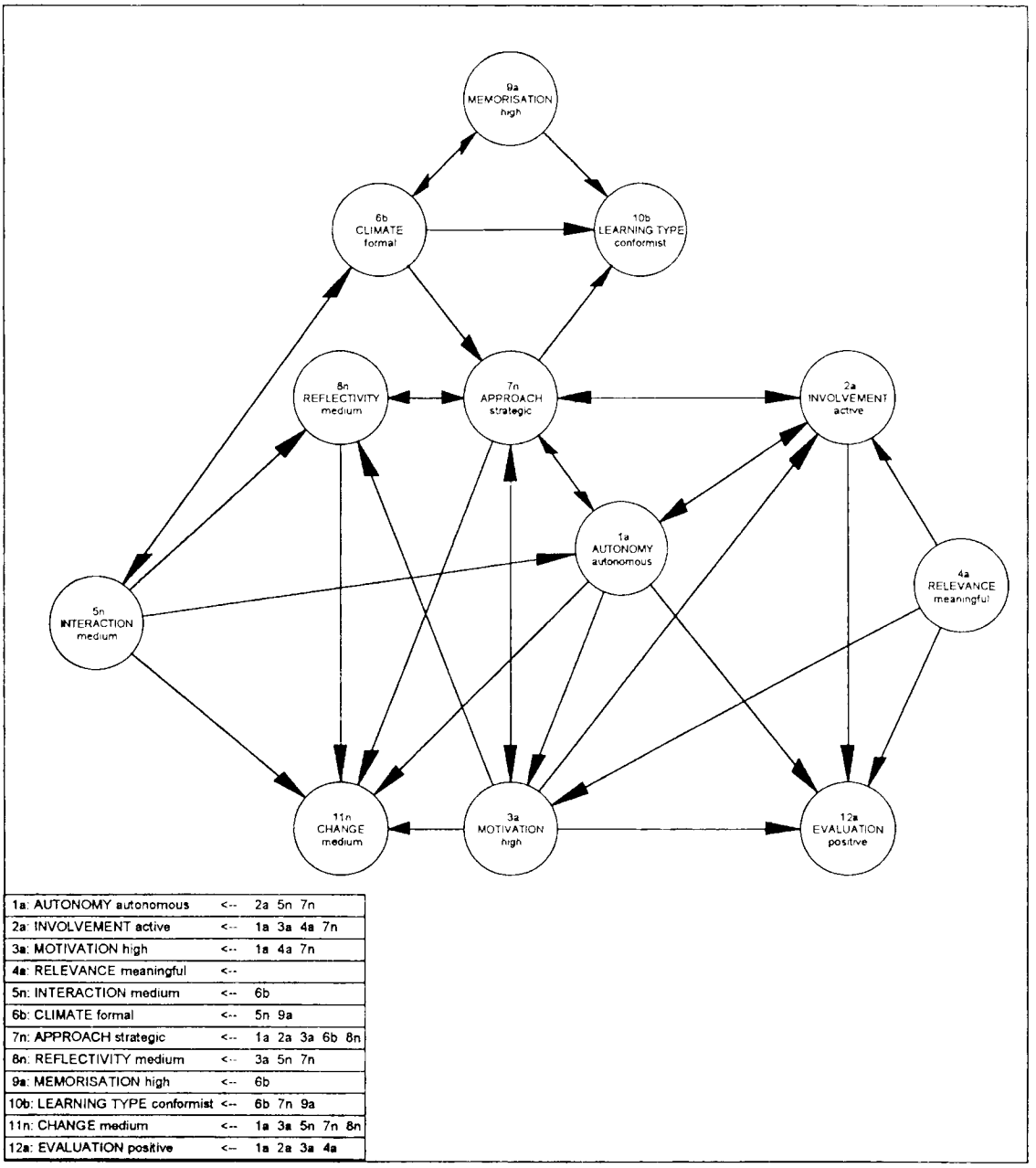
Figure 8.2: Conceptual model of Colin's learning

The conceptual model of Colin's learning (figure 8.2) is fairly well integrated. Both his high motivation and strategic approach, hold critical positions. The type III link between them

indicates that these aspects of his learning were mutually reinforcing. The strategic approach has three other type III relations; with the internal processes of autonomy, involvement and reflectivity. It is the element that links to the other learning processes, his high memorisation within the formal climate which resulted in a conformist learning outcome.

The conceptual model perhaps overplays the importance of social interaction. Because of his exceptional autonomy, Colin did not desire very much social interaction. However, he saw the benefit of interaction with knowledgable insiders, such as tutors, and strategically used the advice that they gave. Thus, the relatively low level of interaction in which he engaged was helpful to him. One suspects that even with less helpful social interaction, this man would have worked out how to surmount the hurdle of actuarial examinations, and would have done so with proficiency. Figure 8.3, overleaf, is an attempt to simulate this.

In figure 8.3 helpful interaction has been reduced to moderate interaction and the diagram is relatively unchanged. His autonomy is still important. His strategic approach and high motivation are still crucial and well supported. The moderate change is still supported in the same way. The positive evaluation remains reasonably well supported, although the perception of a formal climate is strengthened, which would perhaps cause him to feel that the hurdle was a little higher.



1a: AUTONOMY autonomous	<--	2a 5n 7n
2a: INVOLVEMENT active	<--	1a 3a 4a 7n
3a: MOTIVATION high	<--	1a 4a 7n
4a: RELEVANCE meaningful	<--	
5n: INTERACTION medium	<--	6b
6b: CLIMATE formal	<--	5n 9a
7n: APPROACH strategic	<--	1a 2a 3a 6b 8n
8n: REFLECTIVITY medium	<--	3a 5n 7n
9a: MEMORISATION high	<--	6b
10b: LEARNING TYPE conformist	<--	6b 7n 9a
11n: CHANGE medium	<--	1a 3a 5n 7n 8n
12a: EVALUATION positive	<--	1a 2a 3a 4a

Figure 8.3: A simulated model for Colin, reducing the level of social interaction

8.3 Learning to pass

The two case studies in this section describe the experiences of people who qualified in five years, having begun the professional examinations with the maximum six exemptions. This may be regarded as a somewhat slow journey from their head start to the finishing post. During their first year of study, neither knew how to pass actuarial examinations. Later, they learnt how: in Dave's case suddenly, but damaged confidence prevented really rapid

progress thereafter; in Emma's case gradually, without any personal distress. For both people social interaction was very influential.

8.3.1 Dave: A dramatic breakthrough

The data drawn on here are: his questionnaire response to the cross-sectional survey and a tape recorded interview lasting 50 minutes.

Dave grew up in the Caribbean. He was sponsored by his government to read for an undergraduate degree in Actuarial Science, securing a first and maximum professional exemptions. He started work with an international firm of actuarial consultants in London. After two years he moved to another large consultancy in London, where he qualified. In addition to being a Fellow of the Institute of Actuaries, he is an Associate of the Society of Actuaries (USA), having passed some of their examinations. He now works in his home country.

The two conceptual models, figures 8.4 and 8.5 (pages 252 and 255), represent Dave's learning before and after a short series of critical incidents. With an impeccable academic record up to graduation he did not expect completing the actuarial examinations to be very difficult. However his style of studying and approaching examinations, which he felt to be a continuation of his undergraduate habits, simply did not work when he became an actuarial student. At his first sitting he failed two examinations and felt humiliated. Figure 8.4 illustrates his description of his learning at this stage.

Completely demoralised with respect to qualifying in the UK, and considering moving to stockbroking, Dave prepared for, sat and passed an examination set by the Society of Actuaries. This had a multiple-choice format and was thus, completely different from the British examinations. His success rekindled his desire to succeed with the Institute of Actuaries, but he decided to concentrate on one subject at a time. He said this was a response to the devastating blow dealt to his confidence by failing his first two examinations.[61]

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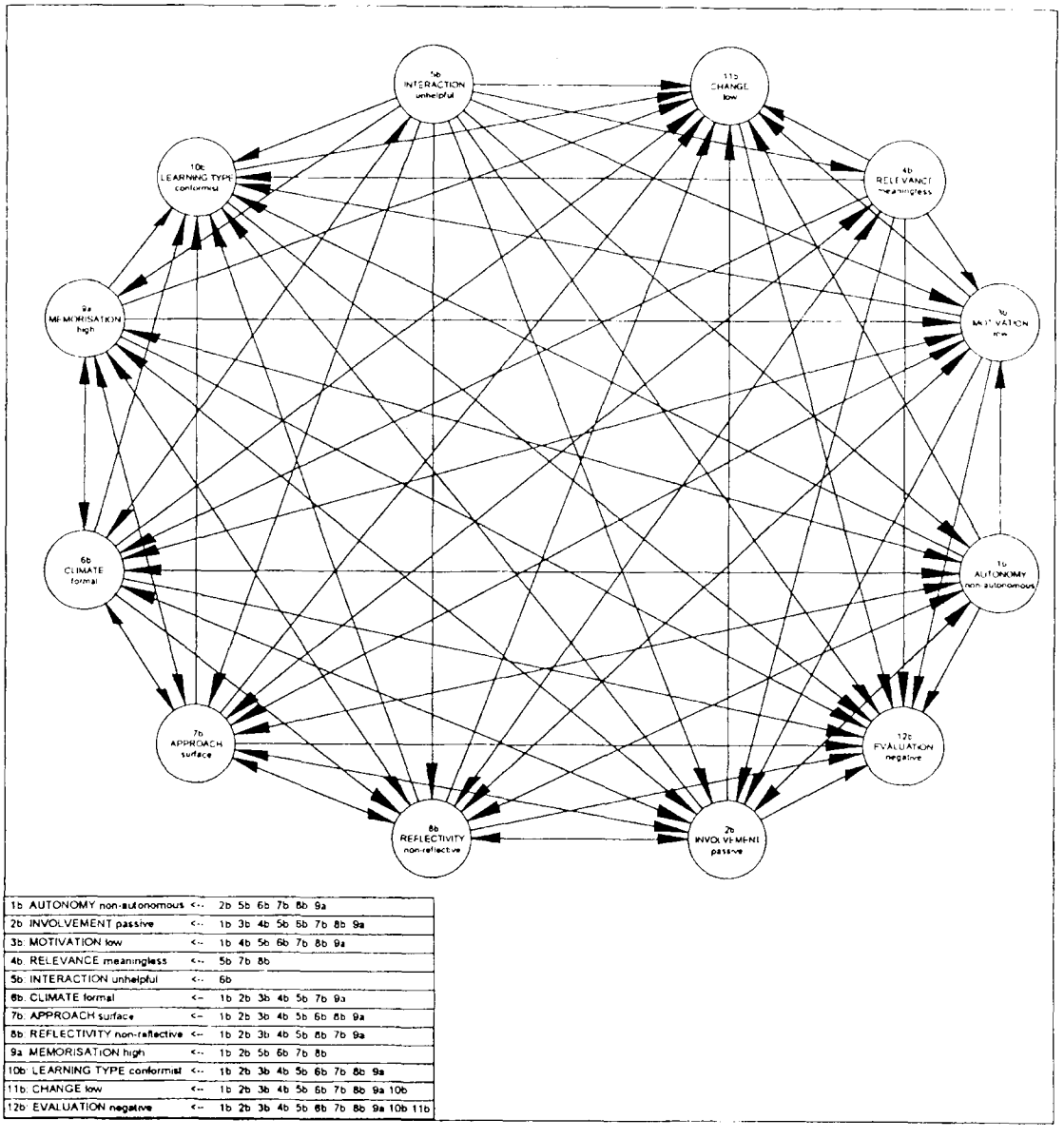
[61] Since qualifying he has regretted that he did not have the confidence to make a serious attempt at the norm of two subjects per year. The source of regret is twofold: he (continued...)



1b AUTONOMY non-autonomous	<--	2b 5b 6b 7b 8b 9a
2b INVOLVEMENT passive	<--	1b 3b 4b 5b 6b 7b 8b 9a
3b MOTIVATION low	<--	1b 4b 5b 6b 7b 8b 9a
4b RELEVANCE meaningless	<--	5b 7b 8b
5b INTERACTION unhelpful	<--	6b
6b CLIMATE formal	<--	1b 2b 3b 4b 5b 7b 9a
7b APPROACH surface	<--	1b 2b 3b 4b 5b 6b 8b 9a
8b REFLECTIVITY non-reflective	<--	1b 2b 3b 4b 5b 6b 7b 9a
9a MEMORISATION high	<--	1b 2b 5b 6b 7b 8b
10b LEARNING TYPE conformist	<--	1b 2b 3b 4b 5b 6b 7b 8b 9a
11b CHANGE low	<--	1b 2b 3b 4b 5b 6b 7b 8b 9a 10b
12b EVALUATION negative	<--	1b 2b 3b 4b 5b 6b 7b 8b 9a 10b 11b

Figure 8.4: Conceptual model for Dave's unsuccessful, early learning

Perhaps the different approach forced upon him by the American examination format made him receptive to the idea of changing his approach to the Institute of Actuaries examinations. In any case, shortly after passing the Society examination, he received sage advice on the Institute's examinations from a qualified actuary. This was very much taken

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(...continued)
believes that he could have been successful and therefore, dispensed with the burden of study earlier; and he has become aware that qualifying quickly, is now viewed favourably by employers, therefore, that would have been advantageous for later career development.

to heart and he revolutionised his approach to both study and answering examination questions. His changed approach coincided with (and may have been assisted by) the introduction of a new syllabus. After this point, as he desired, he passed one subject each spring, thus qualifying in a total of five years. Figure 8.5 (page 255) illustrates his later, successful mode of studying.

The conceptual model of Dave's first year of actuarial study, Figure 8.4 (page 252), is certainly well integrated; a thoroughly disastrous learning experience. Every other attribute in the model supports the negative evaluation. How could this happen to a man with a previously unblemished examination record? To some degree, precisely because of his long history of success. He thought he knew how to study. He thought he knew how to study actuarial science. He thought he knew how to sit examinations. He misjudged the actuarial examinations. Why?

