A STUDY OF THE RELATIONSHIPS BETWEEN CURRICULUM AND LEARNING IN UNDERGRADUATE MEDICAL EDUCATION

by

COLIN ROY COLES

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ABSTRACT

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A STUDY OF THE RELATIONSHIPS BETWEEN CURRICULUM AND LEARNING IN UNDERGRADUATE MEDICAL EDUCATION

by Colin Roy Coles

Curricula often seem to be based on the views of their planners rather than empirical findings and theoretical models. Partly this is due to an incomplete understanding of the mechanisms that link curriculum and learning. This study looks at that relationship within undergraduate medical education, especially to allow an evaluation of problem-based learning and the Southampton programme, which represent current alternatives to the conventional curriculum. It does so by identifying and analysing the causes and effects of medical students' approaches to studying as indicators of their learning, and by accounting for them in educational and psychological terms.

Using a mixed methodology involving interviews, a questionnaire and an inventory, three kinds of learning were identified: restricted, adequate and elaborated. Restricted learning reflects a chaotic cognitive structure leading to poor knowledge-retention and -retrieval. Adequate learning is 'deeper', with better retention though long-term retrieval remains poor. Elaborated learning is both deep and broad, resulting in good retention and the cognitive interconnections doctors need for effective clinical thinking.

The conventional medical curriculum and the early years in Southampton only seem able to generate restricted and adequate learning. However, problem-based learning can promote elaborated learning, as can a revision period at the end of Year Three in Southampton when students relate theoretical knowledge to their clinical experiences.

Elaborated learning occurs under certain curricular conditions, namely when the learner first has a relevant 'assimilative context' followed by specific information and opportunities for what is called 'oscillation'. On these criteria, none of the three curricula are entirely satisfactory, though problem-based learning seems almost appropriate.

A model is proposed, called 'contextual learning', for planning, evaluating and developing curricula in medical education and possibly elsewhere, though its implementation is by no means guaranteed.

PREFACE

The readership of this report

In this study I have taken as my central concern an attempt to achieve a greater understanding of medical student learning in the light of the curricular experiences they face. The approach is educational and, within that broad field of study, its orientation is largely psychological. This has certain consequences for a report which, inevitably, serves a variety of purposes.

First and most fundamentally, the report is aimed at Southampton Medical School. Its interests and well-being are my central concern, and the success of its programme has been the major directive for the research I have undertaken here. The findings reported and discussed are dedicated to the continuing development of that curriculum. At the outset I would like to record that, during my time spent working in Southampton, I have experienced a genuine and deep commitment to the Medical School on the part of all concerned - staff, students and administrators. However, in my view its curriculum faces a number of educational problems which can be resolved but there is an urgent need for further development. I hope that the conclusions I draw from this study will help those responsible for it to see more clearly the nature of these problems and what is needed to rectify them.

However, I felt I could not do this without bringing together observations of student learning and a theoretical background to which I have been exposed over the years but which most of my colleagues have not. This is not their 'fault' - their background is different from mine - but I believe that it is only possible to understand the curriculum's problems and to account for them satisfactorily in the light of that background. Thus, in part, one motive for writing this report is to share some of this knowledge, even though what I write may be unfamiliar to many and may be seen as jargon to others. All I would ask is that those who read it may appreciate and accept my intentions.

There is, though, a second intended readership: this report is presented as a doctoral thesis and will be read by people concerned with a study of curriculum and learning in general and with medical education in particular.

Being an examinable thesis has meant that the work contained within it has had to be my own, and this in turn has applied certain constraints to the study. In an ideal setting curriculum researchers might most profitably work together, with the one acting as a sounding board to the other's observations. Moreover, there is a need to collaborate closely with those for whom their findings are written. Such an approach is restricted where the work needs to be that of an individual.

The arrangement and conventions of the report

This report comprises fourteen chapters. The first introduces the study and outlines its general aims. Chapter 2 discusses broad methodological issues, whilst Chapters 3 and 4 look at the recent literature on the psychology of student learning, particularly in higher education. Chapters 5, 6 and 7 examine medical education: the problems facing the conventional curriculum pattern and recent alternatives, particularly Southampton's programme. Then, Chapters 8, 9 and 10 present evidence from three surveys carried out especially for this study. The results are discussed in Chapters 11, 12 and 13 and some general conclusions drawn in Chapter 14.

Given the varied readership of this report, it is unlikely that this arrangement of the report will suit everyone. For example, those who are familiar with educational research of this kind and have a particular interest in the psychology of learning may find it most useful to read it through from the beginning. However, others who are more conversant with, and interested in medical education, whether as teachers or as curriculum planners, may prefer an alternative 'route'. As a suggestion, these readers might look first at the general aims of the study (Chapter 1) and then move directly to the section on the present state of medical education (Chapters 5, 6 and 7), drawing where necessary on information about the psychology of student learning (Chapters 3 and 4). They might then proceed to the surveys (Chapters 8, 9 and 10), and only refer to the methodology (Chapter 2) to clarify the approach being adopted. Then, they might read the discussion and the conclusions, again referring to the earlier chapters as necessary.

It will emerge in the course of this report that such an approach, where people with different background experience and interests take a different 'way through', is entirely consistent with the findings which will be presented and the conclusions that are drawn from them.

Certain layout conventions are used here which should be noted at an early stage. Where a technical term is introduced, or words used with a deliberately special meaning, single quotation marks will be used. Where quotations from another source are included within the text they will be enclosed in double quotation marks and the reference given. Extended quotations from publications will appear as separate indented paragraphs without quotation marks, but where they refer to reported speech (e.g. from an interview) they will be indented with double quotation marks. Figures and tables will be referred to in the text by a number, and appear at the end of that particular chapter. Use has been made of appendices which extend or develop particular points. At the end of the report a list is given of the references used and these appear alphabetically by author or source.

Acknowledgements

I would like to acknowledge with gratitude the invaluable help given to me here by a number of people. First I would like to thank all who typed drafts, and in particular to Mrs. Barbara Ingram for her tireless efforts. My special thanks also go of course to the many staff and students who have been involved. Without them there would be no research, and we who undertake such work should never forget that it is their curriculum, not ours.

Then, I wish to record my thanks to Bill Fleming and Jan Graat for their assistance in data collection for the comparative study which forms part of Chapter 10, and of Martin Harman and Andy Cotton for their computer programming, as well as Mike Campbell and David Machin for statistical advice. I would also like to thank Mrs. Sheila Mooney, Senior Assistant Registrar of the Faculty of Medicine, and her office staff for all their help in supplying information, documents, minutes of meetings, etc..

In particular, I would like to extend warm thanks to my colleague Brenda Mountford for all her help, advice and counsel, not just during this study but in all our work together. Although I must take responsibility for what I have written here, she, through many lengthy discussions, has helped me greatly to formulate my ideas. I am indebted to her for this.

Other colleagues, too, have helped me. Professor Jack Howell, sometime Dean of Southampton's medical school, has been a constant source of ideas and criticism. I thank him warmly for all of this. The current Dean, Professor Barbara Clayton, has read the results chapters, and I am grateful to her for making some valuable comments. Above all, I would like to acknowledge the support of Dr. Colin Smith. Without his enthusiastic and constructive encouragement this work would have been the poorer. I thank him most sincerely.

My supervisor, Professor Peter Kelly of the Department of Education at the University of Southampton, has been of inestimable help. His criticism has been timely and always appropriate.

Finally, might I record a debt of gratitude to my family, who have suffered most from my labours. They are my inspiration, and without their help and support this study would not have been possible. To them I dedicate my work.

Colin Coles
Southampton
March, 1985

CHAPTER ONE

THE AIMS OF THE STUDY

Introduction

In this chapter the aims of the study will be outlined and a description given in general terms of the way in which these will be met.

Medical education, and especially the initial training of doctors, forms the focus of this report, and has been deliberately chosen for a number of reasons. First, the writer is an educationist working within a medical faculty, and in a very real sense the research presented here is a part of his day to day work. Indeed, to be a member of a faculty would seem advantageous because it provides direct experience of a curriculum, as well as a knowledge of the course content and the people involved, and reasonable access to places, events and documents. Secondly, for decades the people responsible for medical education have been active in curriculum development. Indeed, the profession has, as a central concern, an interest in its educational obligations, such that over the years considerable attention has been directed towards reviewing courses. In part, this study is an extension of that tradition. A third reason for studying medical education is because of the variety of important educational issues to be found within it. Students are required to relate theory and practice, it is multi-disciplinary and there is a substantial amount of information to be learnt. Moreover, medicine itself is a popular career choice, there is extreme competition for places, and medical students are both well qualified and highly motivated. Not least, medical education is important since it is costly, being one of the more expensive forms of higher education.

However, medical education is a fitting choice for such a study for other reasons. Evidence which has accumulated over the past hundred years or so has shown that the kinds of curricula traditionally being provided have not always been altogether successful educationally. Many medical students feel overloaded (Becker et al., 1961) and find it difficult to see the relevance of much of what they are being taught (Miller, 1961). A number lose their early motivation, some even becoming cynical (Simpson, 1972). Moreover, when they find themselves in a clinical setting, many medical students have difficulty in recalling and applying what they had learnt previously (Barrows & Tamblyn, 1980). When eventually they qualify and start to practice, a number of doctors experience problems for which they feel ill-prepared (Maddison, 1978; Pickering, 1979). Indeed, currently the profession itself is under attack from a number of directions (Kennedy, 1981; Wright & Treacher, 1982; Pendleton & Hasler, 1983), and public opinion seems to be demanding greater involvement in health care (Faulder, 1985). These problems and the research evidence will be discussed further in Chapter 5.

Within the past two decades a number of alternatives to the conventional pattern of medical education have emerged. For example, in the United Kingdom the medical school in Southampton has a somewhat novel educational approach (Acheson, 1974) which has come to be acknowledged with some acclaim (Pickering, 1979). A quite different approach emerged in North America, called problem-based learning (Barrows & Tamblyn, 1980), which has now been adopted by twenty or so medical schools throughout the world and seems rather successful educationally (Hamilton, 1976b). These alternatives and the research evidence will be discussed in Chapters 6 and 7.

Naturally, the people responsible for medical education want to know what the causes are of medical education's problems, and whether the various alternatives are worthwhile. Do problem-based learning and Southampton's curriculum alleviate these problems, and indeed is one approach more appropriate than another? Do students learn what they need to know more effectively and efficiently as a result of one curriculum arrangement rather than another?

Equivocal educational advice

It might be thought that education - the organised study of educational theory and practice - was in a position to provide some answers to these questions. Certainly, educational researchers have produced an abundance of evidence, and the theorists a multiplicity of advice, yet even educationists themselves acknowledge that the gap between educational theory and practice "remains a large and ugly chasm" (Kelly, 1977).

In some ways this is rather surprising. At first it seems quite obvious that a curriculum is linked in some way with certain learning outcomes. In educational settings, teachers teach and students study, largely because they believe that their efforts are purposeful and worthwhile. Both hold firmly to the assumption that a curriculum is likely to result in some kind of desired learning, and that this learning is the more or less direct result of some deliberate curricular activity. Yet, however firmly they may believe this, rarely do teachers and learners acknowledge the relationship between curriculum and learning. This remains tacit and assumed.

One consequence of this lack of sound guiding principles in educational planning has been that curricula often seem to be:

> ...an uneasy compromise between traditions (of doubtful pedigree) and various pressures for change; a mixture of high sounding aims and classroom practice which could not possibly attain the aims and sometimes flatly contradicts them. (Lawton, 1973)

A great deal of educational provision, then, is 'naturally occurring': it reflects people's wider views of life rather than some deliberate policy decision or research findings (Becher et al., 1975). Indeed, throughout history two quite distinct approaches have emerged. In one the teacher dominates, deciding what needs to be taught and learnt, and the enterprise is task centred, often competitive. It is what Davies (1976) calls "classical education". The alternative has the learner at its centre, with teachers acting as mediators of knowledge, as counsellors and guides to student learning. Such an approach is often co-operative and collaborative, and has been called "romantic" (ibid.).

These two forms of education are timeless, their origins being deeply rooted, probably reflecting the quite different ways in which people view the world. To some extent the distinction can be seen in different subject areas: the sciences tend to be 'classical' and the arts 'romantic', but even this is by no means inevitable: both approaches can be seen in many disciplines. In medical education, for instance, a classical approach is well illustrated by the traditional curriculum pattern described above, and the romantic alternative is clearly to be seen in problem-based learning. Probably, these curricula have emerged as a result of the unstated and unchallenged views of the people concerned. Certainly, they do not seem to have been greatly influenced by educational theory.

Mediating mechanisms

The study of education, then, may provide some illumination to the dilemmas facing medical education by indicating parallels elsewhere, but it seems unable to explain why the conventional curriculum pattern faces certain problems, nor to say which of the two most common alternatives is the more appropriate. Probably the reason is a failure to understand the mechanisms that link a particular curricular arrangement and the learning it generates.

The importance of such an understanding is well illustrated by the example of drug therapy. Over the years this has become transformed from witchcraft and herbalism, to the art of the apothecary, and now the science of Pharmacology. The principles underpinning this development might provide a fitting analogy in the study of medical education.

For millennia it has been known that certain naturally occurring substances have curative properties. For example, the otherwise highly poisonous plant, deadly nightshade, was found to provide an extract called belladonna which when greatly diluted helped 'settle' stomach ailments. However, it also gave certain side effects including dryness of the mouth and dilatation of the pupils. Not that all of these side effects were seen as undesirable: women in ancient Egypt are believed to have used belladonna cosmetically to enlarge their pupils, and this is said to have enhanced Cleopatra's beauty.

Drugs such as belladonna have, for centuries, been used as a basis for herbal remedies and patent medicines, yet the reasons for their effectiveness were not known. However, with the emergence of the science of Organic Chemistry it was possible to analyse these natural drugs. Belladonna, for example, was shown to contain Atropine, a chemical having the same effects as the plant extract. This finding enabled the drug to be synthesised and produced commercially without the need to use the plant from which it first came. However, although Atropine gave the same effects as, and was chemically 'cleaner' than, belladonna it also had the same side effects. Now, with the development of Pharmacology as a science, it has become recognised that drugs act in particular ways because of mechanisms operating inside the body. For example, Atropine reduces stomach acid secretion by blocking neural transmitters, though not just of the gut where it has a major effect but also elsewhere in the body, hence its side effects. It has now been possible, as a result of understanding these mechanisms, to produce a drug called Pirenzipine which acts specifically at the site it is required. Chemically it is very different from belladonna and Atropine, but it has the same main effects with reduced, though not entirely eradicated, side effects. It is likely that further development will occur, through an understanding of the mechanisms of drug action, which will enhance the desired effects and reduce unwanted ones.

In the light of this analogy, education seems to be pre-scientific. It is at a stage resembling herbalism.

Naturally occurring curricula may or may not be successful, indeed some may have certain main effects but also other undesirable side effects, yet generally the reasons for their actions are not clearly understood. One reason for this may be the complexity of educational situations. Inevitably, many factors (some identifiable, others not, some controllable, many not) influence what occurs. More particularly, the direct effect of a curriculum on student learning cannot be observed. We have to infer the effects from some other evidence, often of an inexact and imprecise nature, from what people say or how they perform.

Nevertheless, much the same could be said of pharmacological research. What occurs inside the body is the result of complex processes, and a drug's effects cannot be observed directly. Instead, pharmacologists investigate effects associated with the action of the drug which are observable, that is by using various indicators of internal processes. An example is taking a blood sample from a person who has had a particular drug administered. By chemical analysis of the sample it is possible to deduce that certain internal mechanisms are occurring.

Much the same approach is adopted in psychological research. Mental mechanisms are inferred by observing overt and sometimes covert behaviour. Indeed, some recent educational researchers taking a psychological orientation have suggested that a fruitful area for investigating the effectiveness of a curriculum might be to examine how students approach their studying (Marton & Säljö, 1976a,b; Entwistle & Ramsden, 1983). The research evidence for this will be discussed further in Chapter 4.

Recently it has been claimed that there is a 'chain of causality' (Entwistle & Ramsden, 1983) linking curriculum and learning. The rationale is this: students experience a curriculum, they approach their studying in a particular way, certain learning processes occur and these have certain consequences. However, so far this research has not described with any certainty the nature of the links in the chain nor the way they interact. Nevertheless, the approach seems to be fruitful, and further research is clearly indicated, looking particularly at how students study in known curricular contexts. What seems to be needed in looking at medical curricula is for *students' approaches to studying to be* observed, noting both the curricular circumstances under which these occur and the outcomes of the learning that takes place. Such an approach is uncommon in medical education research but it would seem a valuable one to adopt.

However, merely observing approaches to studying under certain curricular conditions does not establish the mechanism that may be operating. Just as the pharmacologist draws upon the study of Physiology and Biochemistry to understand the mechanisms of drug action, so educational researchers are likely to need appropriate explanatory theoretical models to account for their findings.

Perhaps the most clearly articulated theoretical models of learning are to be found in Psychology, and over the past one hundred years (Flugel, 1964) a number of theories have emerged. The current view, referred to as information processing, may be of value in explaining student learning:

> Only that can be retrieved that can be stored and... *how it can be retrieved* depends on how it was stored. (Tulving & Thomson, 1973)

Two points are important to stress. First, how we learn determines the effectiveness of the learning outcome, and, secondly, the way in which we learn is greatly influenced by the learning situation in which we find ourselves. These notions will be discussed further in Chapter 3, but they appear directly relevant here. In education a curriculum is an organised 'learning situation' and the 'learning outcome' is what results from it.

Even more significantly, current psychological thinking seems to be suggesting that 'how' we learn relates in some way to both the situation and the outcome: it appears to mediate the two, and this supports the empirical research into approaches to studying referred to above (Marton et al., 1984). Thus, it would seem useful to adopt an essentially psychological orientation in the present study in an attempt to account for how medical students learn.

The questions being asked

This study, then, seeks to understand the mechanisms which link curriculum and learning in medical education so as to devise a more appropriate basis for planning and evaluating medical curricula. Its prime focus will be an observation of students learning within known curricular contexts, particularly looking at how they approach their studying.

Such an orientation is admittedly one-sided. It omits the views of teachers which are likely to be influential in determining what is taught and how it is taught. Moreover, teachers are likely to be in a position to facilitate or possibly to hinder student learning. Naturally, too, the staff will be involved in any development that may be needed of their curriculum, and their views ultimately need to be sought before any change is contemplated. Thus, whilst the importance of teachers and teaching must be stressed, this study looks at the role of the student in learning. Indeed, it might be argued that this is the more fundamental issue: teachers sometimes teach without students learning, and some students can learn without teachers teaching well or at all. At present, not enough is known about the mechanisms that mediate students' experiences and the learning that occurs. To orientate research towards understanding these links seems to be a necessary if not sufficient basis for curriculum change. Indeed, by identifying and understanding these mechanisms it might then be possible to say more clearly what form the teaching might take and what an appropriate curriculum would comprise.

In looking at medical student learning, it would seem useful to investigate how students study within the conventional curriculum pattern, with all its apparent problems, as well as the two common alternatives seen in Southampton's arrangement and in problem-based learning which appear more successful. Thus, the questions being asked here will be:

1. In what ways do students learn under certain known curricular circumstances within medical education, and in particular are there differences in the way students approach their studying which might be associated with different curricular conditions and certain learning outcomes?