Dave found it unexpectedly difficult to make the transition from full-time undergraduate to part-time distance learner. He found the relative isolation very frustrating because he is an avid cue seeker, but the institutional education provision simply did not supply enough cues. Although he felt that his confidence evaporated after failing his first two subjects, there is evidence that it was lacking before then. From the first days he was aware of the actuarial folklore that making points was all important in Institute examinations. However he did not feel sufficiently confident to do this until his second year, after he *"got some boot-legged information about marking of scripts."* It was seeing mark schemes, illicit but official feedback, that convinced him of what he had to do. He could not risk responding to less formal feedback.

During his first year Dave found the social interaction to be unhelpful (5b), and this influenced (had a type II relationship to) every other attribute in the model. Dave worked in a very competitive environment. He mused on the fact that older actuaries reminisced about their student days in which the first half an hour at the office was spent discussing what they had studied during the previous evening. This was unthinkable in his office peer group:

> *"... no-one says what they are doing at home, or what problems they have."* Tape

He felt that the learning climate was very formal (6b). Without consciously deciding so, it happened that he did not keep in contact with any members of his undergraduate peer group and thereby lost social interaction that would probably have been supportive.

As an undergraduate, Dave had not been a particularly reflective or independent learner. There were plenty of lectures that structured and paced the course contents. There was ample opportunity to discuss work with staff. There were plenty of cues. For an able student like himself, there was plenty of time to do what was required and to relax. As an actuarial student he continued to be unreflective (8b) and was only passively involved with his courses (2b). He thought that:

> *"You can't find out from the reading material what is important. You need to speak to someone."* Tape

However, he found the available social interaction to be unhelpful. Finding out what was important was made more difficult by the irrelevant content (4b) of outdated text books, and the large quantity of material to be covered. He adopted a surface approach to learning (7b), including attempting to memorise a large quantity of information (9a) and making very few notes. Not surprisingly, his motivation declined (3b) and he only studied for about ten hours a week. This was inadequate.

On reflection, Dave also felt that his early, mundane work experience contributed to his poor motivation.

> *"I think that to go home and study, if my brain has been dead all day, it's difficult for it to kick start at eight o'clock. If I have had a rewarding day in the office, I find I study that much better because my mind is whirring."* Tape

After he changed company he studied for longer hours and only experienced one further failure. However, this may have been a reflection of his growing confidence. By the time he changed jobs he had acted upon advice about how to tackle the examinations, he had discovered how to access the cues and social interaction that he needed, and he had secured his first Institute of Actuaries examination pass.

Initially (figure 8.4) Dave was not seeking insight, only hoping to be able to reproduce the course content. Therefore the learning that he achieved was conformist (10b) and resulted in little personal change (11b). Unable to adopt a strategic approach to learning, he could

not bring the task under control, and he felt that he had no autonomy (1b). He was a very unhappy and frustrated learner.

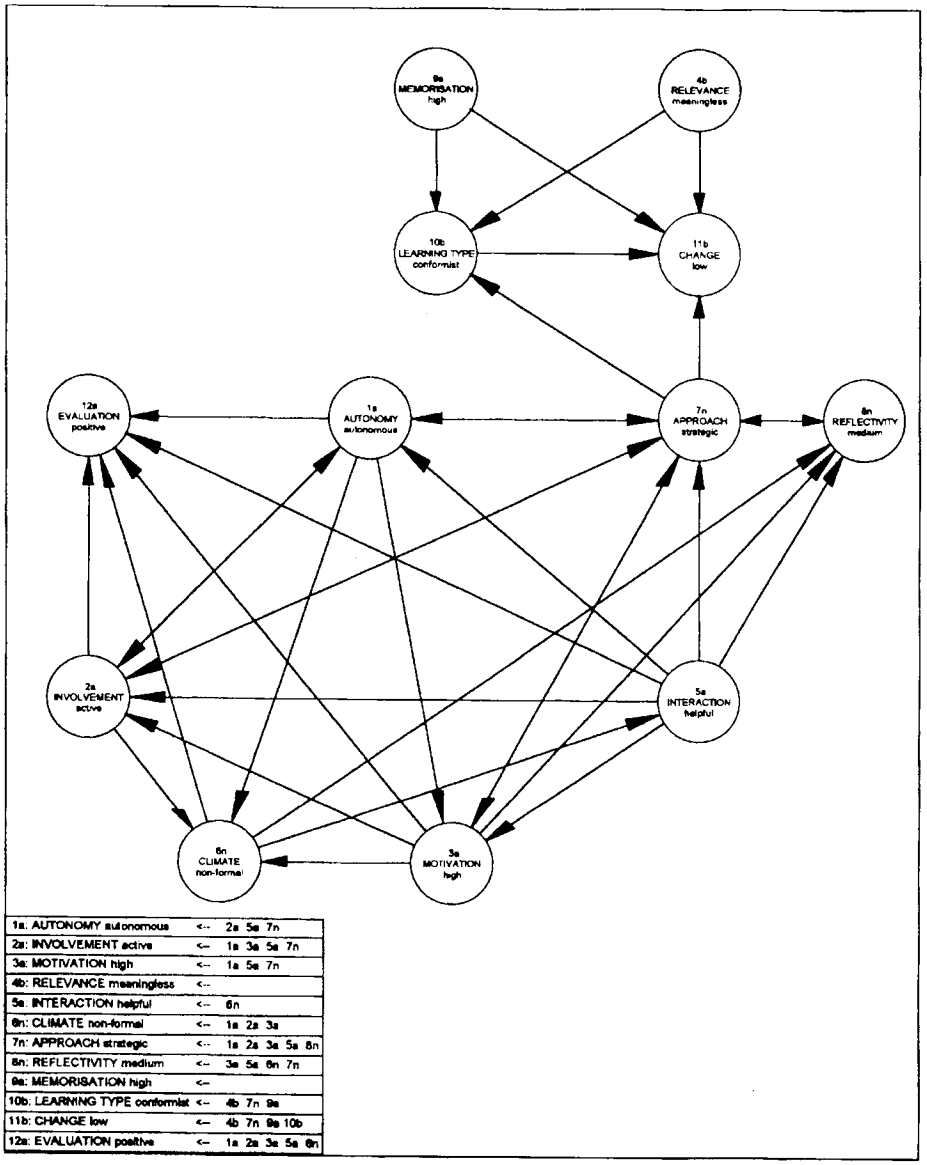


Figure 8.5: Conceptual model for Dave's later, successful learning

Figure 8.5, representing Dave's later, successful period of study is very different from his first conceptual model. The change was very dramatic, with the breakthrough occurring through harnessing the power of social interaction (5a). He sought out face-to-face tuition by enroling on one of the profession's tutorial courses, which he described as *"excellent"*. He learnt that his qualified colleagues had more time to help him if he approached them early

in the study year. The beneficial side-effect of this was that he covered more work early in the year and thus, had more time for consolidation and reflection.

Dave began to see the course content as cumulative knowledge, creating a need to ensure that he understood early sections before he felt that tackling later sections was profitable:

> *"... so I kept bugging people throughout the course."* Tape

Some senior colleagues made the assessment criteria explicit, so he became confident about the rules of the game he was playing. The learning climate had become less formal to him (6n). At this time, a chance encounter influenced him enormously:

> *"Well one thing really changed, this actuary told me that for every exam he sat he finished 45 minutes before the end. I aimed to do that and I did it. You really don't need to write three hours away at all. Two, two and a quarter and I was finished every one. I think it is just a matter of organising your mind and organising your points. Just really planning out, and for every page that you read knowing exactly what points are relevant because there is a load of rubbish on the page as well. Once you focus on that, that is really focusing your mind on what is important."* Tape

The helpful social interaction that Dave experienced, enabled him to adopt an appropriate strategic approach (7n), as he had always wanted. The interaction supported his becoming moderately reflective (8n): reflective about what within the material was important, and reflective about his examination technique. He became actively involved in his learning (2a) and his motivation increased dramatically (3a). Because he was actively sorting the important from the less relevant he wanted to make extensive notes. This activity kept him alert and helped him to achieve an understanding of the main points. In his final year he studied for about 30 hours each week.

Dave felt that he had regained control over his learning (1a) and he began to view the whole process quite positively (12a). At one level he was happy that he had found a successful strategic approach to the actuarial examinations, which is encapsulated in the large cluster of eight attributes within figure 8.5 (page 255). However, there were nagging doubts associated with the outcomes of low change and conformist learning (11b, 10b). These attributes were both supported by his strategic approach (7n), involving a high level of

memorisation (9a), and his continuing perception of meaningless course content (4b). He described his final approach to the actuarial examinations as *"a bit unprofessional,"* the paradox of which bothered him:

> *"... these are supposed to be professional exams."* Tape

He felt strongly that examinations leading to professional recognition should be more professionally run and should reward professional expertise. He gave an example:

> *"You could understand your subject so well and you could know that there are five main issues. If you were the actuary of this company, writing a report, you would stress five main issues. I'd go on and discuss 20 issues, some of which are not important. You say silly things. You just do it."* Tape

He felt that those marking the scripts were unlikely to be able to recognise (and therefore reward) specialist knowledge that he might include in his answers. Thus, presenting specialist knowledge could be a waste of precious examination time. Dave knew that some course material was *"wrong"*. He felt that marks were available for pointing out the errors and providing a fully justified correct answer. However, he believed that the same number of marks was available for restating the incorrect course content, so he did not waste time displaying his expert knowledge. In these circumstances, it was difficult for him to see the professional examinations as anything other than a barrier of dubious validity between him and the *"respect"* accorded to qualified actuaries.

Nevertheless, he saw no difficulty in behaving somewhat unprofessionally in order to pass. Passing was all that mattered:

> *"Oh no, I've never sought to change the actuarial education system, only to find out how to win by playing by their rules!"* Tape

I used this quotation in a working paper (Bloomfield, 1994, p18) adding the aside: 'An unrepentant and masterful cue seeker!' The aside generated comment from an actuary who felt I might be criticising him. She stressed what a good actuary he would be because:

> *"You have to find out what the client really wants."* f 603 Obs

She regards 'playing the game' which pleases one's client or employer, as an essential professional skill.

Dave stressed that he was *"not too critical"* of the actuarial examinations because it is difficult for a small profession to resource the amount of examining required. Additionally, he felt that examination passes do testify to the abilities of extracting the important issues from a very large amount of information, and seeing the implications for practical problems. These skills are needed in the workplace and therefore, examination passes *"give employers confidence."*

8.3.2 Emma: A gradual process

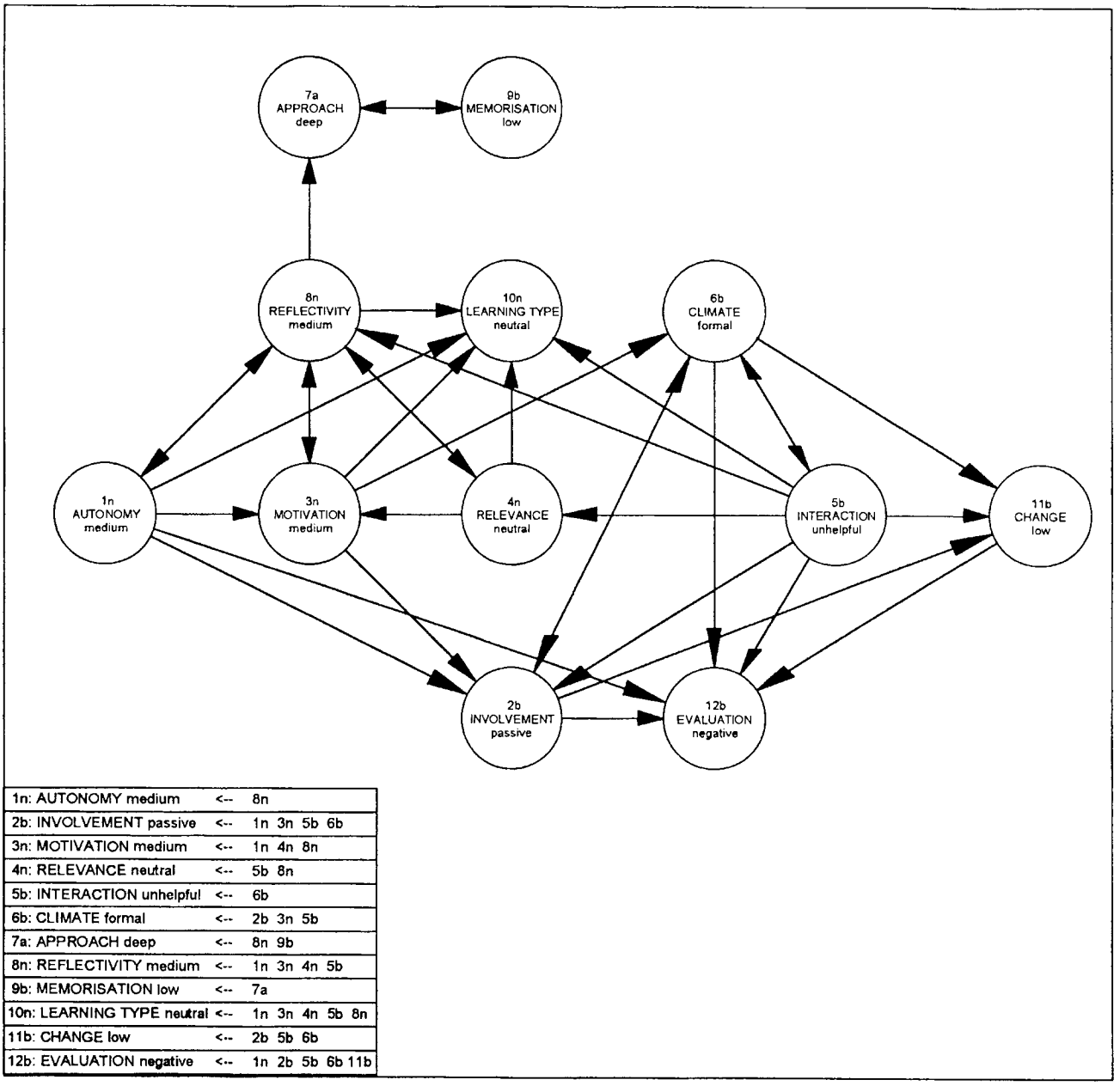
The data drawn on here comprise: her questionnaire response to the cross-sectional survey, and a tape recorded interview lasting 75 minutes.