2. Would it then be possible to utilise existing explanations from the psychology of learning to account for medical student learning, or must these explanations be modified?

3. What might these findings and their explanations say about the relationship between a curriculum and the learning it generates, particularly in medical education?

4. Is it possible to derive from this a model of curriculum and learning which might provide a basis for devising more appropriate curricula in medical education and possibly elsewhere?

Summary

In this chapter, some potentially serious problems of medical education have been described, and it is suggested that medical educators have not been greatly influenced by educational theories in planning curricula. Indeed, novel alternatives have emerged, but the study of education provides few guidelines for choosing between them. It was further argued that there is a need to understand more clearly the mechanisms that are operating.

In the search for an understanding of the mechanisms that link curriculum and learning, it is felt useful to examine students' approaches to studying in known curricular circumstances, employing the contribution of current psychological learning theory to explain the findings.

Four broad sets of questions are being asked here which this study hopes to answer. However, this raises a number of methodological concerns which will be considered further in the next chapter.

CHAPTER 2

RESEARCHING STUDENT LEARNING IN KNOWN CURRICULUM CONTEXTS: SOME METHODOLOGICAL CONSIDERATIONS

Introduction

In this chapter, broad methodological decisions will be taken for researching student learning in known curriculum contexts. It will be argued that two apparently irreconcilable research approaches need to be adopted - nomothetic and ideographic. Both have their strengths and weaknesses, but neither alone is sufficient for understanding student learning. A mixed methodology is proposed and some of the implications of doing so are examined.

Conflicting research styles

The literature on research into curriculum and learning indicates conflicting methodological styles. With the rise of experimental enquiry came a nomothetic approach involving a testing of hypotheses through purpose-designed studies which provided quantitative data, which characterises most scientific research. By adopting this approach Psychology has emerged during the past one hundred years as an identifiable discipline, and through it has produced general theories of learning. However, two decades ago, when educationists came to investigate curriculum development projects, they found this hypothetico-deductive research tradition well established (Parlett & Hamilton, 1972), but greater illumination (ibid.) of the problems facing curricula came by observing single cases in depth rather than by generalising from a large number of instances. (Further details of this methodological shift are given in Appendix 1.) The approach was ideographic - a well established research orientation in the Arts, Humanities and Social Sciences involving observation, interviewing and questionnaires, providing what might be called 'qualitative data'. Sociologists typically use an ideographic approach even though they look at much the same phenomena as psychologists.

The ideographic and nomothetic approaches are quite distinct: one emphasises the differences between particular instances whilst the other identifies generalisable principles. Quite probably the differences stem from the classical/romantic distinction noted in the previous chapter, and they might occur for the same two reasons: the methodology adopted may reflect the nature of the subject being studied and the kind of person attracted to it:

> ...some people have a strong emotional attachment to a way of describing the world which precludes one or other of these styles of research. (Entwistle & Ramsden, 1983)

Although it is quite legitimate for researchers to look either for variability or consistency, it is essential that each acknowledges the alternative approach (Entwistle, 1979). However, in many research studies this has not been the case. Some psychologists are suspicious of the lack of precision in their sociological colleagues, whilst some social researchers feel unnaturally constrained by the scientific approach. Moreover, it may be difficult for a single researcher to adopt both approaches, since they pull researchers in opposite directions (Entwistle & Ramsden, 1983).

Clearly, both approaches have their strengths which could be of value to the present study, but they also have their weaknesses. For example, ideographic studies, being descriptive, often fail to identify the scale or scope of the problems being identified (Harlen, 1976) and also attract the criticism of bias on the part of the researcher:

> They aspire to tell it as it is. And they often write as if that is possible if they allow for some distortion due to their own values. But there is no telling it as it is. (Stenhouse, 1975)

Researchers carrying out a nomothetic approach also face their own constraints:

> We anticipated the creation of... precise models of student achievement out of our psychometric approaches. Such a precision proved impossible... The difficulty we found in extrapolating our statistical results into the real world of lecturers and students is not uncommon, but it is an

indictment of the traditional preoccupations of educational researchers. (Entwistle & Wilson, 1977)

Recently, however, it has been suggested that neither qualitative nor quantitative methods of research alone can provide "a full and convincing explanation of student learning" (Entwistle & Ramsden, 1983):

> It seems essential that an understanding of student learning should be built up from an appropriate alternation of evidence and insights *derived from both qualitative and* quantitative approaches to research.

From the mid-1970s onwards a number of curriculum researchers attempted to bring together these two approaches. The work of Pask in the United Kingdom and Marton in Sweden, together with the work of Mayer in North America, all of which will be referred to again in Chapters 3 and 4, showed this trend. They observed *student learning in natural* or *minimally contrived* situations, took note of students' descriptions of their experience and added information about the consequences of the learning, not just in terms of examination results but also from purpose-designed tests of knowledge. One such study in the United Kingdom (Entwistle & Wilson, 1977) involved a large survey within the nomothetic tradition but the researchers found that their findings lacked ecological validity (Brunswick, 1956). Instead, they concluded quite seriously by characterising student learning as a board game, with counters, dice, hazard and chance cards, etc., noting:

> Our solution was to draw on the interview data and inject a dose of intuition... It lacks the precision of statistical models, but in its more direct links with the students' descriptions of their perceptions of 'reality', it is in keeping with recent trends in research methodology. (Entwistle & Wilson, 1977)

It seems, then, that a mixed methodology combining the nomothetic and the ideographic approaches may be valuable in understanding student learning. However, such an approach is hardly new:

> Men of experiment are like the ant, they only collect and use; the reasoners resemble spiders, who make cobwebs out of their own substance. But the bee takes a middle course. It gathers its materials from the flowers of the garden and of the field but transforms and digests it by a power of its own. (Francis Bacon, 1561-1626)

A mixed methodology

What, then, are some of the implications of adopting a mixed methodological approach? As the above discussion has suggested, an important principle is to be eclectic - to select and use appropriate methods from differing research orientations, with the problem being studied dictating the methods used, not vice versa (Parlett & Hamilton, 1972). Clearly, too, a single researcher is unlikely to have knowledge of or expertise in all areas that may be needed. Inevitably, using a mixed methodology may mean seeking outside advice more than in single methodology research. To see how all of this might influence the research being undertaken here it might be useful to consider the course it is likely to take.

Initially, there may be a need to spend some time observing student learning. Now, observation in its broadest sense might take a number of different forms: participant or non-participant observation, interviewing, questionnaire construction and use, administration of inventories, obtaining examination grades, etc. Obviously these different methods will involve in varying degrees both qualitative and quantitative data collection, but all must face the important question of 'subjectivity': by how much is a particular observational method affected by researcher bias?

No research is ever totally bias-free, and data collection even of a strictly nomothetic kind is potentially subjective. Ironically, often this question seems not to be asked of nomothetic research, which because of its nature is frequently assumed to be objective. However, the ideographic researcher needs to anticipate and address the question of bias, perhaps unfairly (Becher & Kogan, 1980; Guba & Lincoln, 1981). In part, this apparent injustice is a reflection of what 'counts' as research at any time, and at present the nomothetic approach not only seems paramount but often goes unchallenged. However, in part, too, it reflects the fact that ideographic researchers themselves are often centrally placed in the data collection process, and the possibility of bias is omnipresent. Perhaps, though, it is more reasonable to ask in what ways the researcher is able to establish the reliability and validity of the data being obtained: are the findings representative, accurate and true? These criteria can be achieved, even when observing ideographic data, in a number of ways which will be further considered later in this report when surveys are being undertaken. However, certain general points might be made here.

Clearly it is important to consider the sampling of the observations being made - are they representative of the whole population being studied? So, too, the observations of one researcher might be checked by another, providing a 'second opinion'. Moreover, it is important to recognise that a 'knowledge of results' (Woodworth & Schlosberg, 1954) may influence the observations made, hence the strong tradition within all research for prospective studies, though this is not always possible in social research - students' reflections of their experience may be more a historical than a scientific form of enquiry, but no less valid as a result. More particularly, the current literature lends support in establishing the reliability and validity of 'social' data, for example in interviewing (Schatzman & Strauss, 1973: Guba & Lincoln, 1981) and in questionnaire development (Oppenheim, 1966; Moser & Kalton, 1971).

The observational phase of the research is likely to lead to analysing and presenting the findings. Where the data are quantitative the findings are likely to be analysed statistically (Dubois, 1965; McCall, 1980), possibly by computer, and the results tabulated. However, qualitative data are rather more difficult to handle, largely because of their volume as well as the complexity and interaction of the variables found. Clearly, the analysis and presentation of any data, whether qualitative or quantitative, involves the researcher's subjective judgement: why are some comments included and others ignored? Why have certain correlations been calculated and presented but not others? Why are some findings presented whilst others are omitted? The problem, then, is not that judgements are being made, but that their basis needs to be declared. Often the reasons are assumed and not stated regarding quantitative data, yet analysing qualitative data attracts criticism. Again, this appears unjust but the charge will be met here.

In the handling of qualitative data, an important distinction is made by Becher and Kogan (1980) that the same descriptive information can be represented either topographically or topologically. The former indicates as it were 'surface features' whilst the latter shows interrelationships. In a study of student learning it is likely that the data obtained will, in part, show how a course proceeds. This kind of 'chronological analysis' (being of a topographical nature) might be of value in providing an unfolding story, showing how certain learning occurs at certain times. However, this is unlikely to reveal to any great extent the nature and causes of the problems that students face. Thus, a different kind of analysis of the data may be needed focusing on:

> ...any matter of interest or importance to one or more parties... any statement, proposition or focus, that allows for the presentation of different points of view; any proposition about which reasonable persons may disagree, or any point of contention. (Guba & Lincoln, 1981)

Thus, a chronological analysis may lead on to some kind of 'issue analysis'. Of course, at the present time it is not possible to say what form such an analysis will take. Inevitably this will only emerge not just once data are collected but in the course of the chronological analysis. Details of the steps involved will be given later in this report at the time such an analysis is undertaken.

Another consideration is the sequencing of the enquiry. Clearly, as some data are collected and issues identified, there may be a need to obtain additional data to confirm earlier findings or explore others further. Should, then, quantitative data collection precede the collection of qualitative data? As already argued, neither is more reliable and valid than the other, and there would seem to be good grounds for carrying out an ideographic approach before a nomothetic one. Issues cannot be studied further until first they have been identified. However, nomothetic approaches, such as the use of a questionnaire, may be valuable in studying further issues in greater depth within a wider population but are unlikely to identify the issues. Thus it would seem necessary here to begin by collecting qualitative data and then, once the issues have been identified, to proceed towards a quantitative approach.

Again, at this stage the nature of any follow-up procedures cannot be determined with any certainty. Rather the research needs to be 'responsive' (Stake, 1974), adapting to the findings that emerge and adopting appropriate follow-up approaches. For this reason the kind of enquiry anticipated here, unlike much purely scientific research, has no clearly stated hypotheses at the outset. Rather, it attempts to answer a number of questions, though this is not to imply that testable hypotheses will not arise as the research proceeds once particular issues are identified.

These, then, are some implications of adopting a mixed methodology, so how might the approach be characterised? It certainly is not 'experimental' in the strict sense of the term, nor is it expected to be solely a 'case study' approach. Rather it is likely to involve single instances as well as large sample surveys, possibly of a comparative nature. In some respects this approach is rather like a doctor's attempt to diagnose and treat a patient's condition. At the outset a 'history' is taken, using interview techniques and providing qualitative data. Then, and as a result of this, certain symptoms (or issues) are identified, possibly requiring further investigation, often providing quantitative data. The research approach being proposed here appears to resemble this clinical method. Perhaps it is not common in educational research

(Cohen & Manion, 1980), but it is also not unknown (Smedslund, 1977; Lovell, 1978).

Summary

In this chapter there has been a review of alternative methodological approaches for researching student learning in known curricular contexts. It was noted that one is ideographic and the other nomothetic. The understandable differences seem irreconcilable, but neither alone appears satisfactory in the study of student learning. A mixed methodology will be attempted here, and some support for this comes from recent educational research. Indeed, it is similar to the clinical method which doctors employ. The precise details of the methods to be adopted are not given at this stage but will be described later in this report when data collection is undertaken. Nevertheless, some implications of a mixed methodology were noted.

CHAPTER 3

THE PSYCHOLOGY OF STUDENT LEARNING

Introduction

In this chapter, recent psychological literature will be reviewed, particularly that which examines the current information processing model of learning. It will be shown that central to modern learning theory is the belief that our ability to perceive is directly attributable to our memory store and that, through perceiving, we further elaborate that store. The implications of this are discussed in relation to the retrieval of information, forgetting and problem solving. Finally, there is a discussion of some educational implications of the model, particularly examining the role of advance organisers which, it is claimed, are highly effective in facilitating learning under certain well defined circumstances.

The psychology of human learning

Current psychologists (Anderson, 1980; Baddeley, 1976; Kintsch, 1977; Klatzky, 1980; Lindsay & Norman, 1972; Neisser, 1976) see learning as a series of processes. First, information must be perceived by the individual and this occurs when we organise incoming information in the light of previous experiences of similar information. If nothing else happens, within a short time the information which formed our perception is lost, replaced by other, more immediate information. For example, we may remember a telephone number for as long as it takes to find it in a directory and dial the number, but probably for not much longer, unless there is some significant reason for doing so. This information is considered as being retained in our short term memory (STM) - a theoretical construct to account for this transient yet essential memory of sensory input - which is distinguishable from long term memory (LTM) in which knowledge is assumed to be stored.

Perception

The role of STM in perception is an important one. Much of the information which passes into STM becomes retained in LTM in what are considered to be 'cognitive structures' and these structures are both a cause and an effect of our ability to perceive. Indeed, there is a dynamic relationship between perception and learning - we are only able to make a perception because we have learnt something, and through perceiving we extend what we have learnt.

Perception is often described as pattern recognition (Klatsky, 1980): incoming information is matched against stored information. If we 'recognise' that information, that is if it matches what we already know, then we perceive it as being relatable to what we know. However, it is highly likely that the incoming information will not match perfectly with our existing patterns, especially in young children, giving rise to mistakes or misperceptions. However, as a result it is likely that the stored pattern, the cognitive structure, will be extended by this misperception, making it more inclusive or elaborate, thus facilitating a more correct perception when the same information is subsequently received.

The process of pattern recognition has attracted considerable research effort by psychologists. Stated simply, the nature of pattern recognition seems to reflect some kind of template matching. However, studies have shown that it is more appropriate to regard the stored pattern as some kind of 'prototype' - an ideal example of every class of information (ibid.) - accommodating variation in incoming information, with the perceiver making a more or less approximate match. Prototypes contain information about defining characteristics that delineate one prototype from another, allowing differention between them. Nevertheless, this prototype matching in perception can result in 'errors' as seen in illusions - we think we perceive something which in fact does not occur.

With time and with learning, perceiving becomes automatic (Anderson, 1980) and very fast (Klatsky, 1980). Indeed, the speed with which we perceive necessitates some notion of continuous processing (ibid.), that is we carry out a number of pattern recognising acts simultaneously. Indeed, it is considered that perception involves a two-way process - information from outside is related to stored prototypes (bottom up processing) whilst ideas generated by cognitive functioning directs attention to specific information in the environment (top down processing). Klatsky calls this process interaction (ibid.).

Thus, as we perceive, we establish and elaborate our memory store which we utilise to make future perceptions. Our ability to perceive effectively is a direct result of the degree of elaboration of our memory store.

Learning

As already suggested, learning is dependent upon perception as well as being an essential feature of it: we perceive because we have a store of related information which we utilise to process incoming information. As a result we elaborate our stored information. Thus, learning partly is dependent upon what we already know (Ausubel, et al., 1978). As Gagné (1984) notes, through learning we build our knowledge into concepts:

> As learning proceeds, additional links with other concepts and other networks are formed... The schema as originally acquired become more elaborate as the empty slots in its outline are filled in.

Later learning, then, is distinguishable from early learning in terms of the number and extent of 'cross-linkages' between cognitive structures (Entwistle, 1981). Certainly learning cannot be construed merely as the quantitative accretion of knowledge:

> ...there is a qualitative change in the performance of the learner. (ibid.)

Ausubel describes this formation of links as 'subsumption' (Ausubel et al., 1978). He argues that concepts develop once learners "can meaningfully relate to their cognitive structure the criterial attributes of a new concept without first relating them to multiple particular instances that exemplify it", that is to generalise; a view which parallels the prototype matching notion of perception.

Memory, however, is not just storage of information. In fact psychologists see little difference between learning and memory (Lindsay & Norman, 1972), but it is concerned with our ability to retrieve information when it is required. Klatsky sees input (or encoding) and retrieval as "inextricably tied" (1980) and argues that the effectiveness of retrieval is determined at the time the learning takes place:

> ...retrieval is an active process in which previously encoded information is accessed in a search of memory and evaluated with respect to the retrieval context. (ibid.)

Retrieval, she argues, is "an active search through memory structures directed by a cue" (ibid.). This further supports the notion that efficient learning depends on establishing multiple linkages between cognitive structures. As Baddeley puts it:

> The stronger the trace and the more discriminable it is from the background noise, the greater the probability of correct recall. (Baddeley, 1976)

Indeed, Tulving (1972) refers to what he calls 'episodic memory' where information concerning the learning episode is coded in, and stored with, the information being learnt. On retrieval, stored information may be recalled if, at the time of retrieval, information relating to the learning episode is also present. Thus, our ability to retrieve information may be determined by having, as it were, a 'route', or 'routes' of access to that information. However, if the route is simple or uni-directional, then retrieval will be highly dependent on having available the same cue or cues that were present at the time the information was being stored. Naturally enough, there is a strong possibility that this will not occur. Nor is it often possible to predict at the time of learning the kinds of cues that will be present when, in the future, we wish to retrieve certain information. However, if we have established multiple links between cognitive structures, it is more likely for us to be able to retrieve certain information even though learning episode cues are not available at the time of retrieval, but this will only be possible if there is some cognitive 'pathway' connecting the information to be retrieved and those cues that are available in the retrieval situation. Efficient retrieval requires multiple linkages.

Further support for this view comes from research on forgetting. Earlier theories of forgetting had been closely associated with quantitative notions - it was 'decay of a trace'. Bartlett's work (1932), however, suggested memory and forgetting were more dynamic, errors being due to interference, distortion and construction, a view which, like his notions of learning, was to anticipate the current information processing model. Ausubel, for example, sees forgetting as a function of the meaningfulness (or otherwise) of the learning process - meaningful learning leads to retention whilst rote learning leads to forgetting (1968). The mechanism for remembering and forgetting, then, is the same: it depends on the nature of the learning process.

Most current theories of learning incorporate some notion of 'inhibition' to account for forgetting - the learning of one item influencing the learning of another - which can act forwards or backwards. Pro-active inhibition is said to have occurred when some early learning makes later learning more difficult, whilst retroactive inhibition occurs if later learning makes recall of previous learning more difficult. Whilst pro-active and retroactive inhibition can readily be shown to operate under laboratory conditions, their existence in the real world is rather more doubtful. A number of current writers prefer, like Bartlett, to account for inhibition in terms of interference (Klatsky, 1980; Baddeley, 1976). Novak suggest that:

> Information learnt by rote inhibits subsequent learning of additional similar information. Moreover, even information learnt by rote that is forgotten inhibits learning of similar new information.. While it is true that restudy or relearning of the same information is facilitated by prior retention in both rote and meaningful learning, the saving ...in rote learning is

> only for relearning precisely the same material. (Novak, 1977)

Thus, rote learnt information is likely to be forgotten, largely because of the manner in which it is stored - in isolation from other cognitive structures - indeed, the very existence of rotely learnt stored information may even make the subsequent learning of related information more difficult (pro-active inhibition). However, meaningful learning, by its very nature, has multiple linkages. Not only is information learnt in this way likely to be remembered but the very availability of such cognitive structures will facilitate the subsequent learning of related information (pro-active facilitation).

Problem solving

It seems, then, that successful retrieval depends on having available many well-established cognitive interconnections - a deep, rich knowledge - but cognition means more than simply being able to retrieve information when it is required. It is much more common that the information will be needed to do something with; to use it for a specific purpose, often for solving problems.

For a number of years it had been assumed that problem solving was a learnable phenomenon - that we become more expert at it through some form of training. Indeed, psychologists such as Bruner (1960) saw this as support for the then common view that education was indeed a process, not a product. But, more recently, this view has become challenged by researchers who have shown that the most important feature of problem solving ability is the availability to the problem solver of specific information in the area of the problem (Thorsland & Novak, 1974). Indeed, even recent work on 'artificial intelligence' supports the view that "the essence of intelligence seems to be less a matter of reasoning ability than on knowing a lot about the world" (Waldrop, 1984):

> Machines, like humans, will learn best when they learn slowly - when they relate each new concept to what is already known instead of trying to organise a whole mass

of facts by some instantaneous Gestalt.

The difficulty which psychologists such as Bruner faced was that their view failed to delineate precisely what a problem is. Once a problem has been solved it no longer is a problem, particularly if information about it, its solution, leads to an elaboration of cognitive structure. Thus, on being presented with the same problem a second time, one would have been enabled to solve the problem by the previous experience of it. This has led psychologists to distinguish between routine problem solving and creative problem solving (Anderson, 1980), the former using existing procedures which are learnable and the latter requiring the development of new procedures. Our ability to solve routine problems depends on the amount of experience we have had in solving similar problems, but our creative problem solving ability depends on how well we are able to transform the problem to a number of sub-tasks about which we do know something. However, the conditions for establishing such experience are not yet well understood (Gagné, 1984; Langley & Simon, 1981). Nevertheless, it is now well established that:

> ...by increasing the availability of relevant knowledge, one can facilitate problem solving; conversely, one can inhibit problem solving by increasing the availability of irrelevant knowledge. (Anderson, 1980)

Perhaps a useful analogy to illustrate the current view of the relationship between stored knowledge and problem solving ability is that of a library. We may need to find a particular book which we know to be located within the library, to help us to solve a particular problem. To obtain that book, we may use one of a number of catalogues - author, title, class, etc. - which gives access to it. Obtaining the book, then, is dependent partly on the librarian's abilities to catalogue and shelve it in an appropriate manner, and partly on our ability to use certain library skills and procedures. As an analogy for learning and problem solving it emphasises the importance of a knowledge store (shelved books) and also our ability to retrieve information, and this depends partly on the range of cognitive linkages (catalogues) we have made but also on our problem solving skills (our knowledge of and ability to use the cross referencing system). Naturally, like all analogies, the library notion is only partly adequate: memory is more dynamic than a library since it is constantly reorganising the cataloguing system. Whilst this enables us to retrieve more and more elaborated information from our memory store it would make the librarian's task unrealistic.

Information processing and education

Whilst learning may be described in psychological terms as information processing, for the present study it is its manifestation in educational settings which is rather more important. The information processing model has emerged largely from research studies under contrived laboratory conditions but education takes place under rather less ordered circumstances. Nevertheless, psychologists have, for decades, looked for ways in which their findings might be applied to education, and the current information processing model has already proved valuable. Ausubel, for example, argues that "the most important single factor influencing learning is what the learner already knows. Ascertain this and teach him accordingly" (Ausubel et al., 1978). Clearly this directly supports the view that we learn by relating new information to existing cognitive structures and in the process elaborate those structures. However, it also emphasises an important psychological principle when applied to education that learning is dependent upon the learner's prior knowledge:

> ...meaningful learning takes place if the learning task can be related in non-arbitrary substantive (non-verbatim) fashion to what the learner already knows, and if the learner adopts a corresponding learning set to do so... Rote learning, on the other hand, occurs if the learning task consists of purely arbitrary associations...if the learning lacks the relevant prior knowledge necessary for making the learning task potentially meaningful, and also...if the learner adopts a set merely to internalise it in an arbitrary verbatim fashion. (ibid.)

Thus, Ausubel clearly sees that our ability to learn in a meaningful way is dependent upon having available at the time of learning some appropriate prior knowledge to which the to-be-learnt information can be related. If such prior knowledge is not available, then the learner has no alternative but to learn by rote. Educationists set out deliberately to devise situations which enable learners to learn, and Ausubel argues that, given our present knowledge of Psychology, we should be able to make appropriate prior knowledge available to the learner. Central to his view is something he calls 'advance organisers' (1960):

> The principal strategy...for deliberately manipulating cognitive structure... involves the use of appropriately relevant and inclusive introductory materials (organisers)...introduced in advance of the learning material...and...presented at a higher level of abstraction, generality, and inclusiveness...The principal function of the organiser is to bridge the gap between what the learner already knows and what he needs to know before he can successfully learn the task at hand. (Ausubel, 1968)

An advance organiser, then, made available to a learner prior to the presentation of some to-be-learnt information, should facilitate that learning.

Stated in this form, Ausubel's concept of advance organisers is testable in educational settings and this has attracted considerable research interest. Perhaps surprisingly in the light of this theoretical support, some empirical findings reject the notion. Barnes and Clawson (1975), for example, reviewed thirty-two studies and claim that twenty show no significant advantage. Similarly, in the teaching of Biochemistry, Redford-Ellis et al. (1982) found that a prior practical orientation did not facilitate the learning of subsequent theoretical information. Findings such as these led to the opinion that "there is little firm evidence that advance organisers are as effective as Ausubel would expect them to be" (Entwistle & Hounsell, 1975).

However, other research clearly supports the notion of advance organisers. Slock et al. (1980) used organisers in a medical Microbiology course and demonstrated higher scores and better retention. Giles et al. (1982) tested students' recall of lecture information and found that information presented sixteen minutes after the start of the lecture was better recalled, which could be interpreted as being due to the establishing of advance organisers during the early phase of the lecture.

The research evidence on advance organisers, then, appears equivocal, and it would seem important to understand why this is. Recently it has been suggested that this may be because the effectiveness of organisers depends on the circumstances in which they are used (Mayer, 1979a). Work by Grotelueschen, for example, showed that:

> Subjects with little prior knowledge benefited most from material structured to progress from the concrete to the abstract, whilst subjects with a high level of prior knowledge benefited more from materials that were abstract throughout. (1979)

From his own experiments, Mayer concluded that under particular circumstances students learn best in a "general-background to specific-facts sequence", and learning was characterised by what he called "assimilation-to-schema" (1977). The key to Mayer's support for a theory of advance organisers is his assertion that learning can only be judged as being effective under conditions which he called "the far transfer of knowledge" (1979a). He suggested that research studies which merely test "knowledge retention" failed to show any effect of advance organisers, but that under conditions of far transfer (that is where knowledge needs to be retained, retrieved and applied in a context other than the one in which it was learnt) advance organisers do indeed facilitate learning. On this basis he reviewed a number of experimental studies, and concluded that after twenty years of research on advance organisers "assimilation theory is still the best predictor of results" (1979b). He suggested that:

> ...advance organisers will result in broader learning when the material is potentially conceptual but appears unorganised or unfamiliar to the learner, when the learner lacks a rich set of related knowledge or abilities, when the organiser provides a higher level context for learning and when the test measures the breadth of transferability. (ibid.)

This, then, seems to resolve the apparent ambiguity of research findings into the effectiveness of advance organisers. They seem most effective in situations where the information to be learnt is abstract, or at least unfamiliar to the learner, and where the ultimate test of the effectiveness of that learning is the learner's ability to utilise that knowledge later. Under other circumstances, for example if the to-be-learnt information is concrete, or is in an area which is familiar to the learner, then advance organisers appear to have no effect. It is also clear that an advance organiser is more suitable when it is concrete in nature, understandable by the learner and is relatable to the subsequently-to-be-learnt information. However, Mayer notes that:

> Their precise nature is still unclear but...instructional techniques influence the learning process in systematic and predictable ways. The goal of research on the psychology of learning and instruction must be to continue to develop precise descriptions of the mechanisms involved. (1982)

Summary

Learning is both a by-product and an essential component of perception. It only occurs within a context - that of the learner's existing knowledge. Meaningful learning comprises the relating of new information to something the learner already knows. Rote learning occurs when the learner does not already possess some relatable prior knowledge. Educationists can enable meaningful learning to occur by, if necessary, deliberately manipulating the learning context, through making available to the learner some appropriate advance organiser. Advance organisers only operate if the to-be-learnt information is abstract and/or unknown to the learner at the time of learning and they are most effective when they are concrete, understandable to the learner and relatable to the subsequently presented to-be-learnt information, particularly when learning is assessed in terms of its 'far transfer'.

CHAPTER 4

APPROACHES TO STUDYING IN HIGHER EDUCATION

Introduction

In the previous chapter psychological evidence was presented which suggests that learning results from a processing of information, and it indicated that the conditions under which learning occurs can influence its effectiveness. This research, however, was based largely on experimental studies which used, as an indication of learning, a subject's ability to perform in a particular, often contrived manner. In this chapter, research into learning in higher education which indicates how students approach their studying in more natural settings will be reviewed, looking in particular at those conditions which appear to determine a student's success.

Stable characteristics of learners

Some research seems to suggest the existence of more or less stable characteristics of learners which may influence student learning: intellectual abilities, learning style and level of development.

1. Intellectual ability on entry:

One commonly held notion is that a person's ability influences their learning. It is obvious that people vary intellectually but there is little evidence that in higher education these differences act as a predictor of future performance. Partly, of course, this is because the ability of students entering higher education is relatively homogeneous. Entwistle and Wilson .(1977) reviewed this literature and suggest that there is some evidence of specific abilities such as numeracy and performance in mathematics though this correlated negatively with, for example, verbal ability. They note a negative correlation between verbal ability and students' performance in medical schools.

In the United Kingdom an important ability measure of applicants for higher education is their school leaving performance as indicated by their grade in the Advanced Level examinations of the General Certificate of Education ('A' Level GCE). Indeed many universities and medical schools use these as an important (sometimes the only) criterion for entry. The research evidence gives equivocal support to this. Entwistle and Wilson (ibid.) suggest that 'A' Levels provide a positive but low correlation with subsequent performance, particularly where they study the same subject, but that by far the best correlations are obtained between a student's first year grades and final grades, not their grades on entry.

This evidence seems to point to factors within courses being better predictors of success than entry qualification. Probably this is because in higher education the range of ability is greatly reduced by the selection process and because some degree subjects are novel to a number of students.

2. Learning styles:

The literature also suggests that students may exhibit differing styles in their approach to learning tasks probably reflecting their own personality (Witkin et al., 1977; Hudson, 1966; Novak, 1977).

It was also observed (Hudson, 1968) that students seemed either bound to the syllabus or free from it, leading to the notions of 'sylb' (syllabus bound) and 'sylf' (syllabus free) students. Building on this, Parlett (1970) found that 'sylbs' generally attended more lectures, sat near to the front of the class, and did more course work than the 'sylfs' but they tended to do rather less well on individual projects. Mathias (1980) suggested that a better distinction was between students who were what he called 'course focused' and those who were 'interest focused'. He found that mathematics students showed much greater course focusing than B.Sc.-by-thesis students who showed more interest focus, suggesting that the type of curriculum accounted for the differences. Supporting this view, Laurillard (1979) found that students approach their learning in different ways which depended on the situations in which they found themselves, concluding that their "styles and strategies of learning are context dependent".

This research seems to suggest that people may have particular styles, or personalities, which may influence their learning performance and posssibly their choice of degree course, but that particularly in higher education the way students learn seems to reflect the circumstances in which they find themselves.

3. Level of Development:

A number of studies suggest that learning may be dependent on the learner's level of development. For example, Piaget (1962) indicated that children pass through intellectual stages and that a child's thought was qualitatively, not just quantitatively, different from adults. Similar work has been carried out in higher education. Heath (1964, 1978) described students at Princeton University as developing into what he called "reasonable adventurers" who combined "the curious and the critical". Perry (1970) working in Harvard produced a scheme in which students' intellectual development passed through nine positions from what he called "dualism", through "relativism" to a point of "commitment". He saw the shift towards relativism as being particularly important in higher education and called it "the most difficult instructional moment". He argued that two factors were significant in establishing relativism: first, the nature of knowledge as depicted by the curriculum and second, the role of the teacher:

> Where knowledge consists of facts...the teacher's primary duties were to make the facts clear... The students, in turn, collected correct facts and procedures. Where knowledge is contextual and relative, the teacher's task is less atomistic as the student's is more integrational. The good teacher becomes one who supports in his students a more sustained groping, exploration, and synthesis. (ibid.)

Thus, a student's intellectual development (or lack of it) seems largely influenced by curricular factors including the nature of knowledge presented by the courses students take and the manner in which teachers mediate the knowledge.

Taken together, the research into learning styles and abilities suggests that, whilst these may influence a student's approach, they do not seem to provide good predictors of subsequent performance, which seems to depend more on curricular factors, that is, how courses are arranged and presented (Bernstein, 1971).

Learning strategies

Much of the literature on higher education emphasises students' strategic responses to curricular experiences rather than their styles or abilities.

1. Depth of processing:

Ference Marton and his colleagues in Sweden studied student learning and found what they called "qualitative differences in how students grasp or comprehend ideas and principles" (Marton and Säljö, 1976a). Students were asked to read articles and were then questioned about them. Two quite different learning approaches were found which were called deep-level and surface-level processing:

> In the case of surface-level processing the student directs his attention towards learning the text itself (the sign), i.e. he has a reproductive conception of learning which means that he is more or less forced to keep to a rote learning strategy. In the case of deep-level processing...the student is directed towards the intentional content of the learning material (what is signified) ...towards comprehending. (ibid.)

Marton and Säljö found a direct relationship between the 'level' of processing a student adopts and their understanding of the text. Another study (Marton and Säljö, 1976b) examined the effects on students' approach to studying when different types of questions were interspersed between two learning tasks. This showed that subjects who were given factual questions "paid very close attention to the surface structure of the text, e.g. to lists of points and figures" whilst those given questions requiring a deeper understanding showed more variability: it would appear easier to influence a learner into adopting a surface rather than a deep-level processing approach. Dahlgren (1978) had observed students' levels of processing in a first year economics course which set out to teach a number of basic concepts and found that most students merely focused on learning individual items. He suggests that surface processing appears commonly to occur where there is a heavy work load and rapid pace, noting that:

> It is certainly possible to pass an examination without understanding, if only the necessary rules are correctly memorised... But a lot of time will be required; the resulting knowledge will be a mass of logically and psychologically inconsistent fragments; and the practical usefulness of the individual's efforts will, in the last analysis, be highly questionable. (ibid.)

Thus, the Swedish work indicates that students are most likely to adopt a surface approach resulting in a poor learning performance if courses are heavily loaded, rapid and the information factual. However, it is less clear from this research what conditions are needed for generating a deep approach; it merely shows that it leads to a better learning performance.

2. Breadth of learning:

The work of Marton and his colleagues emphasises the importance of a student's depth of processing but others suggest that this alone may be insufficient. Pask, for example, found that some learners acquire skills in a sequence and called this 'serialism' whilst others grouped skills together, which he called 'holism'. He found that neither approach was superior to the other but the one adopted was consistent and seemed to reflect the individual's preference, or learning style (Pask & Scott, 1972). Further studies led Pask to believe that serialists and holists could better be characterised as operation learners and comprehension learners - the comprehension learner quickly grasps an overall picture of the subject matter, seeing relationships between aspects of the work and identifying sources of further information whilst operation learners "pick up rules, methods and details, but are often unaware of how or why they fit " (Pask, 1976b).

Pask argued that, whatever the learner's preferred style, successful learning relies on understanding and this requires a combination of both comprehension learning and operation learning. Those who successfully do this he called 'versatile' (Pask, 1976a) and he demonstrated that versatility could be developed by what he called 'conversational techniques' - when learners explore the meaning of concepts by relating knowledge in different forms such as facts, examples, analogies and models (Pask et al., 1979). Central to Pask's concept of versatility, then, is an active interrelating by the learner of different kinds of knowledge, as in a conversation. However, he also suggested that for each approach there was a corresponding 'learning pathology' - operation learners are prone to improvidence ("failure to use valid analogies, failure to use a common principle, or both") whilst comprehension learners may be prone to globetrotting ("the misunderstanding of valid analogies, the use of vacuous analogies, or both"). Pask suggests that learning requires 'versatility', not merely having a deep knowledge of any particular kind.

3. Approaches to studying:

A number of researchers suggest a link between the way in which people study, or more particularly their study habits (Wrenn, 1941; Mendelson et al., 1978; Biggs, 1976, 1978, 1979). Early work by Entwistle (Entwistle & Entwistle, 1970; Entwistle & Wilson, 1970) indicated that both motivation and study habits were associated with academic performance but the correlations were rather low (Entwistle et al., 1979b), suggesting a complex and possibly interactive relationship. This led on to an examination not just of study habits but students' more general approaches to studying. As has already been suggested in Chapter 1 and will emerge later, this work is important to the present study so it will be described here in some detail:

> In 1975 work began on developing a new inventory at Lancaster which would extend the early attempts at measuring study methods and motivation. Many of the original items were retained...The inventory was developed through a series of pilot versions. At each stage alpha factor analysis with rotation to oblique simple structure was carried out using the SPSS Programme (Nie et al., 1975). In addition each scale was carefully examined to ensure content validity and conceptual consistency in relation to the constructs described in the literature. (ibid.)

The inventory was constructed around previous work as well as the emerging notions of both Marton and Pask already described above. This led Entwistle to propose what he called a descriptive model of learning with four distinct processes:

> The first stage involves initial attention either to the overall description (comprehension learning) or to the details of the evidence and steps in the argument (operation learning). This in~~i~~itial focus of attention leads on to the second stage of considering relationships, which may involve either examining links between ideas or concepts and with personal experience (comprehension learning), or the way pieces of evidence fit together to build up a logical argument (operation learning). To reach a deep level of understanding all four processes would normally be required, but our factor analysis suggests a tendency for each factor identified to have a pathology, as well as a desirable attribute. The orientation towards understanding may be accompanied by a tendency towards the superficiality intended with globetrotting. The orientation towards reproducing may be partially compensated by the attention to detail found in operation learning. And finally the orientation towards success may sacrifice understanding for attainment, unless a demand for full understanding is built into the criteria of assessment. (ibid.)