Emma is a British woman. She completed an undergraduate degree in actuarial science with the maximum six exemptions. She commenced work with a large firm of consulting actuaries, specialising in pensions. After two years she had not passed any of the three subjects that she had tried. She resolved to *"give it a go"* during her third year by taking them all again, with the intention of withdrawing if she did not pass. She passed two and thought: *"Oh dear, I'd better carry on now."* She then took a short period of maternity leave and decided not to return to her original employer, who would not permit her to work part-time. She found part-time employment with another large consultancy, continuing to work in pensions. Emma found the new work environment very supportive. Having recently returned to work, she took just one subject which she passed. She qualified the next spring, in a total of five years. Emma still works for the company with whom she qualified.

The conceptual model in figure 8.6 illustrates Emma's learning during her first year as an actuarial student. She was trying to adopt a deep approach (7a) in that primarily, she was seeking *"understanding"*. She felt that at school and as an undergraduate, she had understood the material and therefore had not had to *"learn"* (i.e. memorise) very much. Her thorough understanding of the subject matter had made examinations straight forward.

However, she found it difficult to achieve understanding for the actuarial examinations. At first, her style of studying was rather inefficient:

> *"Trying to read the course and understand it. I thought I did that better by copying out. Pages and pages of pure copying out."* Tape



1n: AUTONOMY medium	<--	8n
2b: INVOLVEMENT passive	<--	1n 3n 5b 6b
3n: MOTIVATION medium	<--	1n 4n 8n
4n: RELEVANCE neutral	<--	5b 8n
5b: INTERACTION unhelpful	<--	6b
6b: CLIMATE formal	<--	2b 3n 5b
7a: APPROACH deep	<--	8n 9b
8n: REFLECTIVITY medium	<--	1n 3n 4n 5b
9b: MEMORISATION low	<--	7a
10n: LEARNING TYPE neutral	<--	1n 3n 4n 5b 8n
11b: CHANGE low	<--	2b 5b 6b
12b: EVALUATION negative	<--	1n 2b 5b 6b 11b

Figure 8.6: Conceptual model for Emma's early, unsuccessful learning

The copying was intended to focus her attention, permitting a moderate level of reflection (8n). She was not concentrating on remembering the material (9b). Emma did not feel able to respond to advice that this was a waste of time, and that she should make notes.

"I found that unless you'd done it at least once, you didn't know what you were trying to angle on to make notes." Tape

She made notes when she retook subjects.

Besides reading and copying, Emma completed the correspondence course tests at the prescribed intervals. She did this for two reasons: she felt she was expected to; and she wanted her work evaluated by someone, preferably an expert. She did not want to evaluate her own work and tackled few other problems beside those due for marking.

"I was always very unwilling to do questions ... I didn't feel they helped me. 'Cos you do a question and OK, if there was a point you couldn't resolve and you looked it up that would help. But unless it was marked it wasn't worth much. You put down what you knew, it was either wrong or right." Tape

However, she did not find the feedback from her marked tests useful because of the time delay. It was too late, she was *"onto the next thing"* and not due to return to the earlier work until her revision period.

Emma was not happy as a distance learner. In particular, she found the social interaction that she encountered to be unhelpful (5b). She wanted to learn as part of a group; discussing and questioning. As an undergraduate she had become accustomed to attaining understanding through these group processes, and as an actuarial student she yearned for *"the immediateness of a tutorial"*. She wanted to be part of a tutorial group in order to benefit from the other learners, rather than to receive individual, specifically requested help. That is, she wanted regular helpful social interaction that was formally arranged. Emma was aware that it was her company's policy that senior colleagues should be available to help students. Very occasionally she made use of them, but she did not like asking for help. Thus, regular meetings would have been much easier for Emma than the requirement that she should request assistance when necessary. It is a pity that she suffered from this reluctance, because her company employed many past and current examiners, including some senior ones.

Finding the available social interaction unhelpful had a detrimental effect on Emma's learning. This attribute is directly or indirectly associated with every other attribute in the model (figure 8.6), which indicates its critical role. Her perceptions of a formal learning

climate and unhelpful social interaction (6b & 5b) were mutually reinforcing, and both supported; passive involvement (2b), a low level of change (11b) and her negative evaluation (12b). Emma was moderately autonomous and well motivated (1n & 3n), working reasonably hard in a style that seemed appropriate to her at the time. She was seeking understanding (7a), placing little emphasis on the reproduction of content (9b). She did not succeed in making the subject matter meaningful, but had not yet come to view it as meaningless, hence (4n). The learning that she achieved was neither truly conformist nor really innovative (10n). Her moderate reflectivity (8n) was important, being linked (directly or indirectly) to every other attribute in the model.

After qualification Emma felt that in the early days her perception of what was required was in error.

> *"I'd done them too generally. ... At first I thought they* [the examiners] *would read it through and judge a mark. Towards the end I was thinking that perhaps they didn't read through it as such, they've got their marking schedules and they go through and look particularly for the points. It isn't given an overall view."*
>
> Tape

It is possible that at the beginning, Emma did not want to do what was required. She was working for a large employer with an above average pass rate. There were many other actuarial students around her; a potential learning group. However, the office atmosphere was competitive, reducing the probability of cooperative learning. Nevertheless, Emma had better access than most, to the advice of those who were insiders with respect to the examination system. Indeed, she was given some advice about what was required but did not feel able to respond to it.

After her make or break third year and the birth of her daughter, Emma viewed the actuarial examinations differently.

> *"You come to think that the point of doing these exams, particularly those not related to the subject you are in, is to get through because you are in this job. If you are going to get through by putting down the points, that's what you go for. It's like a driving test, you learn to drive for the test, you then develop your particular style afterwards."*
>
> Tape

The conceptual model in figure 8.7 (page 263) illustrates her learning during her final year of actuarial examinations. At this stage she was working part-time for a different consultancy, where she found the atmosphere much more supportive and encouraging.

In the second conceptual model the changed attributes are: 4n→4b, 5b→5n, 7a→7n, 8n→8b, 9b→9a 10n→10b and 12b→12n. She had come to see the content as meaningless (4b), *"a pure academic exercise"*. Therefore, it was not worth reflecting upon (8b). It just had to be learnt. In her final year she sought out a group learning situation by enroling on a tutorial course (5n). The style of this course and its associated reading matter, was the provision of lists to be learnt. These were learnt and, she claims, forgotten immediately after the examination (9a). Her learning, such as it was, was meant to be nothing other than conformist (7n, 10b). She passed. She achieved her objective and was happy about that. She reached the end of a period of study that she had never enjoyed, and was happy about that. She was not particularly perturbed by what she had to do to qualify (12n):

> *"It didn't particularly annoy me that they* [the examiners] *were not judging*[62]*. It may have done if I'd gone on and on, thinking I was putting down a load of relevant points, but I managed to get through."* Tape

Emma is sanguine by nature. She giggled as she told me: *"I don't enjoy studying, so it was a real pain."* A few minutes later she cheerfully and confidently asserted: *"If I went back now I wouldn't change what I did."* After few moments checking through the decisions she made, she smiled and confirmed *"No. Nothing."* For her, the process of learning to pass the professional examinations had been slow but steady, a matter of gradually *"homing in"* on what was required. The examinations had never completely dominated her life, and that is exactly how she wanted it.

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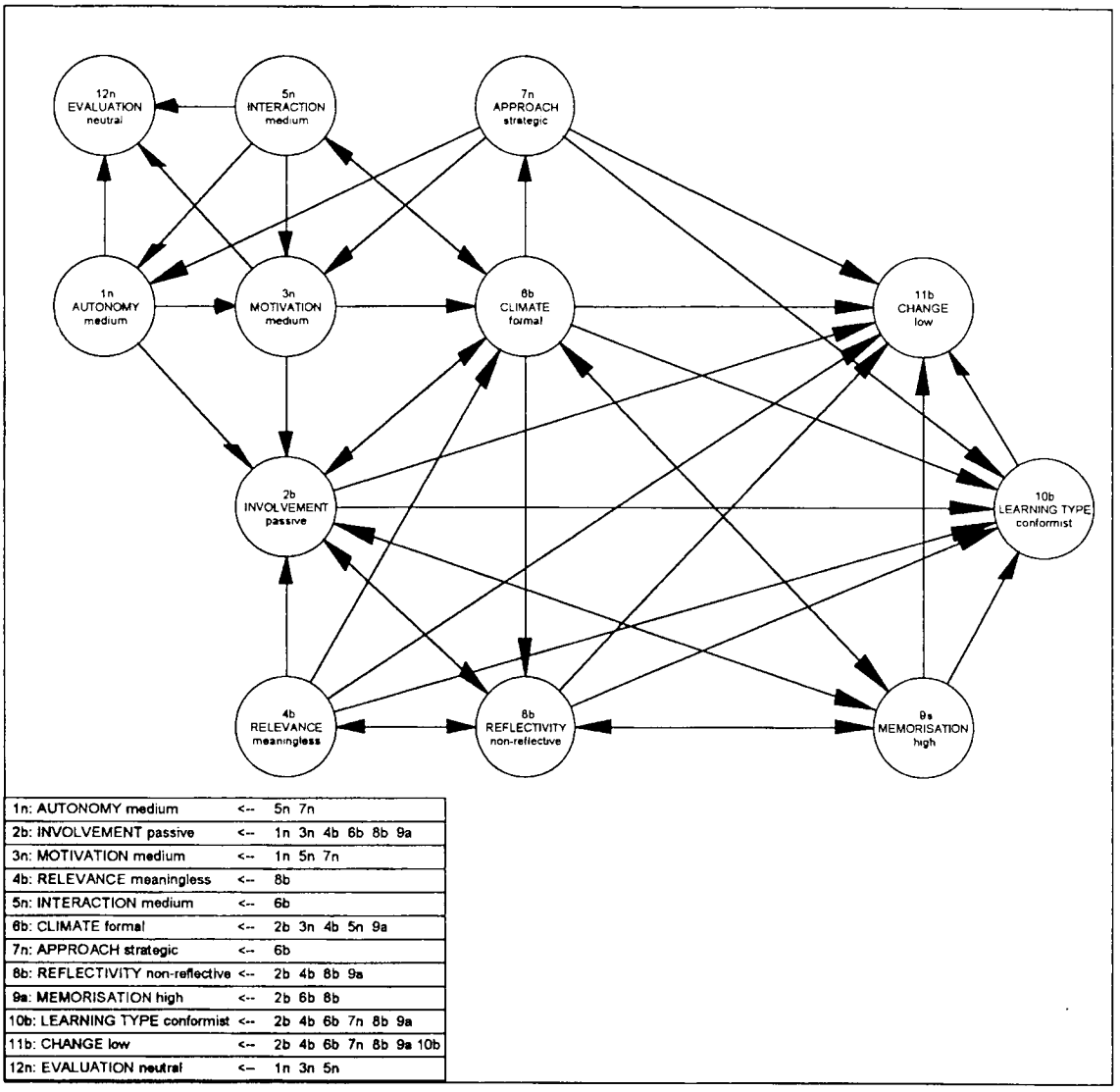
[62] But rather checking off points.



1n: AUTONOMY medium	<--	5n 7n
2b: INVOLVEMENT passive	<--	1n 3n 4b 6b 8b 9a
3n: MOTIVATION medium	<--	1n 5n 7n
4b: RELEVANCE meaningless	<--	8b
5n: INTERACTION medium	<--	6b
6b: CLIMATE formal	<--	2b 3n 4b 5n 9a
7n: APPROACH strategic	<--	6b
8b: REFLECTIVITY non-reflective	<--	2b 4b 8b 9a
9a: MEMORISATION high	<--	2b 6b 8b
10b: LEARNING TYPE conformist	<--	2b 4b 6b 7n 8b 9a
11b: CHANGE low	<--	2b 4b 6b 7n 8b 9a 10b
12n: EVALUATION neutral	<--	1n 3n 5n

Figure 8.7 Conceptual model for Emma's later, successful learning

8.4 Not learning to pass

The two case studies that follow describe the experiences of two men who have been unable to learn how to pass the actuarial examinations. Neither really understands why they have not been successful, although both have theories to account for their difficulties. Frank remains a student member of the Institute of Actuaries, although his job is now sufficiently responsible and demanding to leave little time for studying. Geoff has withdrawn from the profession, although he continues to work for the same insurance company in a role that was

previously occupied by an actuary. He is an example of what some members of the profession refer to as 'an unqualified success'.

8.4.1 Frank: *"I couldn't stop now"*

The data drawn on here comprise: his questionnaire response to the cross-sectional survey and a tape recorded interview lasting 50 minutes.

Frank is a British man. His degree in mathematics and statistics from a provincial, turn of the century university, entitled him to one exemption from the professional examinations. An insurance company sponsored him through a postgraduate actuarial science course, from which he obtained five exemptions. He returned to the insurance company, for whom he still works, and began studying for the final four examinations. After four years of taking actuarial examinations he had notched up eight FAs and, to his relief, his first pass. He has now been a student member of the Institute of actuaries for ten years.

Frank began confidently, largely because he had never failed an examination before:

> *"I think I just thought a course is a course, so if I do the work I'll pass it. Even when you see these ridiculously high failure rates you think, well it won't happen to me. They are not doing any work, obviously; or they are stupid."* Tape

Although he began his first year course promptly, submitted tests on time and attended tutorials, he did not settle into a regular study routine. On reflection, he felt that he had not devoted enough time to study. He had been *"very keen to make an impression"* in the office and so had worked overtime. The temptation to do this was greater because he was the only actuarial trainee in his first department. For the other young graduates, *"the job was all they were doing"*. Through keeping up with his colleagues in the office Frank did not leave enough time for study. He met other actuarial trainees at tutorials, but it happened that everyone else in the group had three or four years work experience. He felt: *"a bit out of my depth"*, although he clung to his notion of *"a course is a course"*, thus reasoning that he could still pass. However, after sitting the papers he expected to fail.

Cured of over-confidence and undue dedication in the office, Frank began his second year with a more formal study timetable. He continued to make his own notes from the reading, being moderately reflective about what he read. He did tests more carefully and paid more

attention to the feedback he received. He felt well supported by his company tutors and the tutors from the two tuition providers whose courses he took. Throughout the year he annotated his notes as he learnt things from doing questions. He revised from his notes. Frank failed again. He felt that he understood the material, but when it came to the examination: *"I didn't really do myself justice"*.

Now feeling under pressure, particularly because six of his cohort from the Diploma course had qualified, he took three subjects in his third year *"to catch up"*. By this stage he was convinced that he understood all the material to be examined, but at revision time found the volume too great.

> *"You end up knowing the subject and not knowing enough points to get down in the six hours, which is infuriating."* Tape

Frank decided that the problem lay with his examination technique and not with his understanding or knowledge. He felt that time was tight so he needed to plan his answers more effectively, listing things in order of importance. In addition:

> *"You don't realise that at university, as long as you knew the course you were bound to get down in your answer what was needed. Whereas when I started doing these sort of questions I found that it is possible to write an answer which you think is fine and in fact it is not. You pick up no marks because it's not exactly what is required. You are wasting your time."* Tape

He lost any sense of autonomy, feeling that henceforth he had to do what was required and first, he had to find out what that was.

> *"I do feel that you've just got to say: right OK, I'll sacrifice a few principles, I'll just play the game. ... They're holding all the cards, it's a question of playing it their way really. I've just got to adjust."* Tape

His sense of having no real control was heightened by his belief that there was a 'fixed' pass rate of between 40% and 45% of candidates.[63]

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[63] In fact, in these three years the pass rates for the subjects he was sitting varied between 36% and 49%.

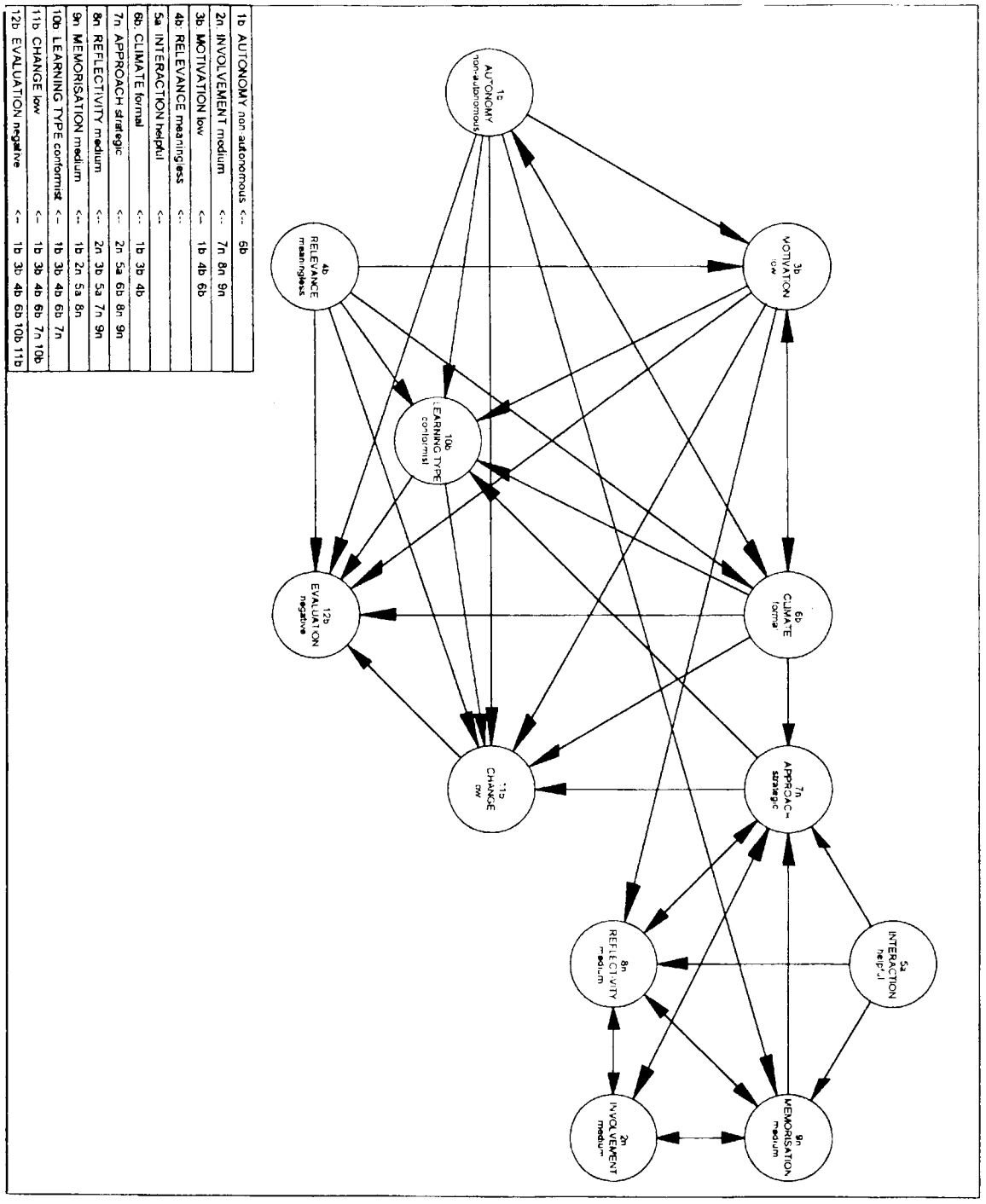


Figure 8.8: Conceptual model for Frank's learning

Frank had a strong sense of office work being separate from the knowledge that it was necessary to display in the examinations. This placed a premium on swift qualification, since knowing too much about the actual work would reduce the probability of passing an examination. Referring to longer-standing partly qualified people, he said:

"Their knowledge of their company and what they do overtakes their bookwork knowledge. It becomes very difficult for them to differentiate between the two when they are answering questions. ... It helps if you can box away separately all the bookwork stuff, so that you are drawing on that when you are answering questions. ... There is no substitute for getting that core answer down." Tape

During his fourth year Frank took three subjects, despite finding that too many during the previous year. He also moved location, remaining with the same employer but switching from life insurance to general insurance. He concentrated on his examination technique and, feeling that he had got as much as he could from the texts by now, mainly did past examination questions. He cross-checked his answers with examiners' reports and tuition course model solutions. He passed one subject, but not the one that he felt he knew best. However, he felt he had the technique *"cracked"* now. He would take two of the remaining exams during his fifth year and qualify the following year. Unfortunately, he has secured no further passes.

By the beginning of his fifth year Frank was finding it *"less and less pleasant to have to study."* With his office responsibilities increasing, he was working longer hours. He had no ambition to be a specialist actuary after qualification:

"I'm just interested in having the actuarial knowledge which can then be of value in other areas of the business." Tape

He thought that an actuarial qualification was an excellent preparation for insurance management because: *"you are capable of talking to anybody in the company about what they do."* It seemed to me that by this stage he possessed that kind of actuarial knowledge, so I enquired whether it was still important for him to qualify.

"Imperative now. I couldn't quit. I couldn't be beaten by a set of exams." Tape

Figure 8.8, the conceptual model of Frank's learning after two years of actuarial exams, shows his style of moderate involvement (2n) with moderate levels of reflectivity and memorisation (8n & 9n), supported by helpful social interaction (5a). These all support the strategic approach that he was trying to take (7n). The need to adopt a strategic approach came from his lack of autonomy within the formal learning climate (1b & 6b). The actual job has always been more important to him than studying for the qualification, particularly

since he is unable to view the examinations as relevant to, or integrated with office work (4b). Therefore, despite not being able to bring himself to withdraw, his level of motivation to prepare for the examinations is relatively low (3b). All of the internal and institutional factors within the model support the three outcomes: conformist learning (10b), low change (11b) and negative evaluation (12b).

Frank has become very frustrated with his lack of progress through the actuarial examinations. He repeatedly talked of things being: *"annoying"*, *"very annoying"*, *"infuriating"*.

> *"I don't find the content of the courses difficult to understand. I think if you understand something, you ought to be able to pass an exam in it. I don't think the system is working properly if you understand something but you are not passing."*
>
> Tape

8.4.2 Geoff: *"I just ran out of inspiration"*

The data drawn on here comprise: his questionnaire response to the cross-sectional survey and a tape recorded interview lasting 55 minutes.

Geoff is a British man. He secured a first in actuarial science and six exemptions. He had three job offers: two with large consultancies and one in a life office. He chose the latter because he felt he would get better support with the actuarial examinations. He intended to switch to consultancy after qualification. Having never failed an examination before, he was confident that provided he worked diligently, he would qualify. Geoff stopped taking actuarial examinations after five years without securing a pass. His employer encouraged him to continue with the professional examinations and *"bent over backwards"* to help him. He was clearly a valued employee. He remains with the same employer in a *"niche"* which could be filled by an actuary.

The conceptual model representing Geoff's learning (figure 8.9, page 270) shows three relatively isolated attributes. He was highly motivated (3a), studying for more than 20 hours a week in accordance with a schedule that he set himself. This study was reasonably active, since it mainly comprised doing questions (2a). He worked hard at the correspondence course tests and took note of the feedback from them, although he did not find this very

illuminating. He attended tutorials and tried to contribute to the discussion. He sought help from others when he felt he needed it. However, Geoff was ambivalent about the relevance of his studies (4n). The effort Geoff applied to his studies (3a & 2a) supports attribute 9n, moderate memorisation. He did not feel he needed to memorise a great deal because he understood the material and had practised many questions. These four attributes do not support the other attributes in the model. He was trying as hard as he could, but he was not learning how to pass the actuarial examinations.

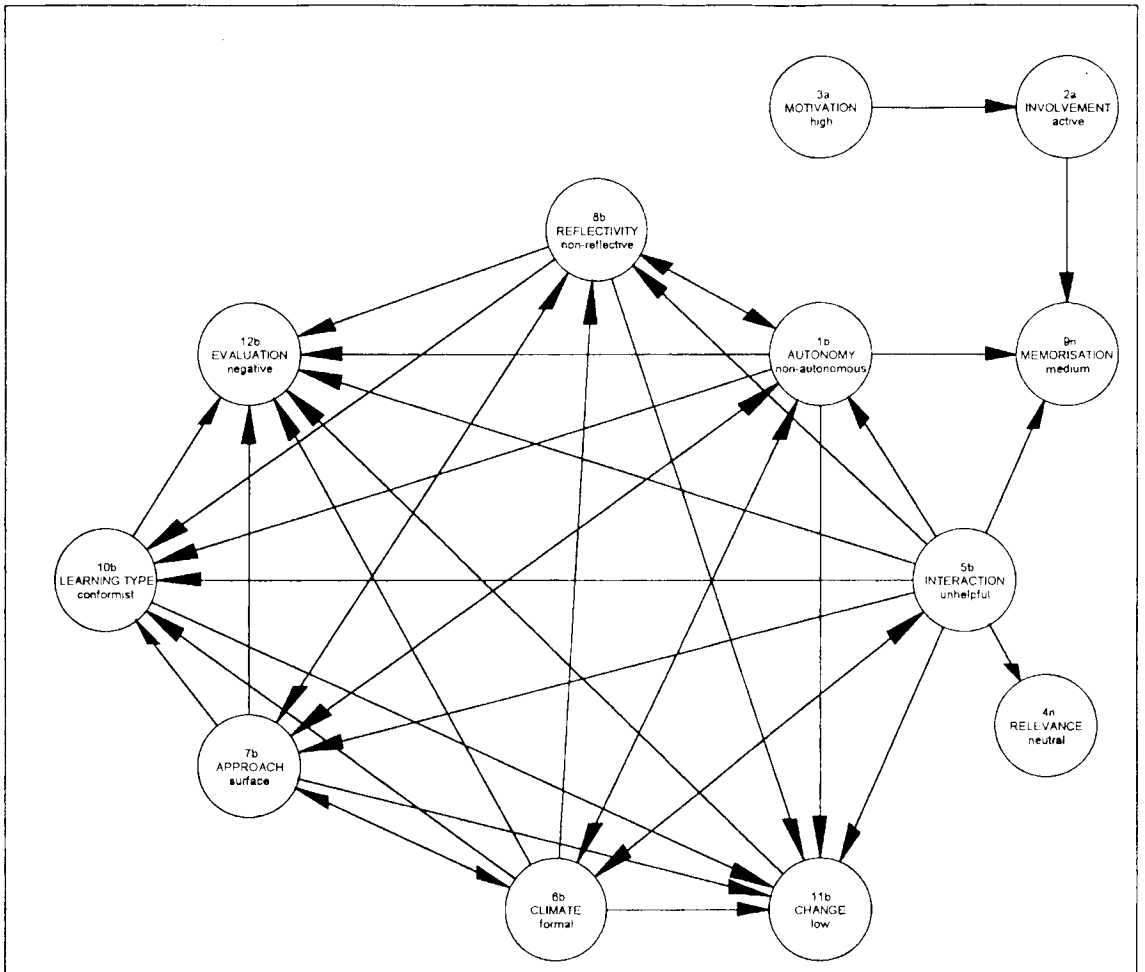
One of Geoff's main problems was adopting a surface approach to learning (7b). In reading and doing questions he was aiming to be able to **reproduce** the relevant parts *verbatim*. Only in his third year, having run out of new questions to try, did he start *"reading and trying to paraphrase it into my own notes."*

Geoff felt that he did not get on as well in the examinations as he might have done because he was unable to get sufficient appropriate help from people (5b). He got good test marks that he interpreted as positive feedback, but inexplicably failed the examinations. He was within a peer group of five or six students all taking the same subjects, but he felt that their attempts at helping each other were *"the blind leading the blind"*. His qualified colleagues were willing to help students, but *"some of them weren't really up to it"*, often leaving him more confused than he was before. This unhelpful social interaction has a critical place in the conceptual model, with type II relationships to nine other attributes. It is directly linked to everything except his high motivation and active involvement.

Geoff felt that he was working sufficiently hard. He felt he understood the material. He was respected in the office. He had no real idea why he was failing, but since he believed his knowledge to be sound he had to assume that his technique was lacking.