Subsequent refinement of the inventory together with further factor and cluster analysis produced <u>The Short Inventory of Approaches to Studying</u> (Entwistle, 1981) (copy attached in Appendix 8). This is a thirty-item questionnaire which requires students to answer questions about their approaches to studying by indicating whether they strongly agree, agree with reservations, disagree with reservations, or strongly disagree with each statement. The inventory is readily and quickly completed and scoring is a simple clerical task. By a combination of scores Entwistle computes seven scales as follows:

(a) Achieving orientation - contains items relating to organised study methods and competitiveness.

(b) Reproducing orientation - relates to syllabus boundness, learning by memorising, extrinsic motivation.

(c) Comprehension learning - student attempts to relate ideas to real life, to map out subject areas.

(d) Meaning orientation - looking for meaning, motivated by interest in topics and courses.

(e) Operation learning - cautious in using evidence, interest in logical problems and rationality.

(f) Improvidence - emphasis on facts and details, difficulty in building up overall picture.

(g) Globetrotting - rather superficial approach, individualistic methods of organising knowledge, tendency to jump prematurely to conclusions or to seek generalisations without sufficient evidence. (ibid.)

Each of these scales may be used separately or in combination with others to give the following eight dimensions:

1. The (a) scale gives a score for "achievement motivation".
2. The (b) scale describes the students' "reproducing" orientation.
3. The (d) scale is a measure of the "meaning" dimension.
4. Combining (c) and (g) scores gives an indication of tendency towards a comprehension learning style.
5. Combining the (e) and (f) scores gives a measure of the operation learning style.
6. An index of a versatile approach to learning is provided adding together scales (c), (d) and (e).
7. An index of learning pathology is given by combining scales (b), (f) and (g).
8. The best predictor of overall academic success is likely to be produced by combining dimension 1 with 6 and subtracting 7 (with a constant). (ibid.)

The Short Inventory of Approaches to Studying has a number of positive attributes. It has been produced over a relatively long period, through a process of continual refinement and as a result of statistical and computer-based analysis. Above all it has been checked against students' own observations from interviews in an attempt to establish its validity. In addition it has been revised in the light of recent theoretical constructions. Indeed the model of learning emerging from it (described above) is more powerful than any of those on which it rests in that it is capable of unifying the work of others. Nevertheless, it also has weaknesses. First, like any inventory it takes as it were a single 'snapshot' of a student's approach to studying. It may not reflect the way a student will respond on some other occasion. Whereas each item has been checked for its internal consistency the inventory has not been tested for its retest reliability (Ramsden, 1983). A second weakness is that it attempts to assess a student's general study approach, indeed the items are designed to be applicable across a wide range of academic disciplines. However, students do not study 'generally'; they do so in relation to specific tasks. There are no indications whether the inventory is applicable to the same student on different occasions or with students in different locations.

Further work, then, appears needed in an attempt to bring together evidence on students' approaches to studying and their experiences of particular curricula. Some research has already emerged. Gaff, in Holland, has shown that there may be what he calls "distinctive atmospheres" which may affect student learning (Gaff et al., 1976). Ramsden, in Lancaster, has attempted to identify students' perceptions of their academic environment, concluding that:

> A supportive atmosphere for learning is an elusive quality; but...is more likely to exist if lecturers show humility rather than arrogance towards their students. A tutor without a commitment to teaching ...might put students off studying it, perhaps for ever. (Ramsden, 1979)

Subsequent work has attempted to relate these perceptions with students' approaches to studying which showed that:

> Using just two variables, 71% of departments were placed in the correct group ($P<0.05$). A reproducing orientation was predicted with 75% accuracy using all eight scales...There is a clear indication that departments rated highly on good teaching and freedom in learning have students with higher average scores on meaning orientation. Moreover, a positive evaluation of departments is associated with positive attitudes to studying. (Ramsden & Entwistle, 1981)

Ramsden has taken this further to suggest that "the associations between context and approaches to learning are causal: the type of teaching and assessment influence how students learn" (Ramsden, 1981). Indeed, in some recent unpublished work (Ramsden 1983) he has indicated that different types of curricula may be associated with different approaches to studying. Sixth formers in two quite different schools - one traditional, the other innovative - completed the inventory. He found that students at the innovative school which featured self-study adopted a significantly lower reproducing and greater meaning orientation than students at the traditional school.

Conclusions

In this chapter, studies, particularly in higher education, have been examined which indicate various factors influencing student learning. These have shown that students' intellectual ability, learning style or level of development may vary but are not valuable as predictors of subsequent performance, which is more influenced by what students do once they begin their courses. Indeed, it seems that curricular experiences may provide the most consistent explanation of how and even what students learn.

The work of Marton emphasises that students' 'depth of processing' significantly correlates with their understanding. Pask, however, demonstrates that depth alone may be insufficient but that students need to be 'versatile'. Recent attempts to identify and measure students' approaches to studying were described and this work seems to provide a valuable contribution to the present study. The findings and the theoretical constructs which follow from them seem related to the information processing model of learning outlined in the previous chapter, though the links are not clearly drawn. They emphasise the importance of students' perceptions of the tasks they are being presented with, which links with some of the observations of learning made in Chapter 3. In particular it seems clear that it is important to recognise the influence of the context in which the learning occurs. The information processing model emphasises that learning results from a relating of new information to what we already know and that education can provide a bridge between what the learner knows and what he needs to know in order to learn effectively. It would seem that a curriculum is ideally placed to do this. There seems, then, to be a need to identify and understand the contribution being made to learning of the context in which it occurs. It also seems valuable to link together the laboratory based findings of experimental psychologists and the findings of researchers in the more real world of education, finding out how students approach the tasks they see being demanded of them and accounting for these findings in terms of the theoretical models devised under experimental conditions.

In addition, the work reported in the previous chapter showed clearly that the effects of the context might depend on the specific nature of the learning task, particularly as seen from the learner's viewpoint. It was noted, for example, that if the information to be learnt is abstract or unfamiliar to the learner there appears to be a need for educational situations to establish a more concrete and inclusive context prior to the presentation of that information. If the information to be learnt is familiar then establishing such a prior context is of no benefit to the learner. This seems to contradict Entwistle's four processes notion which suggests that learning could start either with comprehension or operation learning. Thus, to understand the mechanisms linking curricular experiences with learning outcomes, and especially to be able to interpret the role in this of students' approaches to studying, the researcher must look not just at the context but at the content, and at the ability of the learner to make sense of it at the time it is being presented. It may be that this differs in different subject areas.

Thus, a reasonable way forward in research into student learning in higher education seems to be by examining students' approaches to studying within known curricular circumstances and by attempting to understand more clearly the mechanisms at work.

CHAPTER 5

UNDERGRADUATE MEDICAL EDUCATION IN THE UNITED KINGDOM: THE CONVENTIONAL CURRICULUM ARRANGEMENT.

Introduction

In this chapter there is an examination of what is required of medical education in preparing entrants for the profession. This outlines the conventional curriculum, which is the most commonly occurring pattern of provision, and presents research evidence to suggest that it may not be altogether successful.

Medical practice, medical science and medical education

Recorded history can illuminate current practice, and medicine is no exception (Clarke, 1966). In particular it helps in an understanding of the roots from which today's medical education stems. It is clear that one of man's fundamental concerns has been the maintenance of health, and it is likely that the institutionalising of health-care is as old as organised society (Garrison, 1929). However, it was not until about the fifth century BC that medicine emerged as an experimental study (Clagett, 1957). Until then it had been more an applied art (Farrington, 1961), and physicians were educated through an apprenticeship (Flexner, 1925; Ellis, 1963). In many ways this process of education appears to have been relatively successful with perhaps one of the highest points of medical history occurring at this time - the foundation of the Hippocratic School of Medicine with its pragmatic yet caring approach providing a basis even for present-day practice. With Plato, however, science became a way of knowing rather than a way of acting: to become knowledgeable meant to be able to think consistently (Farrington, 1961). Medical Education became science education, and medical schools were established for teaching and research.

With the downfall of the Greek and Roman Empires the scientific tradition was lost to western Europe, being maintained largely through the Arab cultures. Medicine reverted to the practice of pre-Socratic times "as imbued with magic, religion and superstition as the witch-doctor of more recent times" (Clarke, 1966). Scientific medicine and institutionalised medical education re-emerged only with the establishment of the mediaeval universities (in the United Kingdom, Oxford was founded in 1167 and Cambridge in 1209), but physicians educated there received little practical instruction even though they considered themselves superior to the apprentice-taught practitioners - barber-surgeons and apothecaries (ibid.).

The sixteenth and seventeenth centuries saw remarkable scientific developments and by the middle of the nineteenth century medicine in Britain was expanding rapidly. However, its educational provision was somewhat chaotic (Cohen, 1968) with medical courses proliferating at universities and in hospitals. The Medical Act of 1858 set out "to regulate the qualifications of practitioners in medicine and surgery" and was "a pivotal event in the history of medical education in Great Britain" (ibid.).

Up until the middle of the last century medical education prepared entrants to the profession largely through an apprenticeship (Ellis, 1963) providing in some ways an ideal means of directly transmitting knowledge through its practical application. However, that system was open to abuse, it lacked a suitable means of control and led to gaps in knowledge, and came to be seen as an inappropriate way of training doctors. In the emerging medical schools, unlike the apprenticeship system, students were taught most of what it was thought they should know <u>before</u> they entered the profession, indeed the 1858 Act emphasised the need for training "a safe general practitioner". At this time in the United Kingdom a body was established - the General Council of Medical Education (later to be known as the General Medical Council or GMC) with which qualified practitioners need to register, and from time to time its members publish recommendations concerning the curriculum at medical schools.

Thus, the intention of medical education was clearly to produce a safe general practitioner, and this became the basis for undergraduate courses. Very little was known then about the knowledge doctors actually needed in order to practice effectively, indeed it has not been a research interest until relatively recently. However, since the early 1970's there has been a considerable amount of research into how doctors approach and solve medical problems, and this gives some indications as to the knowledge necessary to do so.

Prior to the emergence of this research it had been assumed that doctors, as a result of their education and experience, gained a unique and quite specific knowledge which enabled them to treat patients' problems. The educational model was essentially quantitative - an experienced clinician knows more than an inexperienced clinician - and the educational process reflected this: to teach students what they will need to know. The belief was that, when a doctor meets a patient, he gathers all the information there is concerning the patients' condition and then, by comparing this information with what he knows, he arrives at a diagnostic decision. An appropriate analogy for this process would be a sieve: information obtained from a patient is put into it, most does not contribute towards understanding the problem and falls through the mesh, but what remains is indicative of the condition and suggests the diagnosis through some kind of matching with what the doctor knows. However, recent research has questioned this view of diagnosis and hence the educational provision for it.

Experience showed that not all doctors proceed towards a diagnosis in the same way. Two doctors examining the same case might take quite different lines of enquiry. Indeed one doctor with two similar cases might proceed quite differently. It was clear, too, that the time to reach an understanding of a patient's problem is considerably less than would be needed if the doctor had to collect all possible information; indeed the doctor may only ask two or three questions and yet be able to arrive at a diagnosis. This gave the act of diagnosing more the character of an art than a science.

These observations suggested that clinical thinking is much more 'untidy' and complex than had been assumed to be the case and this led to further research. The most significant work to emerge within the past decade has come from North America (Elstein et al., 1978; Barrows & Tamblyn, 1980) and from the United Kingdom (Gale, 1980; Gale & Marsden, 1983), observing students and clinicians, (both experienced and inexperienced), with either real or simulated patients and using a technique called stimulated recall - videotaping interviews, replaying them to the doctor and asking questions concerning the thinking processes involved.

Out of this research has emerged the observation that diagnostic thinking is indeed a dynamic and interactive process - doctors ask questions of patients in order to check ideas they may be having about possible reasons for, and explanations of, the patient's condition. The responses given then determine subsequent questioning, and so on. Such a process has been called hypothesis-generation-and-testing (Elstein et al., 1978; Barrows & Tamblyn, 1980) though Gale suggests that this oversimplifies a more complex cognitive process. She notes:

> Interpretation of clinical information is a *sine qua non* of the diagnostic thinking process, mediating between information elicited and diagnosis made. (Gale, 1980)

Gale goes on to suggest that this interpretation can only be made by reference to stored knowledge which may either be present within the cognitive structure of the doctor or, if not present, needs to be obtained. Central to Gale's view is "a restructuring or reinterpretation of clinical information" brought about either by an activation of existing knowledge or "by extrapolation to a variety of contexts from the information given" which leads to the "final selection, rejection or not of the interpretations or reinterpretations of (earlier stages of the process)" (ibid.).

Much the same point is made by Elstein, who argues that although an intellectual skill of diagnosing needs to be developed, the doctor must acquire considerable amounts of relevant knowledge, though he notes a paradox:

> Teaching medical problem-solving cannot focus solely on problem-solving skills...(nor is it) dependent solely upon mastery of passively recalled content. (Elstein et al., 1979)

Taken together, this research on clinical thinking seems to be making a number of common points which have certain implications for medical education. Generally, doctors are not aware of the cognitive processes they routinely use, but when they do become aware of them they are often surprised at their nature. Clinical thinking is an active rather than a passive process. The physician obtains information from a patient in response to his cognitive processes. The physician does not first collect the information and then interpret it. Interpretation of information is an ongoing part of the process. Clinical thinking is not an unusual process, nor is it one that is unique to medicine. It is a process elsewhere referred to as formal reasoning (Piaget, 1972), productive thinking (Wertheimer, 1945), and problem-solving (Bruner, 1961). It is a normal thought process of the human adult. Clinical thinking is unique, then, only in so far as physicians use particular information stored in their memory which aids the interpretation of data from the patient. Clearly, too, the physician's memory is two-way: not only are its stored contents used in clinical reasoning, but are likely to be further elaborated as a result of it.

Such a view closely parallels that of information processing in learning, described in Chapter 3. Quite probably the same mechanisms are at work, though none of the researchers reviewed here have suggested this. More recently, it has been suggested that clinical thinking may indeed come about through a process of 'prototype matching' in much the same way as perceptions are formulated (Bordage and Zacks, 1984). Clearly this research will progress but this appears to be a useful orientation.

It seems, then, that two sources of information are employed in forming a diagnosis. One comes from the patient, largely from answers given to the doctor's questions. The second comes from doctors' own knowledge, normally from their memory store. Thus, clinical reasoning appears to rest on the processing of information, and a doctor's memory store, which is used extensively in forming a diagnosis, is likely both to be established by and extended through acts of clinical reasoning. Clinical thinking is distinct from other similar mental processes only in its specific memory content - the knowledge of the physician - which aids the progress of the process, but it is also clear that the doctor needs an appropriate memory store such that relevant information can be readily retrieved and used when required, sometimes under novel circumstances. To solve clinical problems and to think diagnostically a doctor needs to have not just a lot of knowledge of a particular kind but ready access to it.

The conventional curriculum pattern

Medical education may be thought of as a preparation for medical practice by the inculcation of appropriate knowledge. In the United Kingdom the conventional and most commonly occurring pattern for achieving this, formulated and regularised at the time of the 1858 Medical Act, comprises three distinct phases, pre-medical, pre-clinical and clinical, though normally, today, the pre-medical phase occurs before students enter medical school such that, in practice, there are two phases, the pre-clinical and the clinical. In the pre-clinical phase students are taught about biological and social mechanisms (particularly those underpinning health or disease) and in the clinical phase about the diagnosis and management of illness. This pattern, with a clear separation between theoretical and practical teaching and with the one preceding the other, had emerged by the early part of the nineteenth century (Newman, 1957) and such an arrangement appeared quite obvious (Flexner, 1925):

> Common sense, with which pedagogical sense coincides, places the basic before the medical sciences on the theory that, if the student learns the chemical and physical alphabet which physiology and anatomy employ, his progress will be expedited.

However, virtually from the 1858 Act onwards the students' progress seemed anything but expedited. One immediate problem concerned the amount of information to be taught and learnt. As early as 1863 the GMC reported:

> ...an overcrowding of the curriculum of education, whether as to the number of courses, or of lectures in particular courses...followed by results injurious to the student. (in, GMC, 1957)

By 1869 it found it necessary to add that "some limit must be assigned to the amount of knowledge that can be fitly exacted" (ibid.), yet at the turn of the century it was noted that "the medical course (is) seriously overburdened...and too fully occupied to permit a healthy assimilation of much which the student is taught" (Newman, 1918). Nevertheless, knowledge was expanding and new disciplines emerging, and these became added to the curriculum. In 1927, the GMC recommended including Clinical Pathology, Radiology and Bacteriology and, in 1936, Geriatrics, Psychology, Industrial Diseases and Mental Deficiency as well as the study of legal and ethical issues.

In the early 1940s, considerable anxiety came to be expressed in the United Kingdom about the nature of medical education and the government appointed a committee under the chairmanship of Sir William Goodenough "to enquire into the organisation of medical schools" (Report, 1944). In its report, the Committee repeated concern about overcrowding in the curriculum, suggesting that "a ruthless pruning...is urgently necessary" and that the GMC should review the curriculum and make recommendations. In 1947 the GMC commented that they "could not fail to share the anxiety of the Goodenough Committee" but suggested that they had very limited powers to effect any change, urging medical schools not to retain in their curricula "anything which it is unnecessary or premature for students to learn" (GMC, 1947). The Medical Act of 1950 incorporated many of the recommendations of the Goodenough Report and, with them, the suggestion that the GMC should undertake visitations to medical schools, which began in 1952. The Council's observations became the basis for their 1957 recommendations which warned that:

> ...students have tended to concentrate their attention unduly on memorising factual data. The Council feel no doubt that an effort should be made to reduce the congestion. (GMC, 1957.)

However, these efforts were not altogether successful. A number of studies of medical courses have suggested that the problem of overload is widespread and, as yet, unresolved. In a study in North America, Becker and his colleagues (1961) suggested that students respond to the load by "playing the system" - finding out what is immediately required and devising the most effective way of achieving this somewhat limited end. A more recent study by Anderson and Graham (1980) highlights the nature of the problem. They attempted to assess the number of concepts and facts being taught, claiming that, in basic science teaching, the rate is about twenty four facts per hour whereas the student may be capable of effectively coping with only about six.

Becker's study had noted increasing cynicism as students proceded through their course. Research by Alexander and Haldane (1979, 1980) at Aberdeen Medical School suggested that early work-load was an important source of stress, arguing not that stress should be eliminated but that "the appropriate sources and degree of stress (should) be more clearly defined, and...more effort be put into teaching students how to cope" (1979). A study by Schwartz et al. (1978) described medical school education as "a process of disillusionment" and reported many students as being unhappy and "in conflict", whilst a study by Coburn and Jovaisas (1975) suggested that:

> The overwhelming amount of material to be absorbed, the social isolation, the pressure of examinations, and the discrepancies between expectations and reality all...bring psychological stress.

Similar findings emerged from work by Johnson and Hutchins (1966) and Rosenberg (1971). In a study by Edwards and Zimet

(1976) it was found that "chief amongst students' concerns are a lack of personal freedom, excessive academic pressures, and feelings of dehumanisation". A study by Gottheil and his colleagues (1969) observed the same phenomenon, but their finding was perhaps even more important. They compared students' perceptions of medical school and attitudes towards patients, concluding that when students saw their educational environment as lacking warmth and humanistic values they treated their patients in much the same way.