> *"I think the people who pass have the overall knowledge needed to pass and they also have the technique to put it down on the paper in the precise way the examiners can see they understand the concepts, the facts. ... I think knowledge-wise I wasn't lacking too much. I tried to change my style more than once and it didn't seem to work. I just ran out of inspiration really."* Tape

His principal concern about style was that he was not very good at writing essays. He was the only person that I interviewed who did not have the notion of lists of points.



1b: AUTONOMY non-autonomous	<--	5b 6b 7b 8b
2a: INVOLVEMENT active	<--	3a
3a: MOTIVATION high	<--	
4n: RELEVANCE neutral	<--	5b
5b: INTERACTION unhelpful	<--	6b
6b: CLIMATE formal	<--	1b 5b 7b
7b: APPROACH surface	<--	1b 5b 6b 8b
8b: REFLECTIVITY non-reflective	<--	1b 5b 6b 7b
9n: MEMORISATION medium	<--	1b 2a 5b
10b: LEARNING TYPE conformist	<--	1b 5b 6b 7b 8b
11b: CHANGE low	<--	1b 5b 6b 7b 8b 10b
12b: EVALUATION negative	<--	1b 5b 6b 7b 8b 10b 11b

Figure 8.9: Conceptual model for Geoff's learning

Taking actuarial examinations was a miserable activity for this man. He felt he had no autonomy in the formal environment (1b & 6b), particularly in view of the unhelpful social interaction. The outcomes of his efforts were low change, conformist learning and a negative evaluation (10b, 11b, 12b). This depressing situation was quite different from his office work for which he felt respected. His employer was continuing to support his attempts at the professional examinations and offered further support when he announced that he wanted to withdraw. When he withdrew, he continued with the same work

"The job I do has been done by an actuary before. ... My boss thinks that what I do is half an actuarial job, so he calls me 'half an actuary'! He finds me quite neat now, he thinks I'm quite reasonable at man management and half an actuary, so the best of both worlds. Quite a nice role I think." Tape

8.5 Discussion

The preceding six case studies have illustrated widely differing student experiences and different types of outcome, for people who joined the actuarial profession with similarly strong academic records. The application of Dynamic Concept Analysis to these case studies has illustrated the fact that patterns of influencing factors are often more important than the presence or absence of particular influences. This will be illustrated by taking two concepts as examples; memorisation and involvement. First, high memorisation (9a) is a feature of five of the conceptual models presented in this chapter and of Alan's approach (chapter 7). However, the role and effect of high memorisation vary.

For Alan, high memorisation was simply part of his strategic approach to the examinations, based on the clues derived from the helpful social interaction that he experienced. It coexisted with moderate reflectivity and the perception of moderate autonomy. It was a successful strategy but occupied a rather peripheral position in the conceptual model, only supporting the outcomes of conformist learning and low change.

High memorisation was a feature of Colin's strategic approach. It was what he felt he had to do within the formal climate of these professional examinations, so he did it. His high levels of autonomy and motivation (extrinsic motivation from the rewards beyond the barrier of qualification) permitted him to commit the 'intellectual perjury' of rote learning in the short term, with his sights fixed firmly on the long term. The situation was very similar for Emma during her last two years of actuarial examinations, when they had become *"a pure academic exercise"*. That is, unrelated to her practice as an actuary except in their role as a rite of passage.

For Dave, high memorisation in his early months as an actuarial student was a feature of the surface approach to learning which resulted from his inability to take a strategic approach for lack of 'cues'. It was a product of the lack of autonomy that he felt within the formal learning climate. It contributed to his failure and overall negative evaluation. Later, high memorisation became part of this man's successful strategic approach. It supported his conformist learning and a low level of change, but was separated in the conceptual model from the other attributes. Thus it was not linked with the other outcome, his positive overall evaluation. Instead, this was supported by the other internal learning processes, operating within a learning climate rendered non-formal by helpful social interaction.

The second example of the interaction between influential factors outweighing the individual factors themselves will consider the concept, 'involvement'. It is tempting to view active involvement in the learning process as good and predictive of success, and passive involvement as undesirable and predictive of failure. While this might be generally true, and seems to hold for conceptual models describing the learning of: Ben (page 245), Colin (page 250), Dave (pages 252 and 255) and Emma (initially; page 259); the opposite is true within the conceptual models describing the learning of Emma (later; page 263) and Geoff (page 270).

Within Emma's later model (figure 8.7) the passive involvement (2b) results from her evolved view of her studies as meaningless. She learnt the lists presented to her by her tuition provider and she learnt from other students at the tutorials she attended. She passed by gradually finding and then following the line of least resistance. By contrast, Geoff (figure 8.9) was actively involved while studying, for example, doing as many questions as he could. This was supported by his high level of motivation. However, Geoff had a reproductive conception of learning. His active involvement was not intended to restructure the material in a form that had personal meaning or yielded new insights. When he failed he was not sure why, because he had, certainly after the first year, studied hard and felt that he understood the material well. The main disadvantage that he suffered was unhelpful social interaction, in the sense that the well meant and generous advice that he received did not provide the crucial clues that others encountered and which enabled them to appropriately tailor their approach to the requirements of these examinations. Perhaps the

cues were there but he did not hear them. He certainly was not persistently active in seeking them out.

Alan, in the previous chapter, combined moderate involvement with moderate levels of autonomy, motivation and reflectivity. His strategic approach to the examinations, which featured the moderate level of involvement in the learning process, allowed him to achieve his twin goals of qualification and not allowing actuarial examinations to completely dominate his life. In this chapter, Frank combined moderate involvement in the learning process with low levels of autonomy and motivation, and moderate levels of reflectivity and memorisation. This was not a successful combination, leading to repeated examination failure.

While none of the conceptual models derived from my modified information matrix for adult learning (section 7.5) is broken, several have two (or more) clusters which are only loosely connected. The concept which links clusters often has a critical place within that person's learning. For example, the conceptual models presented on pages 245 and 248, for Ben and Colin who both qualified quickly, each contain loosely related clusters of attributes of the learning experience, but with different bridging concepts. Ben tenaciously employed a deep approach to learning; seen in the well integrated bottom cluster with active involvement, reflectivity, low memorisation, and high autonomy. These internal facets of learning are only linked to attributes of the learning environment and type of learning outcomes through his high level of motivation. This exceptional determination in a context which he strongly disliked, was the key to his success. By contrast, Colin has a mixture of internal and external attributes of the learning process integrated in the large lower cluster. Whilst not particularly enjoying studying for actuarial examinations, he did not actively dislike the learning milieu. The only thing that he had really strong feelings about was the desire to qualify as an actuary, which necessitated finding a way to pass the examinations. His approach to this was entirely strategic, very disciplined and involving a very high level of memorisation. Thus, the strategic approach forms the bridge between the two clusters in his conceptual model.

Many of the themes discussed in Part II have recurred in these case studies, none more strongly than the division between learning to practice as an actuary in the office, and

qualifying to practice as an actuary through passing the professional examinations. Each of the students whose learning experiences have been presented stressed that learning in these two milieu was substantially different and not necessarily mutually supportive (cf. section 5.4.2). Some made conscious efforts to keep the two separate in their minds. This was an area of disjuncture, since their unconscious assumption when they joined the profession was that the courses would teach them what they needed to know to practise as actuaries, and the examinations would ensure that this had been learnt (cf. section 5.2). They found themselves learning much that they came to view as irrelevant to their professional practice, and ceased to view the examinations as verifying adequate learning (cf. chapter 5).

Other themes from Part II, which have been strong features of these case studies are:

- the professional examinations as merely a barrier or rite of passage (sections 5.7 and 5.8) with an associated loss of validity and prestige (sections 5.5 and 5.6) - Alan, Colin, Dave, Emma and Frank
- searching for clues and making strategic use of social interaction (chapter 6) - Alan, Colin, Dave and Emma
- balancing actuarial studies with work and other aspects of life (section 4.3) - Alan, Ben, Emma and Frank
- difficulties with distance learning and the profession's tuition arrangements (sections 4.4, 5.4 and 6.2.1) - Alan, Ben, Dave, Emma, Frank and Geoff.

8.6 Summary

In this chapter the technique of Dynamic Concept Analysis, which was described and demonstrated in the previous chapter, has been applied to a series of case studies. Ben, Colin, Dave, Emma, Frank and Geoff all began the actuarial examinations with five or six exemptions, so the experiences which have been presented relate mainly to the 'applied' subjects. The very different experiences and outcomes for these people demonstrated the influences of different approaches to study, different work and study environments, and differing abilities with respect to adjusting to learning at a distance and to an unfamiliar type of course content. The application of Dynamic Concept Analysis illuminated the students' learning: structuring consideration of their experience, showing the interrelation of its constituent parts and its dynamic nature more clearly than traditional case study

descriptions. The case studies also brought together many of the themes from Part II as varied, holistic experiences of individual people. The interaction of the themes within individual experiences, was seen to be more influential than the simple presence or absence of particular themes.

Part IV: Looking back and looking forward

In chapter 1 the case was made that unravelling and illuminating the student experience of actuarial examinations would deepen understanding of:

- student success and how it was achieved
- student failure, how it was precipitated and its consequences
- the hidden curriculum, intentional and unintentional
- the nature of assessment in the context of actuarial examinations
- the role of tuition
- the roles of various stakeholders
- the complexity of the student experience.

The intention was that an analysis of the student experience of actuarial examinations would provide:

- the actuarial profession with an opportunity to consider whether that experience was as it required and desired
- greater balance and rigour in the debate surrounding actuarial education and assessment, through attention to and careful analysis of the student voice, and application of relevant educational theory
- suggestions for the improvement of actuarial education and assessment
- vicarious experience of an under-researched learning milieu for those concerned with; professional education, transitions to distance learning and part-time learning, or discontinuity in learning competence.

Because there was very little earlier work to build upon, my investigation began with a 'broad brush' survey of the student experience of actuarial examinations; the 'cross-sectional survey' (section 2.4.1). This tested hypotheses which then existed in the literature and actuarial folklore; gathered contextual data; and elicited a wealth of unstructured comment from which the themes pursued in later data collection emerged. Following the approach of 'illuminative evaluation' (Parlett & Hamilton, 1972) there was progressive focusing on critical themes, grounded (Glaser & Strauss, 1967; Strauss, 1987) in actuarial students'

accounts of their professional education and assessment. To guide this, four research questions were defined:

- **What are the pervasive themes in actuarial students' perceptions and experiences of the professional examinations?**
- **How do these dominant concerns help or hinder the process of passing the examinations?**
- **How do these dominant concerns interact with actuarial students' perceptions of the profession?**
- **What can be learnt from different types of student experience?**

The first three of these questions were mainly addressed in Part II, which was a thematic presentation and analysis of the dominant concerns in actuarial students' experiences of the processes of professional qualification. The dominant themes recurred in Part III, in which different types of student experience were portrayed through case studies which employed Dynamic Concept Analysis (Kontiainen, 1989, 1991). The chosen methodology stressed the dynamic, relational and complex nature of students' learning.

The following chapters will summarise: areas for consideration by the actuarial profession, and possibly other professions; the contributions of this research study to the discourses of actuarial education, professional education, distance learning and adult learning; and suggestions for future research.

Chapter 9: Lessons from the student experience

9.1 Introduction

This chapter comprises suggested issues for consideration by the actuarial profession and employers of actuarial students, based on themes which emerged from this research study. They build upon the suggestions made at the end of Part II (Addressing the concerns: page 201) and will be grouped under four headings: Adjusting to the learning milieu; Overload, control and validity; Increasing satisfaction with the qualification process; and Helen's experience as a possible general model.

9.2 Adjusting to the learning milieu

It has become clear that nearly all actuarial students found the transition to the profession's learning milieu very challenging. In general, they had no experience of:

- balancing the demands of part-time study and virtually full-time work
- distance learning.

The educational literature reviewed in chapter 3, indicated that difficulties with these transitions were predictable and could be ameliorated. However, the actuarial students did not expect the type of difficulties which they encountered. The institutional support that they received was not well attuned to the particular needs of new part-time distance learners. Initially, the actuarial students were unable to identify and/or mobilise the type of support which they needed.

The actuarial students adjusted to the demands of the new learning milieu at various rates, depending upon their existing skills in relation to independent learning and mobilising support. Some, like Ben and Colin in chapter 8, quickly made successful transitions. More usually, the adjustment took two or three years (e.g. Alan in chapter 7 and Emma in chapter 8), sometimes being dependent upon a critical incident (see Dave in chapter 8). Unfortunately, some actuarial students do not successfully adjust to the actuarial learning milieu. It is regrettable whenever the profession loses someone with the potential to be a

good actuary. It is of particular concern when individuals who are seen as successful in the office environment, struggle for years with actuarial studies and examinations, but never qualify as actuaries (e.g. Frank and Geoff in chapter 8).

The difficulties with the learning milieu might have been more bearable if they had been anticipated, or if constructive advice to help overcome them had been available. However, the recruitment process did not engender realistic expectations in the sense that a discontinuity in learning competence was not understood as normal, and soluble through regard to the particular demands and opportunities of the milieu. Recruiters, some company tutors and many of those who spoke on behalf of the professional body, tended to associate examination failure with inadequate effort. This resulted in some students working extremely hard, but inappropriately. Their studies consumed vast amounts of energy but generated heat rather than light. Many were deeply hurt by their failure and felt that the professional body and their employers had provided less support than might reasonably have been expected.

Students' inappropriate approaches to actuarial study were encouraged by:

- overload, encouraging surface learning; and
- ill-defined syllabuses and assessment criteria.

As Morgan (1993) pointed out, 'sussing out' the assessment system (and therefore, the *de facto* curriculum) is of paramount importance for students: probably a matter of survival. Naturally, part-time and distance learners take longer to complete the sussing out process: their learning milieu affords fewer, more dispersed opportunities for clarifying what is required of them. However, the actuarial students experienced more difficulty than many part-time distance learners. The profession's syllabuses and assessment criteria were unusually ill-defined, greatly exacerbating the problems associated with the mode of study. Although during the course of this research the definition of syllabuses has improved considerably, and some progress has been made with the setting of examinations, the assessment criteria remain a cause for concern. They are still seen as:

- unclear
- subject to variation from examination to examination
- in parts, of dubious relevance to professional practice.

The literature relating to distance learners (section 3.5.2) indicated that the quality of support from correspondence course tutors and those met face-to-face, would be a critical factor in students' adjustment to the learning milieu. Unfortunately, this appears to be the Achilles heel of the actuarial profession. Whilst there were some outstanding tutors, whose expertise students appreciated, the skills of the majority were not well developed. The status of tutoring is quite low and the professional development offered to tutors is minimal. The profession could benefit greatly from the expertise of professional distance educators. Until the pivotal role of tutors is recognised and their training improved, the student experience of the actuarial learning milieu is always likely to be less happy than anyone would wish, except where chance delivers an exceptional individual.

Proactively managing students' transitions from higher education to the actuarial learning milieu could reduce the number of first year failures. These are costly in resource terms and undoubtedly, damaging to people who have virtually no prior experience of examination failure. Most cannot help but view it as shameful, despite failure being the modal experience. Fortunately, the man speaking below had qualified in five years and become a successful, international actuary. Nevertheless, he was not convinced of the virtue of examination failure as a rite of passage.

> *"When you fail for the first time it is so awful, what your company thinks, you know you think they are disappointed in you, your other friends passed, peer pressure is immense and also the prestige in the company, you will be seen as someone who has been given all this time off and is still not able to pass the exams. Although the first year in which I failed all my exams, in the entire* [large consultant] *company, which was extremely good at passing people, only one person passed one exam, everybody else failed in my year, but even though we all failed I still felt so badly about it."*
>
> 123 Tape qual-med

9.3 Overload, control and validity

These themes recurred throughout Part II. Firstly, the actuarial students worked quite long hours in the office, then grappled with an overloaded professional curriculum. During their first year they experienced the stress of several simultaneous transitions to various aspects of their changed status. They had to learn far more than the course content on which they

expected to be examined. They were also overloaded with the number and variety of disjunctions between their expectations and experiences of the professional examinations. Both in terms of the large burden of tasks to address, and the quantity and degree of adjustments which they had to make, the actuarial students felt that they were placed in a position of having too little control over their lives. This was to the detriment of their learning and their motivation.

Lack of control or autonomy is likely to be more influential in the student experience of professional education than at school or higher education level. The embryonic professionals had hopefully become more mature and independent learners as they passed through the years of their full-time education. Although they may not have minded conforming to the demands of an imposed system when they commenced their degree studies, they felt much less inclined to behave in a conformist manner when faced with the demands of the actuarial examinations. They had become confident in their judgements of demands which appeared to them to lack validity; and inclined to defend these judgements. As soon as they had gained a little experience within the office the actuarial students were expected to make responsible professional judgements in their daily work. It was a source of great discontent that they perceived the professional examinations as not fully valuing their professional knowledge and judgement.

The course content lacked face-validity for the students, and since they expected to be assessed on the course content, the examinations lost face-validity. Again, this is likely to have been more important to the young professionals than it would have been while they were undergraduates. At university there is no compelling need to agree with one's tutor and the atmosphere is supportive of diversity. However, if one's competence to practise is being judged and certified, it is important that one has faith in the appropriateness and accuracy of the judgements being made.

Officially, the actuarial examinations are criterion referenced, the criterion being fitness to assume professional responsibilities (page 171). This was uncontentious since the students had a strong sense that the examinations should be closely related to professional practice. Ensuring fitness to accept certain responsibilities was sufficient justification for the barrier

of the examinations. However, the students acquired the view that the actuarial examinations were:

- not sufficiently closely related to professional practice (section 5.4.2)
- not particularly effective at discriminating between a significant proportion of the candidates (section 5.5).

Further, they felt that the examinations were really norm-referenced. While they did not disapprove of gatekeeping *per se*, they desired **meritocratic gatekeeping** with sufficiently explicit criteria to permit them a sense of rather more control over their likelihood of passing through the gate.

9.4 Increasing satisfaction with the qualification process

Ideally, the various facets of the process of qualification as an actuary should be viewed by stakeholders as necessary and appropriate. Since no education ad assessment system can be expected to be flawless, it is not surprising that this research has identified several areas in which the levels of stakeholders' satisfaction might be raised. Most importantly, all stake holding groups seem agreed that:

- the average time taken to qualify as an actuary is too long
- the professional examinations do not assess all the knowledge and skills necessary for competent practice as an actuary.

While the second point is uncontentious, it is related to a very contentious view held by the majority of actuarial students, along with many Fellows and knowledgable outsiders:

- the actuarial examinations assess knowledge and skills which are not necessary (or even helpful) for competent practice as an actuary.

Although a certain amount of 'jumping through hoops' can be accepted philosophically, an excess of assessment demands which are perceived as of dubious relevance, creates disaffection.

Stakeholders would be more satisfied with the process of actuarial qualification if the average time to qualification could be shortened, and if the validity (particularly content-validity) of the actuarial examinations could be improved. It is likely that the most satisfactory means of reducing time to qualification would be to consider ways in which the

proportion of good quality examination scripts can be increased. My research has indicated that this could arise in a number of ways:

- by improving the quality of students' learning, mainly by reducing the overload which they experience. Overload would be reduced if:
  - courses were shortened by removing unnecessary detail and any obsolete material
  - courses were designed to help structure students' learning through concentration on principles and the integration of knowledge, rather than encouraging list-like reproduction
  - courses of study and daily work were seen to be more closely aligned
  - assessment criteria were clearer

- by improving the quality of tutoring. This might best be done by considering the experience of other institutions which provide distance education, and by considering the academic literature relating to distance learning. Certainly, the status of tutoring needs to be raised.

- by improving the quality (actual and perceived) of examination papers, so that:
  - candidates are able to demonstrate the depth and breadth of their understanding. At present, many feel unable to do this because of: the perception of conflicting assessment criteria (the reproduction of certain knowledge); time pressure; and lack of confidence in the examining process.
  - they have greater face-validity. It is necessary for stakeholders to feel that what is assessed is appropriate and balanced.
  - they are more consistent. Candidates' primary means of examination preparation is working through past examination papers, yet the incidence of surprising or *"untypical"* examination papers is still felt to be high.

- by reducing the frequency of major changes within the education and assessment systems. Although annual syllabus changes are necessary in an ever-changing financial environment, the frequency of structural changes in the past decade has meant that only a tiny proportion of fast-qualifying students have been subject to the

demands of a single system. Virtually everyone has had to cope with transition from one system to another, with the distractions of: transitional arrangements, uncertainty about the new criteria, the possible loss of prior credit. The majority of those who contributed to this research coped with two major syllabus reviews, and a few witnessed more. However, it should be noted that for some individuals a syllabus review enabled qualification, through the removal of a barrier at which they had become stuck. Nevertheless, the majority would have benefited from a little less upheaval than has been the normal student experience in recent years.

It is likely that satisfaction with the qualification process would be increased if there were closer institutional attention to the student experience. The recent formation of a 'Student Consultative Committee', reporting to the Joint Education Committee of the Institute of Actuaries and Faculty of Actuaries, is a sign of progress in this area.

9.5 Helen's experience as a possible general model

Returning to the quotation from page 104:

> *"People say these exams are different, but they don't say anything to help you, they don't say how or why. They just say they are different."* Tape

The difference upon which this newly qualified actuary was reflecting, was between actuarial examinations and both university and school examinations. In common with a high proportion of her contemporaries, Helen found that it took a few years to work out the nature of the difference and how to address it. She qualified in five years.

During her first three years of studying for and sitting actuarial examinations, Helen moved through five stages:

1. Believing that she knew how to study successfully and how to pass examinations. Thus, hearing the message that actuarial examinations were different, but not particularly worrying about it.

2. Failing and not really understanding why. Therefore, deciding for herself that these examinations required something different and beginning the search for what was required.
3. Finding that what was required for examination success was not made explicit by the professional body and further, that some of the official advice was held as unreliable within the flourishing folklore relating to the professional examinations.
4. Tuning in to what was required for success by combining information from several sources.
5. Passing and not being completely sure why, since the assessment criteria were still not clear to her.

These stages were followed by:

6. Further tuning in to clues and consequent refining of approach, resulting in more frequent success.
7. A stable view of what was required for examination success, resulting from continued success.

After qualification, Helen's stable view was finally confirmed through her involvement in 'paying her debt' (footnote on page 130) by tutoring and examining.

I would suggest that Helen's story is illustrative of the general experience of those who qualify at approximately the average speed. The differences between student experiences seem to be largely associated with the speed of movement through the stages. Those that qualified quickly appeared to be able to skip stages 1 and 2, and very occasionally, stage 3. Alternatively, they may have experienced these stages but moved on so rapidly that the initial disorientation was not apparent in their stories. Those who qualified very slowly, or remained students for many years without qualifying, tended not to complete stage 4 successfully. This may have been because they could not divine what was required, or because they were not able/prepared to do what was necessary.

Turning to the case studies in Part III as illustrative examples: the experiences of Alan and Emma were very similar to Helen's. Ben was able to skip stage 2, but found stages 3 and 4 very distressing. Colin spoke of beginning the process at stage 3, although he may have

fleetingly experienced stage 1. He placed little emphasis on stage 5 and skipped stage 6. Dave became stuck at stage 3. His distress was such that he almost gave up, but a critical incident in the form of timely and accurate advice helped him to stage 4. This gave him the momentum to skip stage 5 and qualify. Frank's progress stalled at stage 5, partly because other things in his life have crowded out the continued focussing and striving for success. Unfortunately, Geoff was never able to complete stage 4, partly due to poor support in his work environment.

9.6 Conclusion

The actuarial profession and employers of actuaries could benefit from consideration of the student experience of actuarial examinations, in conjunction with the extensive literature relating to student learning and assessment. Analysis of this experience will indicate areas in which the processes leading to professional recognition as an actuary are working well, or not working as efficiently as they might. This should inform future policy.

It is in everyone's interest to reduce failure rates in the professional examinations by improving the overall quality of examination scripts. My analysis has suggested a number of ways forward, most importantly:

- Supporting students through the transitions to part-time learner and distance learner. To achieve this, consideration should be given to the expertise of educationalists with a particular interest in distance education. Certainly, the importance of the role of correspondence course tutor needs greater recognition. Correspondence tutors could benefit from systematic professional development.
- Taking steps to reduce the overload which precipitates surface learning: the unreflective reproduction of course content or lists of points, without sufficiently critical analysis or adequate integration.
- Reviewing all aspects of the assessment process in recognition of the fact that assessment drives learning. This would suggest striving for greater clarity with respect to: the aims and objectives of actuarial examinations; the contribution of each to the overall assessment of fitness to practise; and the relationship between the examinations and professional practice. There is scope for further improvement in

the quality of examination papers. It would be useful to analyse the marking and grading process, to tease out its consequences (intended and unintended).

Post script

It is difficult to capture adequate recognition of improvements within the student experience because each generation of students experiences the education and assessment systems at a particular point in time. To students battling with the demands of being part-time distance learners in the actuarial context, it is of scant interest that in the past, certain aspects of the experience were more difficult. While noting that there remains ample scope for further improvement, I feel that it is important to state my belief, arising from several years of observation and enquiry, that with respect to study leave, tuition materials and the availability of face-to-face tuition, today's new students *"... have never had it so good"* (Harold McMillan). However, the experience of overload seems to have worsened during the course of this research project. There are two main aspects to this. Firstly, the examination syllabuses are widely felt to be larger than they used to be. Simultaneously, the pressure of competing office work appears to be more acute, particularly since the spectre of redundancy began to haunt members of the profession (Arthur, 1992).[64]

[64] At the beginning of this research study, job insecurity was not part of the actuarial culture. Indeed, over 90% of those participating in the longitudinal survey (section 2.4.2) in 1990, indicated that they regarded the career as affording a high level of job security. This was despite the fact that by then the profession had experienced some redundancies. One year later, the proportion expressing the same view had dropped to 42%.

Chapter 10: This work and future work

10.1 Introduction

In the preceding chapters I have presented an interpretive case study (Merriman, 1988) of education and assessment within a small and relatively obscure profession, from the perspective of one of the principal groups of stakeholders. This process has contributed to knowledge at several levels. In the next section I will outline contributions to the discourses of actuarial education, professional education more generally, distance learning, and adult learning. Finally, a variety of suggestions for the direction of future work will be given.

10.2 The contributions made by this research

10.2.1 To the discourse of actuarial education

For the actuarial profession in the United Kingdom my study is a new approach to the consideration of their education and assessment systems. My research also addresses significant gaps in the profession's 'propositional' and 'process' knowledge (Eraut, 1985, 1992a). Section 3.2 of the literature review highlighted that the discourse surrounding actuarial education has been substantially lacking in two areas:

- systematic consideration of the student experience and its implications for individuals, the profession and employers; and
- recognition and application of pertinent insights from research in other disciplines.

This research study goes some way to remedying these deficiencies. In this endeavour it has been helpful that I am not an actuary. The absence of this professional socialization helped to guard against taking things for granted. However, working alongside actuaries for nine years allowed me to achieve a sound understanding of the context of actuarial education and assessment.

The student experience of actuarial education and assessment has been rigorously studied. The major strands of this experience; adjusting to the learning milieu, disjuncture between expectation and experience, and the critical role of cue-seeking; were explored at length in

Part II. The many-faceted nature of these strands was demonstrated. The most important facets were discussed and linked with appropriate prior research, and illustrated with examples from the data. By unravelling the student experience in this way it has become more tractable. Opportunities for informed debate and reflection, both within and outside the profession, have been presented. It is hoped that the debate and reflection will lead to improvements in actuarial education and assessment, or at very least, improvements in the student experience of these things.

Despite the usefulness of breaking down the student experience of actuarial examinations into manageable parts, to have done this alone would have dulled awareness of the primary problem experienced by actuarial students. They do not experience challenges which individually are not insurmountable, singly, or even necessarily sequentially. Rather, these challenges overlap and interact. When a sufficiently large number coincide, overload occurs. This is associated with feelings of lack of control, impaired decision-making, and reduced motivation. The case studies in Part III integrate several facets of the student experience to show how different aspects of that experience combine to form a whole. They showed some of the variety of student experiences, which was less obvious in Part II when the focus was on themes which recurred within the data. The case studies demonstrated that quite different constellations of learning attributes could have similar outcomes in relation to progress through the professional examinations.