A study by Manderson and Sclare (1973) recognised what they called "an overworked-fatigue-anxiety" syndrome which they called "a vicious circle". Research by Adsett (1968) investigated the psychological health of medical students, suggesting that First Years were the most susceptible, with many complaining of an "inability to cope with the huge volume of factual material".

Schwartz and Snow (1974) looked into the problems of failure at medical school and questioned the assumption that it resulted from lack of either ability or motivation. Indeed they found that many students failed "because they were too serious", suggesting that students find themselves in a "double bind" - they have a great deal to learn but find it impossible to do so:

> It is part of the harassment connected with any rights of passage, and it is an effort to teach the virtually unteachable. (ibid.)

In addition to the load being placed on medical students, a second problem was to emerge - the relevance of courses. The Act of 1858 had stressed the need to produce a safe general practitioner. Curriculum planners interpreted this as meaning that the early years should provide a scientific background since it was assumed that "medicine is part and parcel of modern science" (Flexner, 1910). Newman echoes this view that "the pursuit of medicine requires a basis of general science" (1923). Indeed writers in the early part of the twentieth century were in no doubt that:

> ...medical education must be conceived as primarily the effort to train students in the intellectual technique of inductive science. (Flexner, 1925)

However, in reality students seemed not to grasp the fundamentals of science (Newman, 1923): the relevance of what they were being taught appeared obscure to many. Moran Campbell (1976) suggests that this is because of the type of science being taught:

> It is generally accepted that medical students should learn those stories from the basic sciences that enable medicine to be rational. But there are several reasons why science as an explanatory activity has much more to offer.

Maddison (1978) agreed that "basic science education...is singularly effective in annihilating the motivation and the idealism of a substantial majority of the students, whilst still leaving most of them with a quite inadequate scientific basis for their later clinical education and for their subsequent practice as a clinician".

The dilemma was that much of the early teaching was intended to be of value subsequently but, at that time, students failed to appreciate this (Newman, 1957). However, as with calls for a reduction in the curriculum's load, few attempts were made to address the problem of relevance. Alexander and Haldane (1979) report that many Aberdeen students find the transition between the pre-clinical and clinical years stressful and, after the first year, this is the next most common time for withdrawal from the course. No less disturbing is the wealth of evidence from studies that have looked at the amount students appear to have forgotten by the time they reach the clinical phase. For example, Barrows, notes the paradox that, although he had been responsible for teaching in the early part of the curriculum, when students came to him in the clinical years, they appeared to know very little of what he had previously taught them (Barrows & Tamblyn, 1980). Miller (1961) described a number of studies of this and claimed that the retention of basic science knowledge is no better than that shown by psychological experiments using nonsense syllables. Similarly a study by Rico et al. (1981) found students' memory of basic Biochemistry significantly decreased over time - a 25% loss over a year.

However, the problem of 'forgetting' seemed more complex than merely being unable to remember what had been taught and learnt earlier (Ware et al., 1971). A study by Ekwo and Loening-Baucke (1979) studied medical students' performance in solving clinical problems and found that although students were able to demonstrate their basic science knowledge through examination performance, they could not use this knowledge in a clinical setting. Wingard and Williamson (1973), in an extensive review of the literature, found "little or no connection" between the undergraduate grades of medical students and subsequent career performance. Two studies by Helfer (1970, 1972) investigated the interviewing skills of medical students on a paediatric attachment, which showed that first year students were more able to demonstrate competent interviewing skills than were senior medical students. From his research he suggests that:

> ...as medical students move through their training, a certain degree of their innate ability to communicate...seems to have been altered by their desire to obtain factual information. (1970)

Similarly, a study by Mayou (1978) on psychiatric decision-making suggested that students "displayed considerable knowledge (but) had learned rather less about the selection and organisation of treatment". Research by Gonnella et al. (1970) showed that senior students might gain high examination scores yet not be able to carry out a simple screening procedure based on the same knowledge. Indeed, Sherwood (1978) speaks of "the tyranny of information gathering to the exclusion of knowing what to do with it".

Barrows argues that the fault lies in the education of the medical student, suggesting that "we teach him one system and expect a performance that implies the need for a totally different system" (Barrows & Bennett, 1972). Farquhar makes much the same comment:

> The practising physician is expected to

> apply the unrelated knowledge and unrelated facts gained in one structure (medical education) to a problem having an entirely different structure (actual diagnosis and treatment)...an inefficient and needlessly difficult way to practice medicine; perhaps needlessly expensive. (Farquhar et al., 1970)

All of this evidence seems to suggest little correlation between a student's factual knowledge and clinical competence (Barrows, 1976), but it also concerns the nature of what is being taught. Earlier it was noted that medical education became science education because it was assumed that medicine was essentially scientific. Only in passing was there any acknowledgement that medicine was more than this. In the 1920's and 1930's social, psychological, moral and ethical topics were introduced to the curriculum, but even in 1968 a Royal Commision noted:

> Students have commented repeatedly to us on the inadequacy of the teaching they get in this field. (Report, 1968)

Others, too, have been critical of behavioural science teaching (Pickering, 1979). Maddison (1978), for example, regrets how little curriculum time is devoted to "those sciences to do with man, society and culture", whilst May and Clark (1980) argue that their place remains "precarious" even though they provide "a liberalising influence". Myler-Crook (1974) suggests that the behavioural sciences "have an initial resistance to overcome" since medical students have come to expect medicine to be scientific and concerned with certainties whereas, in reality, "one is dealing...with shades of grey". Wright and Treacher (1982) point out that the practice of medicine is socially determined, and Kennedy expresses the point even more forcefully:

> Modern medicine has taken the wrong path. An inappropriate form of medicine has been created...As now taught and practised, medicine is avowedly and self-consciously scientific...But an education which demands high skills in scientific subjects before going to medical school, and involves years of breathing the heady air of...scientific endeavour once there, produces what it is intended to produce: a doctor who sees himself as a scientist...It may not produce what is so often needed: someone who can care. (Kennedy, 1981)

Conclusions

In this chapter the needs of medical practice have been examined regarding the education which prepares entrants for the profession. It reviewed recent research on the clinical thought process and it was argued that doctors need a particular memory store to solve medical problems. The most common manner in which this is acquired, through the conventional curriculum arrangement, was described. It has a clear division between pre-clinical and clinical components - the former largely teaching mechanisms of normality and abnormality whilst the latter teaches clinical practice. A brief review of the historical development of medical education in the United Kingdom showed that it became reorganised in the middle of the nineteenth century by Act of Parliament but that this, and subsequent recommendations by the General Medical Council and others, have done little to solve its perennial problems. In particular it was noted that, despite these changes, many students feel overloaded, lose their early motivation, some even becoming cynical, fail to see relevance in much of what they are taught and are not able to retrieve their pre-clinical knowledge in a clinical setting.

It seems reasonable, then, to conclude that the people responsible for medical education have failed so far to resolve its perennial problems and that, largely, this is connected in some way with the conventional curriculum arrangement. However, in recent years attempts have been made to devise more appropriate alternatives and in the next chapter some of the more common developments will be described and evidence given from research studies which have looked at their effectiveness.

CHAPTER 6

ALTERNATIVES TO THE CONVENTIONAL CURRICULUM IN MEDICAL EDUCATION

Introduction

In this chapter alternatives to the conventional pattern of medical education are described. The discussion begins by indicating the educational climate of the post Second World War period and then by identifying reforms of medical curricula and their apparent effectiveness. In particular it focuses attention on vertically integrated models, especially problem-based learning, which generally seems to have much to commend it although its theoretical basis remains to be established. It concludes that even this development was more a response by the planners to the educational climate of its time and their perception of medical education's needs, as they saw them, rather than the embodiment of some deliberate educational philosophy or the implementation of research findings.

The climate of medical education

Following the reforms recommended by the Goodenough Committee as described in the previous chapter, the GMC in 1957 devolved much of its educational responsibility to the medical schools themselves, suggesting that it was their duty to innovate. The general tenor of the document was "to instruct less and to educate more" (Cohen, 1968) and, in many ways was "most permissive" (Ellis, 1960). Perhaps this was less the manifestation of some conscious educational policy on the part of the GMC but rather more a reflection of general societal trends. Elsewhere in education, developments were occurring which lessened the influence of central control giving greater freedom to individuals and there was a general trend towards interdisciplinarity.

Also within medical education at this time there was a growing interest in curriculum research. Although in North America the Journal of Medical Education had been published for many years (by 1985 it was producing its sixtieth volume), there was no similar outlet for research publications in the United Kingdom. However, in 1966 the Association for the Study of Medical Education (ASME) was formed which produced its own publication - the British Journal of Medical Education (later re-named Medical Education). Generally, research proceeded rather more rapidly and coherently in North America (Miller, 1980) and a number of innovations emerged from it. In the United Kingdom and Europe change was rather slower, though in 1973 an ASME Conference on curriculum development identified a number of areas in which changes were occurring (ASME, 1973). From this growing literature it is possible to discover two broad types of development which might be called part-curriculum and whole-curriculum changes. The first refers to any development of individual courses or aspects of a course, whilst the second concerns developments that are curriculum-wide.

Part-curriculum developments

One of the most significant part-curriculum developments in medical education over the past two decades has been a growing concern over teaching methods. Miller notes that medical teaching is dominated by lectures; not that it was the lecture method which he criticised but what he called "the lecture system - showing and telling but with more telling than anything else" (Miller, 1978). Other researchers commented that:

> ...students were often well taught but almost always under-challenged. (West, 1966)

Miller recommends a shift of emphasis from teaching to learning. Others argue that medical education should rest on the general principle of "training...the student's mind" (Pickering, 1979). An innovation to accommodate this has been the introduction of student-centred work programmes. Neame and Powis (1981) describe the experience at Newcastle in Australia, and Geertsma et al. (1977) report that an independent studies scheme was preferred by students to the conventional programme. Morgan (1977) describes such a scheme in the teaching of the basic sciences, and reports that it "appears to give many students a greater degree of satisfaction than the classical...programme". Indeed he found that students' examination results were higher than those who took the traditional course. Others report similar schemes with similar results (Lambie et al., 1981; Schwartz, 1980; Ways et al., 1973).

Another trend has been towards the use of computers, more recently micro-processors, in undergraduate medical education (Raj et al., 1982). A study by Marion et al. (1982), suggests that students taught in this way may be no more knowledgeable than in a conventional programme but instruction takes less time. Other studies suggest more positive effects. Murray et al. (1978) found medical students' attitudes towards the approach "favourable", and Skinner et al. (1983) that it was "highly acceptable", also finding that "it produced up to three times as much learning". Essex and Sorlie (1979) found that use of a computer "contributed to an increase in performance on subsequent examinations", whilst Abdulla et al. (1983) reported that it "facilitates interaction with the teachers".

Some medical schools have attempted to introduce clinical examples into the teaching of the basic sciences. A survey by Khayam-Bashi (1978) of students' attitudes to Biochemistry reported that they felt their courses would be "more relevant to the medical curriculum if clinical applications were emphasised over basic principles". Blecher (1978) describes teaching Anatomy "in the context of clinical application". He found that "both students and teachers were enthusiastic about the approach" and claims "the system seems to have resulted in considerably improved motivation and much improved understanding".

Taken together, these various schemes appear effective in their own terms but the research evidence for their success is rather sketchy and imprecise. Moreover, very few researchers have looked at the effects of the innovation on how or what students learn, and those that have rarely explain any improvement. Most report positive attitudes and preferences towards the innovation though it is unclear whether these might not be the result of some 'halo-effect' from the innovation itself or from the innovators - most teachers who innovate are enthusiasts, and enthusiasm is infectious. In few studies have these variables been controlled and it is rare for their findings to be accounted for in terms of mechanisms. Generally, then, the contribution of research into part-curriculum changes seems more to illustrate that the educational climate is innovational rather than providing convincing evidence for the efficiency of any particular innovation.

Whole-curriculum developments

From the literature two forms of whole-curriculum development have occurred. One emphasises the linking of hitherto separate disciplines normally within the pre-clinical phase, and the other a much greater linking of the pre-clinical with the clinical phase. For the purposes of this review the former will be referred to as horizontal integration and the latter as vertical integration.

(i) Horizontal integration

In recent decades, current pre-clinical subjects in some curricula have been brought together in a horizontal way into interdisciplinary or integrated courses. For example, in 1952, Case Western Reserve Medical School in North America changed its conventional curriculum into an interdisciplinary one. This development is painstakingly described by Williams (1980). A major change was to move from discipline-based to so-called 'systems' courses, in which roughly the same content was taught but the focus was 'bodily systems' (cardiovascular, respiratory, etc.) rather than isolated disciplines (Anatomy, Physiology, Bichemistry, etc.). Williams places particular emphasis in her report on the way the staff slowly began to change certain well established assumptions about medical school curricula and, although she concludes that these shifts were perhaps the most remarkable achievement, she observes that "millimetres would have been an appropriate scale in which to measure movement", adding that "in the struggle for faculty receptivity...there were times when brave men of goodwill and high hope felt like sitting down and crying". Nevertheless, she suggests that "the revision of the curriculum at Western Reserve shook the world of medical education for some years to come": she notes that a number of schools adopted systems courses and made others "reconsider what they were doing". However, commenting on the impact of the curriculum on teaching and learning, Williams suggests:

> Experience in the pursuit of integrated systems teaching...would appear to be less a confirmation of the practicability of using the total human organism as a unifying concept for a system of education than of its value as a means of stimulating a faculty to raise its sights from the service of professional self interest to the service of students in their education. (ibid.)

It seems that a 'systems' approach was not altogether successful there. Williams notes that "integrating teaching... became as much a problem as a solution. Indeed, it became an intellectual battlefield". She reports that "the subject committees...had trouble communicating and co-ordinating with one another; faculty and students complained that the objective of eliminating needless repetition is not succeeding". The curriculum planning committee, she reports, found itself in enormous difficulties concerning the timing and sequencing of courses, particularly in the early years of the curriculum. Concluding, she quotes a report on the new curriculum:

> The first two years of the curriculum remain a largely passive learning experience, keyed to the lecture method of instruction. The advent of the 'new' curriculum...with its apparent increase in 'free time' concomitant with a 50% reduction in planned exercises, in fact largely resulted in the elimination of the laboratory...leaving the absolute number of hours devoted to lectures unchanged. (ibid.)

The Case Western Reserve experiment, representative as it is of horizontally integrated curricula, appears to have contributed very little to the development of an appropriate alternative model to the conventional arrangement for undergraduate medical education. Certainly the Williams study casts grave doubts over interdisciplinarity as a solution to medical education's problems. Probably this is because it does not provide a coherent vehicle for integration - it attempts to integrate separate disciplines but without greatly altering the educational philosophy of the curriculum, leaving its interpretation largely open to the discretion of the teachers who apparently continued to teach in much the same way as they always had.

(ii) Vertical integration

A curriculum might be described as exhibiting vertical integration if its programme substantially juxtaposes theoretical and clinical teaching. Three quite distinct approaches are to be seen in the literature. The first is where most of the theory is taught early on with most of the clinical experience later on, but where there is a significant and deliberate interrelating of the two. Such a programme is to be seen at the City College of New York (Gellhorn and Scheuer,1978). For example, the teaching of Biochemistry "is enriched by considering the application of biochemical knowledge to the understanding of disease" and "as the students learn the Anatomy of the human body by careful dissection, they also receive instruction in comparative Anatomy, study radiological correlations with gross anatomy, and participate in clinical presentations at one of the medical centres, where they see and learn about physical disabilities in patients which are correlated with their anatomical studies". The research found that students' grades on national examinations were as high as at other medical schools whilst attitudes and motivations remained high throughout the whole course (ibid.).

A similar arrangement is to be found at the University of Minnesota Medical School (Rosenberg, 1973). Biological and behavioural sciences provide a core to the curriculum with "clinical experience and patient contact...provided from the opening of the School". Students' attitudes were assessed using standardised scales both on the new curriculum and the one it replaced and it was found that "students show a greater level of self-confidence and feel that they are learning and that such learning is retained".

A second type of vertical integration, patient centred, occurs when there are no basic or core courses but students are attached to clinical situations from the start (generally following a short introduction), learning their science and social science <u>through</u> their clinical work. For example, at the Upper Penninsula Medical School the programme is in three phases. "Phase one consists of an on-campus ten week introduction to medicine, with exercises in first aid, problem solving, interviewing skills, and introductory courses in basic and behavioural sciences" (Werner et al., 1978). The remaining two phases are spent rotating between a number of primary health care and hospital attachments through which students learn both clinical medicine and the basic sciences. As with the City College of New York, these students have been found to show comparable grades in state examinations and their motivation remains high. Pittman and Barr (1977) describe the curriculum at the Rockford School of Medicine which, as in Upper Penninsula, is based on learning basic theory through patient contact in community health centres. A similar approach is seen at the University of New Mexico School of Medicine and is known as a Primary Care Curriculum (PCC) (Kaufman et al., 1980). One noteworthy feature of this scheme is that it has been developed in parallel with an existing conventional curriculum and research has compared the two. Students on the PCC performed as well (Duban et al., 1982) but showed less cynicism "towards the curriculum and its relevance to future practice" (West et al., 1982).

A third type of vertically integrated curriculum has been called problem-based learning. One major concern in medical education noted in the previous chapter is a general inability on the part of students to carry forward pre-clinical knowledge and to be able to use it in the clinical setting. In the mid-1960's, planners at a new medical school in McMaster, Canada, attempted to devise an educational programme that would encourage students to use knowledge as it was being learnt (Neufeld & Barrows, 1974; Hamilton, 1976b). Students there are not formally 'taught', there is no lecture programme, but, working in small tutorial groups, they attempt to solve biomedical problems. The rationale of this is that, in the process of solving these problems, students acquire appropriate and relevant theoretical knowledge (Barrows & Tamblyn, 1980). This approach has been adopted by a number of other medical schools, notably in Australia at Flinders (Fraenkel et al., 1979) and the University of Newcastle (Morgan, 1980), at the University of Ben Gurion, Israel (Prywes, 1978), at Maastricht Medical School in the Netherlands (Reerink, 1978), and at Michigan State in America (Echt & Chan, 1977). Partly because of its ubiquity and partly because of its significance for the present study (as will emerge later), problem-based learning will be described here in some detail.

The McMaster curriculum is divided into four phases. During the first, students are introduced to the notion of self-directed problem-based learning in small group tutorials by exploring health care problems, which forms the basis for all subsequent learning. This phase lasts ten weeks and includes an introduction to interviewing and clinical skills. During the second phase which lasts twelve weeks the general theme is:

> ...the reaction of the body to stimuli and injury, concentrating mainly on how cells, tissue and the whole organism responds to inflammation, neoplasia, metabolic homeostasis, ischaemia, and behaviour. (Sibley, 1978)

The third phase of forty weeks covers the major bodily systems and includes an emphasis on clinical problems and the physical and biological mechanisms which give rise to them. In the fourth phase students undertake a clinical clerkship under supervision, with the intention that:

> ...the student will increase his problem solving skills in the real life clinical situation and use this as an integrating experience of knowledge and skills. (ibid.)