The previous chapter drew attention to aspects of actuarial education and assessment on which members of the profession might like to focus during the debate which will follow the dissemination of this work. In particular, my research has drawn attention to the possibility of the profession gaining substantially from:

- consideration of the literature relating to adult learning; and
- the expertise of those who practise and research distance education.

10.2.2 To the discourse of professional education

This research has added a detailed case study of a little researched profession to the literature on professional education. Reflection upon the student experience of actuarial examinations can inform debate about: the role of professional examinations; the relationship

between professional curricula and practice; and the outcomes (intended and otherwise) of education and assessment systems.

The existing literature pays relatively little attention to the financial services sector, the much larger profession of accountancy drawing most, but still not much attention. Professionals in this sector are less visible in our daily lives than, for example, teachers, doctors and other health sector professionals, about whom so much has been written. However, the nearly invisible actuaries, because of the ubiquity of insurance and pensions, influence the lives of just about everybody. Therefore, the effects of their professional education and the implications for the future of the profession, are of public interest.

The professions which have been studied most place a fairly high proportion of their professional education in higher education. This is not surprising, since locating professional education in a university places it in proximity to a corpus of researchers. However, this does bias the literature. The financial services sector has traditionally mistrusted the universities and devolved very little of its professional education to them (Carter & Webb, 1993). In return, little research attention has been directed towards financial professions, and the discourse on professional education has been restricted by focusing upon a narrower range of models than actually exist.

My focus on the student experience highlighted the importance of good quality student support, particularly during the period of transition from the learning milieu of higher education to that of professional education. Although student support has been studied extensively in the context of higher education, it has been paid far less attention within the literature relating to professional education. Perhaps this work will spark some further consideration of this area.

10.2.3 To the discourse of distance learning

Early in my research it became apparent that the majority of existing literature on distance learners constructed them as previously unsuccessful learners. Distance learning was often portrayed as a 'second chance' for those who had left full-time education before achieving their full academic potential. Graduate entrants to the professions are certainly not in this

category, they have all been highly successful learners in another milieu. The actuarial students' particular needs were for help in:

- realising that studying and examination preparation are not context-free; and in
- coping with an unexpected discontinuity in learning competence, induced by moving to a strange learning milieu.

These are quite different from the needs of students who do not have fond memories of long-term success in learning and passing examinations.

Whilst the literature does pay attention to the link between past and current learning experiences, there is scant consideration of the possibility that the new learning experience might be considerably less satisfactory (educationally and emotionally) than previous experiences. It should be recognised that learning does not necessarily get better and better.

10.2.4 To the discourse of adult learning

Of course, the contributions described under the previous three headings are also contributions to the broader field of adult learning. Consideration of the student experience of actuarial examinations is seen to contribute to an understanding of the transition from a familiar learning milieu (in which individuals had learnt to be highly successful), to alien learning milieu (in which success was rather more elusive).

In addition, an important aspect of my research has been the development of Kontiainen's adult learning model, which had not previously:

- been applied to distance learners; nor
- incorporated the Gothenberg and subsequent British research into student approaches to learning.

Further, I demonstrated that attributes could be derived satisfactorily from interview transcripts.

The technique of Dynamic Concept Analysis is a powerful means of structuring consideration of the multi-faceted phenomenon of adult learning. It deserves wider consideration. Hopefully, my work will help to stimulate debate of the methodology, which is needed to test its robustness.

10.3 Future research

My analysis of the student experience of actuarial education and assessment has drawn my attention to several related questions which warrant research in the future.

- Adding the student voice to our understanding of actuarial examinations has drawn my attention to neglect of tutors' experiences. They have low status within actuarial education which belies their key role. An exploration of their intentions and definition of their role would be useful. It would indicate the degree of congruence with the profession's intentions and role definition, highlighting areas where adjustment or development might be appropriate. It would also establish the degree to which the profession's tutoring accords with recognised good practice within distance education.

- Throughout my research I was aware that there was a lack of clarity among examiners in relation to their aims and objectives. A piece of action research which helped examiners to clarify their purpose and identify their development needs would be valuable. This would naturally lead to a programme to meet the development needs and an improvement in the examining process. Other stakeholders would also gain clearer, more realistic expectations. This should quickly yield benefits in terms of satisfaction with the examining process and a significant decrease in the perception of a lottery.

- In recent years, the influence of the universities on actuarial education has increased. There is scope for research into the effects of this institutional change.

- At various stages my analysis touched upon the theory-practice divide in actuarial education. It was widely felt that some of the material examined was obsolete or otherwise irrelevant to practice. Also, we saw that it was possible to be highly successful within the office environment and yet, for a variety of reasons, fail to make significant progress with the professional examinations. Whilst a theory-practice gap may be inevitable, there is value in identifying the extent and nature of

the gap in this context. This scrutiny could inform future syllabus and assessment changes.

- Although such usage has not been thoroughly explored in this research study, Dynamic Concept Analysis should be a useful tool in the planning and implementation of change. Once a satisfactory model of a current situation has been constructed, consideration can be given to which parts of the model, and hence situation, are amenable to change. Simulation of the likely effect of such change is then possible. This could be a fruitful area for further research. It may be possible to use the technique to help actuarial students to understand their learning more deeply. This insight would provide them with the opportunity to consider the scope for positive changes.

- The most recent syllabus review tentatively addressed the questions:
    - what is an embryonic actuary like?
    - what should s/he know?
    - what should s/he be able to do?

  For the future, one could add:
    - what **should be** the learning outcomes of actuarial education?
    - what **are** the learning outcomes of actuarial education?

  Some learning outcomes of the present system have been identified in this research. There is scope for more detailed investigation of these questions.

Appendices

Appendix I Subjects examined by the Institute of Actuaries

1978-1987

Group A	
A1	Probability & Elementary Statistics
A2	Compound Interest
A3	Life & Other Contingencies
A4	Investment: Principles & Economic Background
A5	Further Statistics
A6	Mortality & Other Actuarial Statistics
Group B	
B1	Institutional Investment
B2	Life Assurance
B3	General Insurance
B4	Pension Funds

1988-1993

1	Probability & Statistics
2	Mathematics of Finance
3	Life Contingencies
4	Economics & Accounts
5	Applied Statistics
6	Mortality

continued ...

1988-93 continued...

7A	Institutional Investment (Ordinary Level)
7B	Institutional Investment (Specialist Level)
8A	Life Assurance (Ordinary Level)
8B	Life Assurance (Specialist Level)
9A	General Insurance (Ordinary Level)
9B	General Insurance (Specialist Level)
10A	Pension Funds (Ordinary Level)
10B	Pension Funds (Specialist Level)

1994-

A	Fundamentals of Actuarial Mathematics
B	Economics, Finance & Accounts
C	Statistics
D	Actuarial Mathematics
E	Investment & Asset Management
F	Life Insurance
G	General Insurance
H	Pensions
Q	Fellowship Paper

Appendix II Institute of Actuaries Examination Pass Rates

The tables below show the pass rates for the spring Institute of Actuaries examinations 1988-1993, and the Institute of actuaries pass rates for the Institute and Faculty of Actuaries joint examinations 1994-1996. The percentages shown indicate the proportion of candidates who presented themselves for examination at centres in the United Kingdom, Isle of Man and Republic of Ireland[65] who were successful. Percentages are only reported for examinations with at least 50 candidates. Because of small and fluctuating numbers of candidates, results from the specialist papers in the period 1988-93 have not been reported.

Year→ Subject ↓	88	89	90	91	92	93
1	55%	39%	55%	58%	70%	63%
2	46%	39%	59%	51%	56%	48%
3	41%	41%	57%	60%	67%	69%
4	38%	46%	58%	57%	40%	47%
5	54%	38%	60%	61%	59%	53%
6	48%	47%	52%	56%	49%	52%
7	41%	43%	48%	40%	33%	28%
8	49%	48%	45%	40%	33%	35%
9	48%	44%	42%	44%	44%	43%
10	49%	36%	42%	44%	40%	37%

[65] These are usually known as 'home' candidates.

Date→ Subject ↓	Apr 94	Sep 94	Apr 95	Sep 95
A	60%	53%	63%	56%
B	52%	57%	57%	57%
C	61%	63%	58%	69%
D	42%	63%	65%	69%
E	66%	50%	64%	59%
F	30%	34%	29%	31%
G	46%	26%	26%	30%
H	25%	38%	36%	35%
Q	25%	32%	32%	26%

Date → Subject ↓	Apr 96	Sep 96
A1	77%	52%
A2	58%	49%
B1	56%	65%
B2	55%	52%
C1	71%	53%
C2	69%	50%
D1	65%	71%
D2	76%	38%
E	66%	55%
F	31%	39%
G	24%	36%
H	44%	49%
Q1	40%	45%
Q2	61%	41%

Appendix III Summaries of Survey Respondents

Cross-sectional Survey: September 1988 - 138 respondents

Professional Body	Frequency
Institute of Actuaries (England)	124
Faculty of Actuaries (Scotland)	7
Society of Actuaries (USA)	3
Institute of Actuaries & Society of Actuaries	3
Institute of Actuaries of Australia	1

Sex	Frequency
male	121
female	17

Longitudinal survey - 1990-91 - 48 respondents

Professional Body	Frequency
Institute of Actuaries (England)	46
Faculty of Actuaries (Scotland)	2

Sex	Frequency
male	34
female	14

Appendix IV The Treatment and Coding of Quotations

Some quotations from the questionnaires and letters have been tidied up a little to improve readability. This usually amounted to correcting spelling or grammar, or expanding uncommon abbreviations. For example,

> *"Moving house adversely effected exam prep"*

became:

> *"Moving house adversely affected exam preparation."*

A few questionnaires contained longer passages which were written in block capitals and devoid of punctuation. Where I have felt it necessary to making sense of the passage, I have inserted punctuation. This inserts my sense of what the person is saying. I realise that this may not be the sense intended by that person, but it is the sense in which that piece of the data has been interpreted and analysed. As a safeguard, I have checked my interpretations against those of a fellow researcher. Ambiguous passages were discarded if I could not confidently insert punctuation, or contact the author. Thus:

> *"I HAVE BEEN ABLE TO START EARLIER THIS YEAR ALTH' BEING SECONDED TO VALUATION FOR THE YEAR END HASN'T HELPED STUDY DURING NOVEMBER I ALSO KNOW THIS TIME AROUND WHAT ARE THE IMPORTANT ISSUES AT LEAST IN SUBJECT 7A & WILL ENDEAVER TO UNDERSTAND THEM THOROUGHLY RATHER THAN WORRY ABOUT TINY DETAIL"*

became:

> *"I have been able to start earlier this year; although being seconded to valuation for the year end hasn't helped study during November. I also know this time around what are the important issues, at least in subject 7A, and* [I] *will endeavour to understand them thoroughly, rather than worry about tiny detail."*

The codes which follow quotations indicate:

- the gender of the person; women are marked f
- my code for that person; codes within the ranges below indicate particular sections of the data:

101-250	respondents to the cross-sectional survey who graduated from City University's BSc in actuarial science
251-300	respondents to the cross-sectional survey holding a postgraduate Diploma in Actuarial Science from City University

601-650 informants who did not participate in either questionnaire survey

701-750 longitudinal survey participants who had studied at City University

801-850 longitudinal survey participants who had not studied at City University

- the type of data source:

Obs	field note
Q'naire	questionnaire data
Tape	tape transcript

- the outcome, or present status, of this person's association with actuarial examinations, which I have defined as:

qual-fast qualified - within three years, having completed a university actuarial science course; or otherwise, within four years

qual-med qualified - within four to six years, having completed a university actuarial science course; or otherwise, within five to eight years

qual-long qualified - in seven or more years, having completed a university actuarial science course; or otherwise in eight or more years

student student member in January 1997

withdrawn not traceable through the membership lists of the Institute of Actuaries, Faculty of Actuaries, Society of Actuaries, or personal contacts.

Appendix V Statements of Relationships between the Concepts of Adult Learning

The following statements are reproduced from Kontiainen (1991) pp91-95 in order to permit both interpretation of the information matrix shown in section 7.3, and comparison with the modified model developed for this research study. The information matrix for the modified model was shown in section 7.5.4, and the corresponding statements of hypotheses follow in appendix 10.3.