From this description it seems that the content of the curriculum is not unlike that at a conventional medical school, at least it closely resembles the systems courses of the horizontally integrated approach described earlier. However, at McMaster the emphasis is on small group individualised and self-directed learning - "we are not only concerned about what (the student) learns...but how he learns" (Barrows, 1976). To ensure that a learning process is efficient, it was felt necessary for students to learn in small groups rather than through lectures and not to be faced with learning for examinations. Indeed, in problem-based schools students are not formally assessed until their national qualifying examinations, merely being assessed by their peers in terms of their contribution to group learning. The 'case' for problem-based learning largely rests on an analysis of the task of the clinician:

> (The doctor) is never told...'there is a patient out there with liver disease. You had better read up on it before the patient comes in.' He must deal with the problem always initially as an unknown, as a stimulus for developing his problem solving skills and as a focus to determine what is the relevant learning in the basic sciences and the clinical sciences in medicine. (ibid.)

A further justification is that it reflects the way in which a clinician thinks, as described in Chapter 5. The suggestion is that, in problem-based learning, the student is more likely to learn to develop this intellectual skill as a central rather than peripheral feature of the curriculum, and that the knowledge learnt will not only be directly relevant, since it relates to medical problems, but also it will be retained and retrieved when required since it "is remembered together with the problem" (ibid.).

Maastricht Medical School in the Netherlands shares a number of characteristics with McMaster (Reerink, 1978). It was established in the early 1970's and the curricular model closely follows the problem-based learning pattern. However, the model is somewhat different from McMaster. In the Netherlands most medical students enter straight from school whereas in Canada, students generally already possess a first-degree. Another difference is that the national curriculum there lasts for at least six years, with the first four years being pre-clinical followed by a two year clinical phase, whilst in Canada it is only four years, roughly half of which is clinical.

At Maastricht Medical School there is an Educational Development and Research Unit which has undertaken a considerable number of studies of the curriculum. Work has shown, for example, that the cost of educating a medical graduate there is less than at other Dutch medical schools (Stalenhoef, 1984): although the student/teacher ratio is the same throughout the country (11.3 to 1), Maastricht students have a much lower proportion of drop-outs (10% compared with 30% for the rest of the country's medical schools) and the proportion graduating on time rather than deferring graduation (which is common in many European medical schools) is much greater (60% compared with 5% elsewhere).

Research at Maastricht also indicates that students spend considerable amounts of time and effort studying within a problem-based curriculum. Weggeman and Moen (Stalenhoef, 1984) found that first year students spent, on average, just over 30 hours per week on private study, not including time spent travelling, planning or organising their work, and this rose to nearly 35 hours per week in Year Four (the final 'pre-clinical' year). Another study, by Smellen, Pollemann and Stalenhoef (Stalenhoef, 1984), found that students worked for between 30 and 45 hours per week, of which about 15 hours were scheduled and which included between 18 and 25 hours reading relevant literature - books, articles, journals etc..

Thus, there appear to be grounds for believing that problem-based learning may be quite effective. As with other vertically organised schemes, the empirical evidence suggests that the level of students' learning, as indicated by results in national examinations, is the same but their attitudes are much more positive than in conventional medical schools (Hamilton, 1976b). A recent follow-up study of McMaster graduates suggests that they see themselves as "very well prepared" compared with other graduates especially in terms of independent learning, self-evaluation and problem solving skills (Woodward & Ferrier, 1983).

Generally, then, problem-based learning appears to be rather successful. However, some doubts exist. A follow-up study at McMaster (ibid.) indicated that graduates questioned whether they had sufficient 'basic knowledge', recommending that this should be given "more attention in the curriculum". Other studies, too, cast some doubt over the effects of problem-based learning on the student. As an approach it seems to provide them with a valuable learning opportunity, but not all of them respond to it in a way that might have been predicted by the planners. For example, a study by Haas and Shaffir (1982) found that McMaster students, just like students from a conventional school, adopt what the researchers call a "cloak of competence" - an unintended covering-up of their inadequacies and an attempt to deceive others into believing that they are competent. The researchers made this observation at McMaster with some surprise:

> One might expect...that an innovative medical education program that organises the curriculum around small-group problem solving and omits grades and written examinations would also omit (or socially change) the nature and degree of cloaking behaviour characterising...traditional medical schools. (ibid.)

However, the Haas and Shaffir study suggested that 'cloaking' by McMaster students was not just the same as at the conventional schools but that it occurred earlier in the programme. The possible reasons for this are discussed by the researchers, suggesting that McMaster students show high levels of anxiety, probably because they get "no guidelines...no clear benchmarks of progress...(and because) members of each tutorial class also assess each other's progress".

It seems, then, that 'peer group assessment' may, in fact, be counter-productive to the educational success of the problem-based curriculum. It has been noted there (Olson, 1984) that some students 'prepare' for tutorials by reading-up beforehand one or two books which, through the common knowledge of the problems they are likely to experience in the next few days, they decide will provide them with relevant knowledge. However, they may be doing this to establish their own 'cloak of competence' for those tutorials, such that their fellows are more likely to perceive them as "good" students when it comes to the peer group assessment. The evidence on this to emerge so far from McMaster suggests that 'prepared' students may be disadvantaging themselves educationally (McAuley, 1984).

These doubts, then, provide some empirical evidence that problem-based learning may face certain educational problems. These are not relieved by such theoretical justifications as have been offered in its support. For example, the rationale for problem-based learning, that it reflects clinical thinking, rests largely on evidence that simply was not available when it was being developed in the mid-1960s. In Chapter 5 research into clinical thinking was reviewed but this post-dates problem-based learning. Similarly, psychological justification by Schmidt (1981, 1983) at Maastricht that problem-based learning conforms to an information processing model, is another <u>post hoc</u> rationale.

Thus, searching questions need to be asked about the theoretical rationale of problem-based learning. Do doctors solve problems? Is not much of their work pattern recognition? Do we learn how to solve problems, and do we do so best by problem solving? Indeed, do we best acquire factual knowledge through problem solution? What kinds of psychological mechanisms are operating when we learn, and which occur during problem solving? What are the effects of the problems, what are their functions here and from where do they emanate? On what basis are problems chosen? These questions are not satisfactorily answered by the proponents of problem-based learning, yet it is clear from the earlier discussion of clinical thinking (Chapter 5) and of the psychology of learning (Chapter 3) that problem solving may not be an entirely satisfactory basis for establishing the kind of deep, rich knowledge needed for medical practice. Problem-based learning, as Gale (1980) puts it:

> ...leaves the question of structure open. The organising agents...are not identified, thus no conclusions may be drawn about the structural properties of knowledge acquired through such learning.

It seems, then, that some features of problem-based learning may be productive but others may not. However, at present we are in no position on the current evidence to say why, nor on theoretical grounds to predict which are its more important features. Largely, this is because we are not clear as to the kinds of psychological mechanisms that may be operating. In other words, whilst it may be possible to use recent research to justify problem-based learning, it is clear that this did not, and perhaps may not, form an appropriate rationale for it. The early planners of McMaster certainly produced an exciting and innovative educational programme, but they did so without satisfactorily justifying their actions. In short, it was based on a set of assumptions and hunches on the part of the planners that reflected radical thinking at that time. These may have led to the development of an apparently successful curriculum but, in the light of recent research, it is arguable that present-day planners might not be led to devise such a curriculum. Problem-based learning (or at least aspects of it) may 'work', but possibly not for the reasons that have been given so far.

Conclusions

In this chapter the way some medical schools have attempted to resolve their educational problems has been discussed. It was suggested that the educational climate following the Second World War was, particularly in the United Kingdom, generally one of change, with medical schools being encouraged to experiment. There was, too, a growing research literature in the field of medical education. Evidence from published accounts of innovation falls into two types - part-curriculum and whole-curriculum developments. Generally the evidence from studies of part-curriculum changes lacks precision and fails to give theoretical explanations of the findings. Reports of whole-curriculum developments may be classified as being concerned with either horizontal or vertical integration. The research evidence from one horizontally integrated medical school is of a high methodological standard, though it concludes that the curriculum has not altogether been successful. Vertically integrated curricula appear to have had more success - students learn as much as in conventional schools without the dramatic decrease in motivation and increased cynicism. However, the research evidence again provides few theoretical models to account for this. Attempts have been made to explain problem-based learning in information processing terms and on the basis of research into clinical reasoning, but it is argued that these do not provide a sufficiently coherent rationale for adopting such a programme nor to account for its apparent weaknesses. Indeed, none of the alternatives reported here resulted from empirical and/or theoretical enquiries. Rather, they seem to be either something of a 'reaction' to the problems facing the conventional curriculum or based on the sometimes highly questionable assumptions of the people involved. More particularly, they appear to reflect trends elsewhere in education such as moves towards greater interdisciplinarity and also the social and educational climate of the time, which was one of general permissiveness.

One implication of these studies is a need to look deeply and critically as well as broadly at medical school curricula. Their context, background and nature need to be understood, and the teaching and learning that occur observed and analysed. The next chapter will look in detail at Southampton's undergraduate medical curriculum and some of the work there that has investigated its effectiveness.

CHAPTER 7

SOUTHAMPTON MEDICAL SCHOOL UNDERGRADUATE CURRICULUM

Introduction

In this chapter the curriculum of Southampton's Medical School will be outlined describing its major features, together with evidence from early studies which attempted to evaluate its effectiveness. It is concluded that even this apparently attractive alternative to the conventional curriculum arrangement is not altogether satisfactory, though it is acknowledged that more research is needed before undertaking further development since the current evidence not only lacks credibility but fails to identify the causes of the problems.

Southampton's curriculum and its major features

In the United Kingdom a Royal Commission on Medical Education, chaired by Lord Todd, was established in 1965 to review the nation's medical manpower needs and "to consider what changes may be needed in the pattern, number, nature and location of the institutions providing medical education " (Report, 1968). It was likely that the Todd Commission would recommend expansion, and universities without a school were invited to submit proposals. A committee was established in Southampton, jointly representing the University and the Wessex Regional Health Board (later Authority) under the Chairmanship of the Vice-Chancellor. In its submission the Committee noted the existence of much of the necessary teaching, a well established postgraduate medical programme, on-going research contacts between University and Health Region, and a hospital development programme that would require only minor alterations. Twelve months in advance of the publication of its report the Todd Commission recommended that "a new medical school be established at Southampton...as quickly as possible" (ibid.), and, on publication, two further schools were established, at the Universities of Leicester and Nottingham.

At the University of Southampton the working party which had submitted its proposal to the Todd Commission began, in anticipation of its acceptance, to plan the educational programme for the Medical School. With the appointment of the Founding Dean in 1968, the curriculum details were finalised. (The planning process is outlined in Appendix 2.) The curriculum that emerged has become recognised as being innovative. Sir George Pickering, in his review of medical education in the United Kingdom, described it as "one of the most exciting experiments to have emerged in my lifetime" (1979). Whilst the Southampton curriculum does contain a number of departures from the conventional pattern described in Chapter 5, it is also true to say that these are consistent with the guidelines set out, at that time, by the then most recent recommendations of the General Medical Council (GMC, 1967), and embodying a number of the proposals to emerge from the Todd Commission report (Report, 1968).

Perhaps the most striking development was to blur the distinction (Acheson, 1976) between the pre-clinical and clinical phases which traditionally separate the theory and practical teaching in a medical curriculum. In Southampton, these two phases overlap rather like two wedges - one, the pre-clinical phase, gradually phases out, whilst the other, clinical medicine, gradually phases in. In practical terms this has meant on the one hand introducing into the early years as many clinical illustrations to the theoretical teaching as possible, and on the other involving the students in re-examining theoretical issues later on in the curriculum. In addition, in Year One students attend what is called the Early Medical Contact scheme: they go out with a general practitioner to visit a patient at home, and they follow an obstetric patient through her delivery, visiting the patient and baby some weeks later in their home (Elstein & Forbes, 1976).

A second notable innovation which attempted to give added relevance to the course was to teach much of the basic science material through topics which focused on bodily systems

(Howell, 1976) rather than as separate academic disciplines, as in Case Western Reserve as described in the previous chapter. Thus, the student would study the Cardiovascular System, the Respiratory System, the Gastrointestinal System, etc. rather than simply the Physiology, Biochemistry, Pathology and Pharmacology.

In accordance with the recommendations of the GMC and of the Todd Commission, Southampton's curriculum incorporates a greater emphasis than the conventional curriculum on the Social Sciences - largely Psychology and Sociology, though it includes some Epidemiology, Medical Statistics, Ethics and Legal Medicine (Waters et al., 1976). Indeed, students are introduced to the notion that medicine has a social basis from the beginning of Year One.

Having completed much of the theoretical teaching by the end of Year Two, students enter their first clinical attachments in Year Three, spending much of their time with patients in hospitals and in general practice. Towards the end of that year students take an important examination of their theoretical knowledge, which in Southampton is known as the Intermediate Part II examination. In a conventional medical school such an examination, traditionally called the Second MB, occurs at the end of the pre-clinical phase and students need to pass it in order to enter clinical attachments. In Southampton, such an examination occurs after, rather than before, students have experienced much clinical work.

In Year Four, Southampton students spend about sixty per cent of their time engaged in a research project of their own choosing (Normand & Cantrell, 1976). They study in depth a particular area which can be either clinical or pre-clinical in nature, at the end of which they present a five thousand word report and a ten minute presentation to an audience of their peers and academic staff - the Fourth Year Project Conference. It was this feature of the curriculum which drew the most substantial commendation from Sir George Pickering (1979).

The fifth year is entirely devoted to clinical attachments in hospitals and in general practice. Students may be placed anywhere within the Wessex region, and it is rare for a student to be based in Southampton. Students are attached to a consultant on a one-to-one basis and they learn clinical medicine without formally being taught it: the experience is almost entirely an apprenticeship. Following successful completion of a final examination at the end of Year Five, students enter pre-registration rotations as in other medical schools.

Thus, the Southampton curriculum contains a number of features which distinguish it from the conventional pattern, though arguably these may not, strictly speaking, be termed innovations in that they may be seen occurring elsewhere (GMC, 1977; Gale, 1979, 1983). Nevertheless, it is true to say that Southampton's Medical School embodies within its curriculum a number of innovative features which had not been seen occurring together in the United Kingdom.

Early monitoring of the curriculum

The Medical School admitted its first students in October, 1971. From the very beginning, the Faculty had committed itself to monitoring courses (FM 76) and did so largely through the use of end-of-course questionnaires (FM 98). Data from these were used to make minor adjustments to individual courses but questionnaires came to be seen as of "limited value" (FM 725) in monitoring the overall curriculum. However, findings have emerged from a variety of other sources and, taken together, these provide evidence on which to base an evaluation of the curriculum's effectiveness.

(i) The Teaching Methods Working Party and the Medical Education Group

Two years after the Medical School had admitted its first students the Dean established a Working Party on New Teaching

Methods (later known as the Teaching Methods Working Party) which, at its first meeting (FM 700), agreed to "widen (its) terms of reference to include broader issues concerning the curriculum". For example it felt that course questionnaires gave inadequate information and that "a course should be assessed both as an educational vehicle and as a stimulating, enjoyable experience, as these two did not necessarily go together" (FM 712).

Shortly after this the present writer, who had been a member of the Teaching Methods Working Party since its inception, undertook some small-scale enquiries into aspects of the curriculum. One looked at a systems course running in Year Two. It seemed that some students were coping well, were combining the separate disciplines and making links between courses but the remainder appeared unable to cope and spoke of being overloaded. The former were referred to as 'integrators' and the others as 'non-integrators'. It was suggested that:

> ...the integrators were more able to fit the knowledge into their model of the system and so reduce the complexity of the learning task. The non-integrators had no such pigeon-holes and, as it were, constantly had to handle an enormous pile of unsorted mail. In a sense these students reduced the complexity by putting blinkers on - they concentrated on passing the examination. What this course lacked was not more relevance, nor a clearer statement of its goals - it had these. At face-value it was well designed. What it seemed to need was some way of helping students towards an appropriate way of <u>handling</u> the information. (Coles, 1976a)

It also seemed that integration did not occur 'automatically' just because the course was arranged as a system (Coles, 1976b) and that those who taught on it seemed less aware of the links between their own contribution and the overall course than the co-ordinator might have wished. Much the same conclusion was drawn at Case Western Reserve (Williams, 1980).

Another study looked at a third year clinical attachment and observed that many students seemed unable to bring forward knowledge from the early years. This seemed paradoxical because students had passed assessments in the first two years:

findings confirming experience elsewhere (Coles, 1977a).

These observations were presented at the Teaching Methods Working Party which noted with interest that "courses...were perceived in a way different from that intended" (FM 1336). The approach adopted in these studies was rather different: rather than using questionnaires or examination results the work was based on observation and interviewing. Partly this contributed towards the establishment by the Faculty of a post, initially part-time but subsequently full-time, of a researcher to monitor the curriculum. The person appointed works with the present writer, and together with him they form the Medical Education Group which was established by the Faculty of Medicine in 1979. The findings of this research are being presented elsewhere (Mountford, 1985) but two observations appear relevant to the present discussion. The first concerns the importance of people's assumptions, attitudes, values and expectations in determining the way courses were being taught. It was found that third year clinical attachments were either closely timetabled and formally taught or they were loosely organised allowing students considerable opportunities for seeing patients which were then discussed informally. It was clear that the way in which a particular attachment was being organised depended not so much on the Faculty's objectives of the third year nor on the medical specialty itself but on the opinions of the people concerned with organising it (Coles & Mountford, 1978).

A second observation concerns what appears to be the transitory nature of the learning in the early part of the curriculum. Previous work had suggested that some students entering clinical attachments in Year Three seemed unable to recall much of what had been taught (and learnt) in Years One and Two. In order to examine this further a study was undertaken which tested student's knowledge of a systems course five weeks after it had finished, the intervening period being a vacation. Each systems course normally ends with an assessment - usually multiple choice questions (MCQ's). Most only contain items testing fact recall but some include questions requiring the application of knowledge. For the retest a random sample of students was given a shortened but representative version of the same questions. The results showed a statistically significant drop in performance on retest (Coles & Mountford, 1982). However, whilst there was a reduced performance on items testing memory of fact there was no decrease in items testing the application of knowledge. Two implications seem to follow: first, forgetting occurs rather quickly after a course has been completed - days or weeks rather than months or years. The second is that the students' memory for factual material appeared rather more vulnerable than their ability to use their knowledge.

(ii) The curriculum review

Early in 1976 the Faculty Board established a Working Party to review the curriculum. This body met on 26 occasions, invited comments from all members of the Faculty, and issued a questionnaire. Student feedback from course questionnaires was noted and the Chairman met students and recent graduates informally to obtain their views. In addition, Faculty members were invited to attend meetings of the Working Party to comment on specific aspects of the curriculum. An interim report (FM 1553) recommended no major structural alterations to the curriculum and the final report (FM 1853) suggested some minor modifications. However, it had some quite severe overall criticisms to make:

> ...the early part of the curriculum is overtaught (and overexamined) and there is insufficient time for students to evaluate and use the knowledge which they have acquired. As a result...they may concentrate excessively - and unnecessarily - on factual detail at the expense of understanding. (ibid.)

The Working Party saw several reasons for this:

> Firstly, some teachers have attempted to cram the same detail into the restricted time available as they would have done in a conventional school. Secondly, appointments of staff have occurred piece-meal and some newer members have little or no knowledge of the curriculum or the individual courses in which they teach. Thirdly, the nature of the curriculum with its large number of short courses and a great variety of part-

icipants gives rise to excessive repetition and consequent ineffective use of the limited time available. (ibid.)

The Working Party considered that in order to reduce the load the amount of time available should not be fully utilised. It suggested that the problems were exacerbated by "a curriculum which aims at integration" (ibid.):

> The need for integration is greatest in the Systems Courses, but some of these are in danger of disintegration... The problems are aggravated by the failure of some course co-ordinators to convene meetings to discuss what is and should be taught in their courses. It is essential for co-ordinators to ensure that participants adhere to a common philosophy with individual courses and that inappropriate teaching is excluded. (ibid.)

The Faculty Board received the report of the Working Party and implemented its proposals concerning individual courses, but its comments on the curriculum as a whole made little impact and largely were ignored.

(iii) Students' views

For the most part students in Southampton appeared to be somewhat acquiescent, even to the extent of defending their Medical School and its curriculum (Mountford, 1983), at least in public. However, to mark the tenth anniversary of the first admissions a group of students "from differing backgrounds" (Davies et al., 1982) produced a report (ibid.) which was highly critical of the curriculum. The document is a substantial (27 page) review of what the group saw to be serious problems. It began by acknowledging Southampton's innovations:

> We recognise that much of the Southampton experience is progressive and educationally effective, but we do not apologise for adopting a robust attitude to those many aspects of our course which leave much to be desired. May the second decade see drastic improvements where they are needed.

And went on to say:

> The traditional 'bread and butter' aspects (of the curriculum) have been less imaginatively designed, and are correspondingly less successful...We draw attention to this and question the relevance of the 1960's model of medical education to the 1980's and 1990's.

Commenting on the first year of the curriculum the report notes that:

> ...students and many staff have recorded it as a horrendous introduction to medicine ...Should the Southampton prospectus and the list of obectives...be taken too seriously by the entering student, his illusions will surely be shattered within weeks of starting the first year...Students start their medical course with a naivity and good intent...Only later does it transpire that the first year...contains assumptions which take on the magnitude of a confidence trick.

They observed that "insufficient opportunity is taken to make (subjects) interesting and purposeful" and that "teaching methods, assessments and examinations all have the effect of reinforcing aspects of medical education which are in direct contravention of some of the major tenets of the agreed course objectives, in particular...critical thought, reasoning and inculcation of appropriate attitudes".

The report does not only comment on Year One but observes that the second year "reinforces all the deleterious effects noted in our discussion of the first year" and "much of the third year content really comes too late". One of its conclusions is particularly pertinent here:

> There is, in the early part of the course, an excess of patently purposeless material which has to be committed to memory only to be discarded and forgotten as soon as its irrelevance becomes apparent. The Faculty Board appears to exercise no control over these aspects of the course, which are out of keeping both with the course objectives and with common sense.

As if to indicate their sincerity, these students funded the duplication of their report and distributed it to full-time academic staff in the Medical Faculty (about 150 people). However, it did not meet its objective of being a "discussion document": at an individual level it was welcomed by some staff but flatly rejected by others. The Medical Faculty Board's Curriculum Sub-committee included a brief discussion of it as one item on its agenda at a meeting nearly a year after the report was written. The minutes record, somewhat enigmatically:

> ...that the Faculty be asked to note the students' comments in their paper... (FM 3013)

What does monitoring Southampton's curriculum show?

The review earlier in this chapter of the major features of Southampton's undergraduate medical curriculum suggests that, in many ways, the curriculum substantially broke from the traditional pattern. In this sense it could be described as innovatory, though it is interesting to note that the curriculum is not dissimilar from that at two other newly established medical schools, Nottingham and Leicester, sharing many novel features with them (see Harden et al., 1978; GMC, 1977; Gale, 1979, 1983): all three seem to have been greatly influenced by the GMC's recommendations (GMC, 1967) and the Todd findings (Report, 1968).

The latter part of the chapter describes how the curriculum has been monitored, both formally and informally. Taking together all of this evidence, it seems that Southampton's undergraduate medical curriculum is by no means ideal. Indeed, there is a prima facie case for suggesting that it is somewhat problematic educationally, but from the available evidence it is unclear what is the precise nature of its problems. Perhaps it is rather easier to say what are not its problems. Generally it seems that the latter part of the curriculum is rather more acceptable than the early part. The fourth year project scheme and fifth year attachments seem quite successful in their own terms.

The evidence, then, seems to suggest that it is the first three years which are problematic and each of the studies reported has criticised that phase most severely. At first this appears surprising. The early planners consciously decided to consider the first three years as a single entity. They saw the need to forge closer links between the traditionally separate pre-clinical and clinical phases. No more clearly is this to be seen than in the decision to hold the Intermediate Part II examination after rather than before students are exposed to much clinical medicine. The problematic nature of the early years is surprising for other reasons too. The planners saw it as important to introduce students early on to patients. The Early Medical Contact scheme in Year One and the use of clinical illustration in Year Two bear this out. So, too, does the decision that clinical attachments in Year Three should, in part, encourage the consolidation of a student's basic science knowledge. Even so, students seem to find the early years overcrowded, unsatisfying and, in their own terms, largely irrelevant. In other words, the traditional dilemmas facing medical education noted in Chapter 5 appear not to have been entirely resolved by the Southampton curriculum.

One observation might be that there is not, after all, a problem. Some might argue that an undergraduate medical course is a full and difficult one, and students will always complain if they are asked to work hard. In short, there may only appear to be a problem because the current evidence, based largely on student opinion, says there is. This, then, questions the validity of the observations being presented here; the source of the data being people and their perceptions of their experiences. Nevertheless, for a number of reasons, these data appear valid in their own terms. A wide variety of independent sources have contributed to them - research educationists, a Faculty review body and an *ad hoc* student group - each coming to much the same conclusion. In addition, the findings reflect others made elsewhere in medical education over several decades as reported in Chapter 5.

Thus, it seems quite likely that there is a problem and that it is located in the early years, certainly the first three. It is during this time that most of the theoretical teaching occurs and students first begin to use their knowledge in an applied setting. However, having identified where the problem is located tells us little about its nature, and at present this is unclear from the available evidence. It seems to be associated with what the students are learning, the way in which they are learning it and their ability (or inability) to utilise that knowledge later on, but the evidence does not provide much insight into the mechanisms operating: it merely describes its occurrence.

A further question arises concerning why Southampton's Medical School has not responded to the evidence of these reports. In one sense it has. It saw the need to monitor the curriculum, it established a Teaching Methods Working Party, it appointed a researcher and it held a review of its curriculum. Yet very little has changed as a result of these apparently laudable initiatives. It may be that little action has been taken partly because the problem has not been clearly enough articulated, people did not see the causes. It may also be because the findings have not been credible to the people concerned. Each of the three sets of evidence share the same approach: they are based on students' observations of, and comments on, the curriculum. Essentially they are qualitative studies which have taken the same rather limited view. Now, it is self-evident that students' experiences and views are an important source of information, and they are valid in their own terms. They are necessary for understanding a curriculum's problems, but it seems they may not be sufficient to effect some change. In any academic community the nature of the methodological approach being adopted may influence the acceptability of the findings, but, as noted in Chapter 2, what 'counts' as research in a medical school is likely to be a reflection of the scientific approach. This may be a restricted view but it is an understandable one. The implication would seem to be this: for the findings of any curriculum research to be acceptable the study needs to acknowledge the context into which those findings will be made available. The research needs to be credible, but it has not been so far.

In addition, none of the reports suggest reasons for their findings. As noted in Chapter 1, a criticism of much curricular research has been that it fails to explain its findings in terms of commonly accepted theoretical models. Partly this has been because of the inadequacy of these models but partly, too, because the available models have not been employed by researchers. However, recent curricular research has looked more closely than before at student learning and, as reported in Chapters 3 and 4, a well articulated model - information processing - is now available against which to relate the results of any learning.

The need for further research and development

In the light of this discussion it would seem reasonable to suggest a need for further research to clarify the nature of the problems facing the early years of Southampton's undergraduate medical curriculum and to identify the mechanisms giving rise to them. It also seems that any further research should look not just at students' opinions but at how they approach their studying, the effects this has on what they learn as well as their ability to retain and use it, and which curricular influences are associated with what students do. It is likely, too, that a mixed methodological approach will be needed, as argued in Chapter 2, using qualitative methods as well as numerical techniques, and the findings will need to be related to theoretical models such as those outlined in Chapters 3 and 4. On the basis of such research it may be possible to make a further commentary on the curriculum in terms of its strengths and weaknesses as well as possible indications for further development, not just because the additional research would have been more rigorous but because, as a consequence, it might be possible to identify underlying mechanisms giving rise to the problems seen. The remainder of this report will be devoted to presenting and discussing research findings purposely designed to address these matters.

CHAPTER 8

RESULTS 1: INTERVIEW SURVEY

Introduction

Monitoring of Southampton's curriculum, reviewed in the previous chapter, indicated not just educational problems during the early years but also a need for more research. In this chapter the problem is addressed broadly. Evidence obtained from an interview survey is presented of students' observations of the early part of the curriculum. It is suggested that different kinds of data analysis are possible. One, a chronological analysis, indicates students' unfolding experience. The second shows where students stand in relation to four major issues: load, motivation, relating and relevance. On the basis of this second analysis, three learning profiles are identified and illustrated with typical case studies. The approach is ideographic and is consistent with methodological considerations discussed in Chapter 2.

Method

1. Approach, Sample and information collection

The prime aim of this study is to understand medical students' learning in known curricular contexts by seeing how they approach their studying and also some of the consequences. In the light of previous research in Southampton it was felt that the first three years of the curriculum were critical educationally. Moreover, on the basis of studies in Southampton and elsewhere it was felt that students were in a better position to reflect and comment on their experience once they had completed a particular phase, but not too long afterwards, otherwise they might forget some things and invent others. Thus it was decided that the major source of information about the first three years would be the views of students shortly after entering the fourth year.

It was felt necessary for students' views to be as representative as possible and a large sample (two thirds) of a year group was surveyed. Seventy-eight of the 116 students in the 1982/3 fourth year at Southampton Medical School were selected (using random numbers) and invited by letter to an interview. Sixty-seven of these students (86%) were interviewed between October and December of that year, each interview lasting between one and one and a half hours. Students were asked to describe in their own terms their experience at the Medical School. The interview style was low in direction, questions being kept to a minimum and merely used either as a prompt such as "what happened next?", or for clarification such as "how did that make you feel?". Copious notes were kept during the interview and dictated immediately afterwards into a pocket recording machine, subsequently being typed up. (Examples of notes are given in Appendix 3.) If a student made what appeared to be a pertinent point, the interviewer would pause, ask for the comment to be clarified, write it down <u>verbatim</u> and check its accuracy with the interviewee by saying "let me just check ... what you said was ... have I got that correct?" In this way an attempt was made to check the reliability of the data.

In addition, about twelve students from each of the first three years were randomly selected and interviewed (often for about half an hour each) three times during the year (normally at the end of the terms). These interviews, too, were informal, notes again being made as a record. These additional data were obtained to extend the reliability of the information from fourth year students. Indeed, it established a number of important points. First it showed that the course had not changed in any significant manner and also that the comments of the fourth year students were in no way atypical. Moreover, it gave some impression about the reliability of students' retrospective comments: were Fourth Years saying certain things merely because they were older or had experienced more of the curriculum? Were their views influenced by examination success (or lack of it)? Generally, there was a high level of concordance between the data from these additional interviews and those from the survey of fourth year students.

2. Analysis and presentation of the data

On completion of the interviews, the notes were assembled. Clearly this represents an enormous volume of data with a need to analyse and synthesise it for presentation. Immediately this raised two important considerations. The first was confidentiality. The interviewer had assured students that what they had said would be confidential. In presenting the data, therefore, care is taken concerning the identity of a particular student, though on the notes themselves the student's name was recorded to enable further data such as examination grades to be added.

A second consideration was the representation of students' views. During the interviews it seemed that students were making two types of comment requiring a different analysis and presentation. One concerned students' reactions to courses or events, and could be presented chronologically as an unfolding story in much the same way as students experienced the curriculum. The second concerned issues which students saw as important to them and required a different form of analysis. As argued in Chapter 2, the first analysis is 'topographical' and the second 'topological' (Becher & Kogan, 1980). These two forms of analysis will be described separately, and at the end of the chapter an attempt will be made to evaluate their relative effectiveness.

Chronological analysis

The first analysis was achieved in the following manner. It became clear that there was not one 'story' but many, reflecting the ways in which different students experienced the same curricular events. It was decided to attempt to present the data in a way which reflects these differences, and this was achieved by a process of re-reading and resorting of the interview notes into groups of similar comments. For example, most students talked about the Anatomy course in Year One.

On reading through these notes, it was clear that most students had commented on the lectures and the dissecting room, many on both. The notes were first sorted into those which contained comments on the lectures and those that did not. The lecture comments were then resorted into the kinds of comments made. These were recorded, and then all the notes resorted into comments about the dissections. In this way it was possible to identify both the range of comments and also to give some indication as to their frequency. A strictly numerical analysis of the data was rejected since interview comments were freely made - the absence of a comment does not indicate that a student did not have a comment to make, merely that they did not make one. Nevertheless, it was possible to make a broad assessment of the frequency of responses and certain overall percentages are given, particularly in the summaries. However, general statements are given to indicate how often comments were made, using phrases such as "most", "many", "about half", "some", "a few", indicating a frequency range from greatest to least.

Once the information about Anatomy had been identified, and recorded the notes were resorted into comments about Biochemistry. This process was repeated for each aspect of the first three years, and the results of this analysis are presented in Appendix 4, with additional data in Appendix 5. They provide a clear indication of students' chronological experiences of the first three years. As a check of reliability an educationist, independent both of the writer and of the Medical School yet conversant with this style of research, was invited to study the interview notes and to comment on them. His report appears in Appendix 6, and closely resembles the analysis given in Appendix 4.

Summarising the chronological analysis the following points emerge:

1. Most students have negative experiences during the first three years. Overall, 15 of the fourth year students

interviewed (24%) positively disliked their experience, 21 (34%) thought that the course "gets better", 11 (18%) were philosophical about it, suggesting that this is how they had expected a medical school to be, and 15 of them (24%) commented that they had enjoyed the three years.

2. Most students found the first year very difficult. They concentrated on three science courses - Anatomy, Biochemistry and Pathology - which account for more than 80% of timetable time. These form the basis for the Primary Examination at the end of Year One which students must pass in order to continue with their studies. Generally, courses in the first year are taught through lecture programmes and practical classes. Anatomy, however, relies on a considerable amount of self study. Overall in Year One the timetable is very full, the amount of information is great, and students have very little free time. Students coped by (a) ignoring much of the rest of the curriculum and (b) by committing information to memory, with or without understanding much of it. Early Medical Contact, through which students meet patients in the first year, accounts for a small amount of timetabled time (4%), and many students felt that this was rather less than they had expected.

3. Students enter the second year with some relief, expecting it to be easier. In some ways it is. Certainly many students prefer the systems course approach and find the teaching more relevant than in the first year. However, the amount of information presented and the demands on a student's time remain great. In particular, the second term is very concentrated, with several end of systems course assessments, a major assessment in Pharmacology and the writing of essays for the Behavioural Sciences which count towards the Intermediate Part I examination. Students coped with these pressures in much the same way as in the first year - by memorising information but not necessarily greatly understanding it. In the third term students attend an Introductory Course to Clinical Medicine, which many approach with a mixture of

apprehension and eager anticipation.

4. Much of the third year is taken up by clinical attachments (though approximately a quarter of the time is accounted for by continuing science courses). Generally, students saw attachments as introducing them to clinical medicine rather than consolidating their basic science knowledge. When asked questions based on knowledge taught previously, most students found difficulty in recalling what they once knew. If they "looked things up" they did so in clinical rather than basic science textbooks. Rarely did they refer to their own notes.

5. The third year concludes with the Intermediate Part II examination, held in July, which students see as important, demanding and stressful. Most began revision at about Easter and spent about three months revising. They found the amount of information to be revised enormous, covering all of the taught courses in the second and third years with some reference to first year work. The prospect was daunting. Many students reported revision as "starting from scratch". Most began in much the same way as for previous examinations. About a third continued in this way and appeared to be "brushing up" on what they once knew. The remaining two-thirds, however, found to varying degrees that what they were learning took on a "new meaning" and "things coming together". These students, but not the "brushing up" students, felt that clinical attachments helped them with their revision. They were more able to cope with the revision than the "brushing up" group and some saw it as being "enjoyable" even though the work was hard. Students who had experienced this "coming together" felt able to carry forward this learning into their elective during the long vacation between the third and fourth years.

6. There is some evidence for suggesting, therefore, that much of what is taught (and in which students pass assessments) during the first three years is not learnt in any meaningful or enduring sense. It is merely collected. However, when students have to revise for the Intermediate Part II

examination at the end of Year Three, some now learn in a way which appears different from their earlier learning. The catalyst for this change appears to be students' clinical experiences in the third year.

<u>Issue analysis</u>

The chronological analysis indicated students' unfolding experience of the curriculum but it told little about the nature of any possible mechanisms linking these experiences with the learning that results from them. In Chapter 2 it was argued that this might be achieved by a 'topological' or issue analysis which was carried out as follows.

The interview notes were re-inspected, but now they were examined to see what general comments students were making and what their concerns were. Four issues seemed to recur: the load students found themselves facing, their motivation, the way they related information and the relevance of what they were being taught. Interestingly, though unsurprisingly, three of these issues emerge from other research studies of medical students as reported in Chapter 5 but 'relating' is novel. Each of these issues will be examined here in greater detail indicating students' comments in relation to them.

i) Load

From the interview notes it was clear that an issue of major significance to many students, particularly early on in the curriculum, was their perception of the load of work being presented to them, and this took on a number of different meanings both in the same student at different times and between students at the same time.

Many students spoke about the amount of information that was being presented to them, saying "I was just overloaded", or "it swamps you", and "you can't take it all in when it's just thrown at you". For other students, load seemed to represent the amount of time available, some saying they felt "rushed", or, in relation to revision for an examination, that they had "left things too late". In addition, load also meant "importance"; certain examinations in particular came to be seen as very significant, particularly the ones that had to be passed in order to continue to the next phase of the course. Some students also felt loaded because of pressures put upon them by staff who kept telling them they needed to "get down to their work" and also because of the "emphasis on hard work". Pressures came, too, from other students with a kind of "group neurosis" developing in certain circumstances.

Students found different ways of coping with load, two of which were common: "survival" and "keeping up with it". Survival techniques included "putting it all off until the examination", and not going to lectures or even whole courses. A few students revised only two of the three major subjects for the Primary Examination at the end of the first year. One said "my failure in Anatomy was preordained. I decided it was not recoverable, so I purposely failed it and then passed at the resit". A number reported, as one student put it, "lowering my sights". These students found that they could cope by "doing the bare minimum". Moreover, it was not uncommon for a student to say "the understanding comes later, now you just have to learn it to pass the examinations".