"A statement indicates that there is a direct relation from another concept to the concept in question

- *In brackets are the variables which are considered not to have a linear relation to the variable in question.*

* *indicates a trend towards a relation as stated.*

** *The cell in the information Structure*[66]

1. ***Autonomy*** *(autonomous - medium - non-autonomous)*
*Cell***
1/2 *The more active role the more autonomy*
1/3 *The higher motivation the more autonomy*
1/4 *The more meaningful content the more autonomy*
*1/5** *The more active interaction the more autonomy*
1/6 *The more informal situation the more autonomy*
1/7- *(Approach)*
1/8 *The more reflectivity the more autonomy*
1/9 *The less memorisation the more autonomy*
1/10- *(Outcome)*
1/11- *(Change)*
1/12- *(Evaluation)*

2. ***Involvement*** *(active - medium - passive)*
Cell
*2/1** *The more autonomy the more active role*
2/3 *The higher motivation the more active role*
2/4 *The more meaningful content the more active role*
2/5 *The more active group interaction the more active role*
2/6 *The more informal situation the more active role*
*2/7** *The more practical approach the more active role*
2/8 *The more reflective process the more active role*
2/9 *The less memorisation the more active role*
2/10- *(Outcome)*

---

[66] This information matrix was reproduced in section 7.3

2 11- (Change)
2 12- (Evaluation)

3. ***Motivation*** *(high - medium - low)*
Cell
3 1 The more autonomy the higher motivation*
3 2- (Learner Role)
3 4 The more meaningful content the higher motivation
3 5 The more active interaction the higher motivation
3 6 The less formal situation the higher motivation
3 7 The more practical approach the higher motivation*
3 8 The more reflective process the higher motivation
3 9 The less memorisation the higher motivation*
3 10- (Outcome)
3 11- (Change)
3 12- (Evaluation)

4. ***Content Relevance*** *(meaningful - neutral - meaningless)*
Cell
4 1- (Autonomy)
4 2- (Involvement)
4 3- (Motivation)
4 5- (Interaction)
4 6- (Climate)
4 7- (Approach)
4 8 The more reflective process the more meaningful content
4 9 The less memorisation the more meaningful content
4 10- (Outcome)
4 11- (Change)
4 12- (Evaluation)

5. ***Interaction*** *(active - medium - passive)*
Cell
5 1 The more autonomy the more active interaction
5 2 The more active learner the more active interaction
5 3 The higher motivation the more active interaction
5 4 The more meaningful content the more active interaction
5 6 A nonlinear relationship/Climate
5 7 The more practical approach the more active interaction*
5 8 The more reflectivity the more interaction
5 9 The less memorisation the more active interaction
5 10- (Outcome)
5 11- (Change)
5 12- (Evaluation)

6. ***Learning Climate*** *(informal - non-formal - formal)*
Cell
6 1 The more autonomy the more informal situation
6 2 The more active learner role the more informal situation

6/3 The higher motivation the more informal situation
6/4 A nonlinear relationship/content relevance
6/5 A nonlinear relationship interaction
6/7 The more practical approach the more informal situation
6/8 A nonlinear relationship Reflectivity
6/9 The less memorisation the more informal situation
6/10- (Outcome)
6/11- (Change)
6/12- (Evaluation)

***7. Learning Approach** (theoretical - neutral- practical)*
Cell
7/1- (Autonomy)
7/2- (Involvement)
7/3- (Motivation)
7/4- (Content Relevance)
7/5- (Interaction)
7/6 The more formal approach the more theoretical
7/8 The less reflectivity the more theoretical
7/9 The more memorisation the more theoretical
7/10- (Outcome)
7/11- (Change)
7/12- (Evaluation)

***8. Reflectivity** (Reflective - medium - non-reflective)*
Cell
8/1 The more autonomy the more reflective learning approach
8/2 The more active learner role the more reflectivity
8/3 The higher motivation the more reflectivity
8/4 The more meaningful content the more reflectivity
8/5 The more active interaction the more reflectivity
8/6 A nonlinear relationship/Climate
8/7 The more practical approach the more reflectivity*
8/9 The less memorisation the more reflectivity
8/10- (Outcome)
8/11- (Change)
8/12- (Evaluation)

***9. Memorisation** (high - medium - low)*
Cell
9/1- (Autonomy)
9/2- (Involvement)
9/3- (Motivation)
9/4- (Content Relevance)
9/5- (Interaction)
9/6 The more informal situation the more memorisation
9/7 The more theoretical approach the more memorisation
9/8 The less reflectivity the more memorisation
9/10- (Outcome)

9 11- (Change)
9 12- (Evaluation)

***10. Learning Outcome** (innovative - neutral - conformist)*
Cell
10 1 The more autonomy the more innovative outcome
10 2 The more active learner the more innovative outcome
10 3 The higher motivation the more innovative outcome
10 4 The more meaningful content the more innovative outcome
10 5 The more active interaction the more innovative outcome
10 6 A nonlinear relationship Climate
10 7 A nonlinear relationship Approach
10 8 The more reflectivity the more innovative outcome
10 9 The less memorisation the more innovative outcome
10 11- (Change)
10 12- (Evaluation)

***11. Change** (high - medium - low)*
Cell
11/1 The more autonomy the more change
11/2 The more active learner the more change
11/3 The higher motivation the more change
11/4 The more meaningful content the more change
11/5 The more active interaction the more change
11/6 A nonlinear relationship/Climate
11/7 The more practical approach the more change
11/8 The more reflectivity the more change
11/9 The less memorisation the more change
11/10 The more innovative outcome the more change
11/12- (Evaluation)

***12. Evaluation** (positive - neutral - negative)*
12/1 The more autonomy the more positive evaluation*
12/2 The more active learner the more positive evaluation
12/3 The higher motivation the more positive evaluation
12/4 The more meaningful content the more positive evaluation
12/5 The more active interaction the more positive evaluation
12/6 A nonlinear relationship/Climate
12/7 A nonlinear relationship/Approach
12/8 The more reflectivity the more positive evaluation
12/9 The less memorisation the more positive evaluation
12/10 The more innovative outcome the more positive evaluation
12/11 The more change the more positive evaluation"

Appendix VI Relationships between the Concepts of Adult Learning: Modified Model

The following statements relate to the modified adult learning model described in section 7.5. The information matrix for this model was given in section 7.5.4. The statements which differ from those of Kontiainen (1991) (reproduced in appendix V) are shown in bold type. In addition, some of the original statements have been reworded slightly.

The direction of the postulated relationships is always *from* the various, named concepts *to* the concept heading that group of hypotheses. For example, the first hypothesis below, 'the more active involvement the more autonomy'; postulates an influence *from* the level of involvement of the learner in the learning task, *upon* the autonomy felt by the learner.

(1) **Autonomy** (autonomous - medium - non-autonomous)
Cell:(row/column)

1/2 The more active involvement the more autonomy
1/3 **(No influence from motivation)**
1/4 **(No influence from relevance of content)**
1/5 **Helpful social interaction tends to support autonomy**
1/6 The more informal situation the more autonomy
1/7 **A deep approach to learning supports the perception of autonomy**
A strategic approach to learning supports the perception of at least a moderate level of autonomy
A surface approach to learning supports the perception of little autonomy
1/8 The more reflectivity the more autonomy
1/9 The less memorisation the more autonomy
1/10 (No influence from type of learning outcome)
1/11 (No influence from change)
1/12 (No influence from evaluation)

(2) **Involvement** (active - medium - passive)
Cell:(row/column)

2/1 The more autonomy the more active involvement there tends to be
2/3 **The higher the level of motivation the more active involvement there tends to be**
2/4 The more meaningful content the more active involvement
2/5 **The more helpful the social interaction the more active the involvement**
2/6 The more informal situation the more active involvement
2/7 **A deep approach to learning supports active involvement**
A strategic approach to learning supports at least a moderately high level of involvement
A surface approach to learning supports passive involvement
2/8 The more reflective process the more active involvement
2/9 The less memorisation the more active involvement
2/10 (No influence from type of learning outcome)
2/11 (No influence from change)
2/12 (No influence from evaluation)

(3) **Motivation** (high - medium - low)

Cell:(row/column)

3/1 The more autonomy the higher level of motivation there tends to be

3/2 (No influence from the degree of involvement adopted within the learner's role)

3/4 The more meaningful content the higher motivation

3/5 **The more helpful the social interaction, the higher the motivation**

3/6 The less formal situation the higher motivation

3/7 **A deep approach to learning supports high motivation**
A strategic approach to learning supports at least moderately high motivation
A surface approach to learning supports low motivation

3/8 The more reflective process the higher motivation

3/9 The less memorisation the higher motivation **['tends to be' removed]**

3/10 (No influence from type of learning outcome)

3/11 (No influence from change)

3/12 (No influence from evaluation)

(4) **Content Relevance** (meaningful - neutral - meaningless)

Cell:(row/column)

4/1 (No influence form autonomy)

4/2 (No influence from involvement)

4/3 (No influence from motivation)

4/5 **The more helpful the social interaction, the greater the tendency to perceive the content as meaningful**

4/6 (No influence from learning climate)

4/7 **A deep approach to learning supports the formulation of a definite view of the relevance of the course content: meaningful or meaningless**
A strategic approach to learning supports a neutral or ambivalent perception of content relevance
A surface approach supports the perception of meaningless content

4/8 The more reflective process the more meaningful content

4/9 **(No influence from memorisation)**

4/10 (No influence from type of learning outcome)

4/11 (No influence from change)

4/12 (No influence from evaluation)

(5) **Social Interaction** (helpful - medium - unhelpful)

Cell:(row/column)

5/1 **(No influence from autonomy)**

5/2 **(No influence from involvement)**

5/3 **(No influence from motivation)**

5/4 **(No influence from content relevance)**

5/6 **The less formal the learning climate, the more helpful social interaction there tends to be**

5/7 **(No influence from approach to learning)**

5/8 **(No influence from reflectivity)**

5/9 **(No influence from memorisation)**

5/10 (No influence from type of learning outcome)

5/11 (No influence from change)

5/12 (No influence from evaluation)

(6) **Learning Climate** (informal - non-formal - formal)

Cell:(row/column)

6/1 The more autonomy, the more informal the perceived situation **tends to be**

6/2 The more active learner role, the more informal the perceived situation **tends to be**

6/3 The higher motivation, the more informal the perceived situation **tends to be**

6/4 A nonlinear relationship/content relevance

6/5 **The more helpful the social interaction, the less formal the perceived learning climate tends to be**

6/7 **A deep approach to learning supports the perception of informal and non-formal learning environments**
No influence from the strategic approach to learning
A surface approach to learning supports the perception of a formal learning environment

6/8 **(No influence from reflectivity)**

6/9 The less memorisation, the more informal the perception of the learning environment **tends to be**

6/10 (No influence from type of learning outcome)

6/11 (No influence from change)

6/12 (No influence from evaluation)

(7) **Learning Approach** (deep - strategic- surface)

Cell:(row/column)

7/1 **A high level of autonomy supports deep and strategic approaches to learning**
Lack of autonomy supports a surface approach to learning

7/2 **Active involvement supports deep and strategic approaches to learning**
Moderate involvement supports a strategic approach to learning
Passive involvement supports a surface approach to learning

7/3 **A high level of motivation supports deep and strategic approaches to learning**
A low level of motivation supports surface learning

7/4 **Meaningful content supports a deep approach to learning**
Neutral or ambivalent content relevance support a strategic approach to learning
Meaningless content supports a surface approach to learning

7/5 **Helpful social interaction supports deep and strategic approaches to learning, while unhelpful social interaction supports the surface approach**

7/6 **An informal learning climate supports the deep approach to learning**
A formal learning climate supports strategic and surface approaches to learning

7/8 **A high level of reflectivity supports a deep approach to learning**
Moderate reflectivity supports deep and strategic approaches to learning
A low level of reflectivity supports a surface approach to learning

7/9 **A high level of memorisation supports a surface approach to learning**
A moderate level of memorisation supports deep and strategic approaches to learning
A low level of memorisation supports a deep approach to learning

7/10 (No influence from type of learning outcome)

7/11 (No influence from change)

7/12 (No influence from evaluation)

(8) **Reflectivity** (Reflective - medium - non-reflective)

Cell:(row/column)

8/1 The more autonomy the more reflective learning approach

8/2 The more active learner role the more reflectivity

8/3 The higher motivation the more reflectivity **there tends to be**

8/4 The more meaningful content the more reflectivity

8/5 **The more helpful the social interaction, the more reflectivity there tends to be**

8/6 A nonlinear relationship/Climate

8/7 **A deep approach to learning supports high levels of reflectivity**
A strategic approach to learning supports at least moderate reflectivity
A surface approach to learning supports low levels of reflectivity

8/9 The less memorisation the more reflectivity

8/10 (No influence from type of learning outcome)

8/11 (No influence from change)

8/12 (No influence from evaluation)

(9) **Memorisation** (high - medium - low)

Cell: (row/column)

9/1 **The lower the level of autonomy, the more memorisation there tends to be**

9/2 **The lower the level of involvement, the more memorisation there tends to be**

9/3 (No influence from motivation)

9/4 (No influence from content relevance)

9/5 **The more helpful the social interaction, the less memorisation there tends to be**

9/6 The more informal situation the more memorisation

9/7 **A deep approach to learning supports a low level of memorisation**
(No influence from strategic approach)
A surface approach to learning supports a high level of memorisation

9/8 The less reflectivity the more memorisation

9/10 (No influence from outcome)

9/11 (No influence from change)

9/12 (No influence from evaluation)

(10) **Learning Outcome** (innovative - neutral - conformist)

Cell:(row/column)

10/1 The more autonomy the more innovative outcome

10/2 The more active learner the more innovative outcome

10/3 The higher motivation the more innovative the outcome **tends to be**

10/4 The more meaningful content the more innovative the outcome **tends to be**

10/5 **The more helpful the social interaction, the more innovative the outcome tends to be**

10/6 **Formal and non-formal climates support innovative and neutral learning outcomes, while formal climates support conformist learning outcomes**

10/7 **A deep approach to learning supports innovative learning outcomes**
A strategic approach to learning supports neutral and conformist learning outcomes
A surface approach to learning supports a conformist learning outcome

10/8 The more reflectivity the more innovative outcome

10/9 The less memorisation the more innovative outcome

10/11 (No influence from change)
10/12 (No influence from evaluation)

(11) **Change** (high - medium - low)
Cell:(row/column)
11/1 The more autonomy the more change **there tends to be**
11/2 The more active learner the more change
11/3 The higher motivation the more change **there tends to be**
11/4 The more meaningful content the more change
11/5 **The more helpful the social interaction, the more change there tends to be**
11/6 A nonlinear relationship/Climate
11/7 **A deep approach supports at least moderate change**
A strategic approach supports moderate or low levels of change
A surface approach supports a low level of change
11/8 The more reflectivity the more change
11/9 The less memorisation the more change
11/10 The more innovative outcome the more change
11/12 (No influence from evaluation)

(12) **Evaluation** (positive - neutral - negative)
Cell:(row/column)
12/1 The more autonomy the more positive the evaluation tends to be
12/2 The more active learner the more positive evaluation
12/3 The higher motivation the more positive evaluation
12/4 The more meaningful content the more positive evaluation
12/5 **The more helpful the social interaction, the more positive the evaluation**
12/6 A nonlinear relationship/Climate
12/7 **A deep approach to learning supports a positive evaluation**
A strategic approach to learning supports neutral and positive evaluations
A surface approach to learning supports a negative evaluation
12/8 The more reflectivity the more positive evaluation
12/9 The less memorisation the more positive evaluation
12/10 The more innovative outcome the more positive evaluation
12/11 The more change the more positive evaluation

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