Ways of "keeping up with it" or "getting organised" took a number of different forms. In Anatomy, for example, some students would first read through the demonstration boards and then study the dissections whilst others would proceed in the opposite way. Most students had a way of coping with examinations. Some would break down their notes into two or three sides of paper and then "sit down and learn them" and a number used past examination papers to "spot questions". Indeed, some found that getting organised for one subject would not necessarily be appropriate for another, and also that "getting organised in Year One did not help in Year Two, nor in Year Three". Many spoke of difficulty in adjusting to working in a university, and especially of getting organised in Year

One. In some cases this took at least two terms. In the second year, students discovered that the systems courses, running consecutively, were unlike the major courses in Year One, which ran concurrently. Courses had different ways of proceeding and students had to adopt new ways of coping. Many found it useful to see the systems courses as 'self-contained'. Indeed, it was common for students to speak of the second year as taking on its own momentum. One student said "The systems courses are good for neurotics. You get a way of organising yourself and then you stick to it".

A number of students organised themselves into groups. For example, in Anatomy groups of five or six students would divide up the work, each looking at a certain part of the work presented. Then they would meet together, share their experiences as well as their notes, thus reducing the load considerably. Other students worked in pairs, particularly when revising for examinations, and these students reported that they found this a good way of coping. Many, however, worked alone and they seemed to experience the greatest load.

Taken together, these experiences of load present a number of paradoxes. Some students experienced load with certain subjects but not others, and a number experienced load early on in the course but not later. Indeed, whilst it was common for most students to report the early years as being overloaded it was equally common for many to say the latter part of Year Three was a time which could be coped with more easily even though it required considerable effort on their part. It seemed also that those students who did best in the Intermediate Part II examination at the end of Year Three were those who did not feel overloaded, and this raises the question of causality: was it that the better student could handle the load or did handling the load make the student better?

ii) Motivation

As already noted, some students appeared to cope by as it were "opting out". They survived by lowering their sights, by doing the bare minimum. They were not happy about this but they found it helped them to cope. Other students appeared to have different sources of motivation, and from the interview notes it was clear that these were either 'external' or 'internal'.

External motivation was by far the most common and represented itself in different ways. Some students said they worked "because there were examinations", some because "they want us to do it", others because "I always did it that way". A number said "I went to lectures and didn't miss anything because I was brought up not to skive". However, a minority of students worked for intrinsic reasons, saying "because I wanted to" or "because I enjoy it".

Many students found that their enjoyment of the course varied between different subjects. Some would say "I enjoyed Anatomy but not Biochemistry" and others would say quite the reverse. However, in the first year, most students appeared to enjoy their Pathology course. Some students felt this was because "they were good teachers" and others because "it's the most relevant subject in the first year". Indeed, the relevance of subjects seemed closely associated with students' motivation. For example, some said of Early Medical Contact "it kept you going".

Of particular interest was the manner in which the students' sense of motivation changed as the course proceeded. When students entered the medical school most had very high motivation but many found that this dropped rather rapidly during the first year. As already noted, some spoke of a need to adjust to university life and adopted different ways of getting organised. It was not uncommon for students, especially at the end of Year One, to question their commitment to Medicine. One said "I always wanted to be a doctor, but I knew that if I failed the Primary examination I wouldn't even bother to come back for the re-sit". Many believed that the second year was going to be more enjoyable.

Some found that it was, seeing more purpose in what they were studying. Others did not, reporting dejectedly that it was "just more lectures and more assessments". However, most students felt that the third year was more enjoyable and more motivating. A number said that the revision period at the end of Year Three was, as one student put it, "the most enjoyable part of the course so far". This is perhaps a surprising response in view of the importance of that examination and the amount of revision needed for it. One or two students reported that their elective was enjoyable, some saying "it has rekindled my enthusiasm for medicine".

From the point of view of a student's motivation, a number of themes emerge. Motivation seemed high on entry, but generally appeared to reduce in the early years, only increasing for some during and towards the end of Year Three. It also seemed that motivation was associated with the student's perception of relevance, that is appreciating what the purpose was of something they were studying at a particular time. It also seemed that students who saw their learning as relating together felt more motivated, as did those who felt less overloaded than others.

iii) Relating

From the interview notes, it was clear that students spoke in different ways about relating - that is the relationships between courses or the way in which the information they were learning "fitted" not just with other information but with what they already knew. Indeed, one response commonly found in the earliest years was not to acknowledge any relating occurring whatsoever. These students spoke of courses as comprising "tedious detail" and "isolated little factlets to be learnt". Indeed, most students in Years One and Two felt that the courses did not relate together.

A second type of comment from students indicated a certain degree of relating, but one in which information 'fitted-in' to what they were doing. For example, some students spoke of

Biochemistry as being relatively easy for them because they had studied and enjoyed 'A' Level Chemistry. Other students who had studied Mathematics at 'A' Level found the problem solving in Biochemistry easier than those who had not. Similarly, students who had 'A' Level Biology found the Physiology and some of the Anatomy easier than those without. One mature student, a qualified dentist, found the Anatomy particularly easy and enjoyable. It fitted in with his previous experience. Similarly, a number of students found the Anatomy course easier when, as one put it, "you do some work first", by which he meant reading up the relevant chapter in the textbook for a week's work before attending the dissection room.

This 'fitting in' experience was common, too, in clinical attachments. A number of students found that reading a clinical textbook helped them to understand the cases they were seeing. Generally, students who experienced 'fitting in' performed rather better in examinations during Years One and Two than those who did not.

A third kind of relating was rather different from this 'fitting-in'. It was indicated by students who spoke of things "fitting together" or, as one student put it, "integration from different directions". However, this was relatively rare, particularly in earlier years, but rather more common towards the end of Year Three when students were revising for the Intermediate Part II examination. Then, when this 'fitting together' occurred it was unexpected and rather sudden, though generally pleasurable: as one student said "it was the best bit of the course so far". It also seemed that those students who experienced a "fitting together" had the highest grades in the Intermediate Part II examination.

Thus, as with the analysis of load and motivation, a number of themes appear to be running through the students' experience of relating. No relating was found in many students in Year One and in some students even at the end of Year Three. A 'fitting in' approach was seen more commonly in Years Two and Three but a 'fitting together' was only really found at the end of Year Three.

It also seemed that whether or not a student experienced any relating was not a function of the amount of information being presented. Indeed, a sense of overload appeared to be associated with little, if any relating. However, having had some clinical experience helped students not just to 'fit-in' information, but also to 'fit it together'. A further theme concerns the relative success of different relating experiences: no relating was associated with least success throughout and "fitting together" with greatest, though this was only seen at the end of Year Three when it was also associated with highest motivation.

Another theme indicates whether students felt that parts of the course related to one another. Most said "it's a straight pre-clinical/ clinical course", one adding "there's no way that the clinical course starts at any other time than the first week of the first attachment in the third year". Indeed, some students noted a paradox. One commented "it was only when I was revising for the Intermediate Part II examination that the notes that I had taken in Years One and Two really made sense" and another suggested "we should have Year Three first and then have Years One and Two".

iv) Relevance

Analysing the interview notes it became clear that, particularly in the early years of the curriculum, many students questioned the relevance of the courses they were taking. Clearly, these comments cannot be taken literally since it must be assumed that those responsible for planning and teaching the various courses see a need for them. Thus students' notions of what is and what is not useful to them appears to reflect their perception of relevance.

Many felt confused and frustrated. One said of the early teaching "there's just no way of telling if it's all going to be needed, yet it must be". Another noted "you begin to wonder what the point of it all is". It is perhaps ironic that certain parts of the course such as Early Medical Contact and Man, Medicine & Society, which might be thought of as the most highly relevant aspects of Year One, were seen by some students even as being irrelevant. Where they were less dogmatic in their criticism, many students said of these courses "Oh it's light relief" and "I was just an observer".

Most students, then, particularly in the early years, saw relevance as a short term goal, recognising, however, that certain courses might be relevant "in the future" though not at the present. Even in their clinical work some students had a rather limited perception of relevance. Many saw it as a time for "acquiring clinical knowledge", learning about diagnosing and the treatment of conditions. Many, indeed, felt that the theoretical courses taught in Years One and Two were not at all relevant for their clinical experiences in Year Three. One student said "it's not at all easy to relate what you've learnt (in Years One and Two) when you're on the wards". Indeed, some students questioned the relevance of the timing of the Intermediate Part II examination, a test of the students' theoretical knowledge coming after rather than before they entered the clinical attachments. Nevertheless, a number of students believed that the timing of that examination was correct because "it's only at the end of Year Three that the basic sciences begin to make sense".

It seemed that many students found difficulty, especially early on, in perceiving the relevance of what they were being taught. Perhaps it is interesting to note that the two students who did find these years relevant were a qualified dentist and a nurse: possibly their previous experience helped them. However, most students did not, at least until the third year clinical attachments, when many saw more clearly, as one student put it, "the tasks of the doctor". Another noted "the clinical work helps you to know what you need to know".

This, then, presents a paradox: the early years are not seen by most students as being relevant even though it must be assumed that they are, but students' clinical experiences during Year Three do appear to make the first two years appear relevant, but only, as one student put it "in reverse. It's only relevant when you look back", the opportunity for looking back being to revise for the Intermediate Part II examination at the end of Year Three.

Learning Profiles

So far, this 'issue analysis' has shown how students responded to certain curricular experiences in terms of load, motivation, relating and relevance. However, it was also suggested that these issues did not occur in isolation from one another but were related in certain ways. As a result, the interview notes were re-read with the issue analysis in mind, also taking into consideration other information such as the students' examination grades, their feelings about the permanence or otherwise of what they had learnt and whether or not they would retrieve and use information learnt at one point in the course when they found themselves needing it later on.

Out of this further analysis three 'clusters' of response emerged with their own distinctive characteristics. Each cluster was more or less stable, at least for a particular point in the curriculum, though it changed in a number of students as the course proceeded. These three clusters will be referred to here as learning profiles. Each of these learning profiles seemed highly typical and will now be discussed in turn. An illustration of the profile will be given using an extended (though edited) quotation from a student's interview notes which will be followed by some more general observations.

a) Profile One:

"I'm pleased it's over. I had done a

(previous degree) and that was infinitely preferable to this place. Medicine is a training for a job, so all the time you're thinking about how it's going to be and what's going to be useful. That's the trouble. But you have to accept it. I suppose I did the bare minimum. It didn't seem to be relevant. You know that medics have to learn a lot, but all of this... In the end you just have to learn it and it's all forgotten. You just do it. It's just something you've got to go through.

"For the Primary exam I slogged. I just sat in front of my books. I knew that nothing was really going in. I never make a timetable because I never keep to it. I don't think anybody does.

"In the second year, Neuro was incredibly bad. It was totally lacking any depth. You just couldn't get the knowledge to pass the assessment to pass the course. Cardiovascular was alright, but looking at my notes again for Part II's, some things weren't clear how they were related. Pharmacology, well you've just got to learn it. Learn it to pass the assessment that is, after all, you're not applying it at the time.

"In the third year, it all seemed to be about wearing the right clothes, standing properly, laughing at the jokes and not caring about people. Medicine was OK but you can put in a lot of time and you don't automatically get a lot out. It's nice talking to people, but it's a waste of time as well. You can't do anything about it. What good is a ten minute chat between a student and a patient? The first patient I clerked, I was so scared she would die before I got the history and then when I was presenting the case I was asked for a diagnosis. I hadn't expected to come up with that. What you are taught is to bluff it out to appear confident and to give some sort of an answer. Confidence is everything. In any case, in clinical medicine they're not concerned with the second year fine detail of facts.

"For the Part II's I went through the notes and I realised there was a lot I couldn't remember. I always revise in the same way. I don't feel I have the time to do it differently. I just go through the notes. Part II's were big. They loomed. I thought I might fail them, but it's difficult to work out where you will be in the pass/fail spectrum. You know that quite a lot of people who do a lot more work than you won't do any better. (The student got a D grade.) My elective was in India. I didn't really like what I saw and language was a problem. I don't think I learnt very much."

This learning profile was by no means uncommon, particularly in the early years, though it was also to be seen even at the end of Year Three, and is characterised by an almost oppressive feeling of low self-image. These students are overloaded and cope by adopting what often seem to be bizarre, even apparently counter-productive measures such as 'lowering their sights', by not attending, syndicating their work, etc. It is common for them to feel demotivated by their experience, even cynical, some reporting wanting to give up. Work is "a slog" and they do things because they have to, in order to pass exams., fearing they would fail. Typically they do not relate their knowledge, usually seeing courses as being separate from one another, and they adopt a rote or memorising approach to learning. Generally, too, they have a low sense of relevance in what they are being taught. It is common for these students to find it difficult to 'carry forward' much of what they learnt early on into their clinical attachments, and even when revising for the Intermediate Part II examination at the end of Year Three they merely "brush up" their knowledge. There is no sense of things fitting together, and generally examination performance is poor through the three year period.

b) Profile Two:

> "The first three years are pretty boring. It's just a slog - you've got to learn this and you've got to learn that and prepare for the next assessment. It's not fulfilling the true purpose of a university education. It should be inspiring. There's far too much detail. It's a waste of time learning parrot fashion - it just goes. What's the point of doing it like that and then forgetting it? Early Medical Contact was interesting, a good idea, but you weren't involved, you were an observer and you hadn't got the ability to do anything. You didn't do any Medicine. But for me the General Practice experience here has been the best thing so far. It puts it all in the right context in a broad sort of way. I was extremely worried about the Primaries. In fact I had to resit Anatomy.
>
> "I enjoyed the second year more than the first. Things were clinically orientated but some courses were a bit turgid. Cardiovascular was good, though, with practicals really fitting in well. I noticed that. There was a nice link between the practicals and the lectures. The Nervous System was packed with detail again, new words and confusing terms. I had a Systems Course routine. I'd go to the lectures, take notes, buy the set book and not make any more notes, but go home and read as much of the book as I could right up to the assessment. Things that interested me I learnt in detail. I would spend more time on them and it would stick automatically. Pharmacology was interes-

ting and it was presented in a nice way. What I liked was, it was more the broad issues rather than the detail, how drugs are used in the community. It wasn't just Pharmacology, but it was also Sociology. That made it interesting. Nutrition, to be honest, I couldn't find any use for. So far I haven't used any of that information.

"In the third year you would be aware of some of the knowledge but wouldn't necessarily be able to remember it. I'd be able to give an answer from some areas, in Medicine Physiology was discussed and some did come back, but we were unsure about it. We'd say 'was it this or was it that?'. We really didn't know it. We were very vague.

"For the Part II's, I started to get moving at Christmas. By about Easter I'd made a timetable and I'd spend equal time on each subject. Every night I'd go through the notes, except for the Nervous System, which I found were rubbish and I couldn't use them. I was doing it all at a reasonable pace and not cramming, but I was determined not to get bogged down. I thought 'if I don't understand it I'll forget it and it'll take too much time'. I read through my notes just like a novel. If it was interesting I'd become absorbed and learn much more. I found using the clinical experience from the general practice attachments was valuable. It was interesting and more informal and they encouraged us to develop a relationship with the people and realise the problem. You remember their face - who they were and you'd remember them. It really is true. You do see their face. You'd be remembering the details about hypothalamus and I'd try to think of a person with that, and what he'd said and what he was complaining of and what we'd done and so on. It really did stick that way, because you were able to relate it to a person. I felt more confident for Part II's than for Primaries. I got a C. On my elective in Zimbabwe I got more inspiration to do Medicine than the whole of the three years here in Southampton. I got it from the doctors because they were doing Medicine rather than conforming to Medicine."

Interestingly, this student starts out in Year One by displaying most of the characteristics of the first learning profile, but by the second year sees more relevance in what is being taught, and makes much more sense of it. The early sense of load becomes considerably lessened and the student begins to see the links between courses, though any relating is of a 'fitting in' rather than a 'fitting together' type. Motivation remains external, though without the cynicism and oppression of the first profile. The students' examination performance in Year One is poor but in Year Two it seems higher than the first profile student. However, even this student found difficulty in retrieving and using knowledge on clinical attachments, and performance in the Intermediate Part II examination was only average.

c) Profile Three:

> "The big disadvantage of a medical curriculum is that you're just given the facts. I did Physics at school and I like thinking things through. Don't get me wrong, I've enjoyed the course but... Then again perhaps you can't run a medical course like that. Though I think that thinking about things would be good, seeing Medicine as an extension of basic science rather than being a witch doctor where you say 'it works so that's why we do it'.
>
> "I was fairly disillusioned with the first year. Having done Physics at school I thought that perhaps going to university would be more about thinking about things. Perhaps I approached Anatomy wrongly. Perhaps it was my fault, but perhaps it was also the fault of the course. Learning in that way was quite a shock. I found it an obstacle to be got over. I definitely did it wrongly. I learnt it by rote and I'd never learnt that way before. For the Primaries, I was certainly worried about them, but I didn't think I'd fail because I'd passed all the assessments up to then. I just learnt by rote. I would read something, cover the book up, try to write it out and check it over again. It really was just memory.
>
> "In the second year I enjoyed it quite a lot, but I didn't really work hard enough. I missed lectures and did all the sorts of things that students do, but I don't really regret it. For an assessment I'd do some revision possibly for half an hour beforehand and then I'd pass it and go on to the next. I'd just flick through the notes I'd managed to make and refresh my memory.
>
> "In the third year, when you're asked questions on the wards, it was always on the tip of my tongue. And of course I would deny that I'd learnt it and then see it in my notes. I always used to try to follow up cases. I would go off and read it up afterwards, usually in Davidson (a clinical textbook).
>
> "When I got to the Part II's, looking back at my notes, there were tons of surprises. I was amazed how much was relevant to the year. I'd always seen the second and third years detached until I got to the revision, then I realised just how much they told us that was relevant to what we'd been doing in the third year. Certainly seeing patients made me look at my second year notes in a new way. I even saw the patients there when I was revising from the notes. It did help. I can honestly say that the most enjoyable part

> of the three years was revising for Part II. No, don't fall on the floor! It really is true. It all came together. Of course it's a big strain and I'm really annoyed about the paranoia we'd all get into, but if I'd known that I was going to pass I'd really have enjoyed it. On my elective in Barbados it was very enjoyable and lots of Medicine to be done there. The Part II's knowledge came forward then and I could use it."

This student shows considerably more insight than either of the other two, yet clearly early on displays both the first and second learning profiles. Indeed, the characteristics of a distinctive third profile only emerge during the revision period for the Intermediate Part II examination at the end of Year Three. Then the difference is startling. Relevance now becomes apparent, though retrospectively, motivation is intrinsic, often to the students' surprise, and load is manageable if still present. Above all and quite characteristically, relating is a "fitting together" of knowledge, and this occurs often suddenly and unexpectedly. This profile is associated with a greater sense of permanence of the learning. It also seems that these students utilise their clinical experience in their revision even though the examination at the end of Year Three is essentially theoretical.

A qualitative shift in student learning

These three learning profiles seem to have quite distinct characteristics and different consequences, but are they really an extension of one another? Are they three points on a continuum? In one sense this seems to be the case, with the second profile being a middle point between two extremes. So is the third profile merely quantitatively different from the other two? For a number of reasons, the evidence from the interview data seems to question this notion.

The first two profiles occur throughout the three years but the third only really emerges towards the end of Year Three, that is at the time of revising for the Intermediate Part II examination. In addition, the third profile seems somewhat different from the other two - characterised by a fitting together of information, the ability to retrieve information subsequently, and a greatly increased enthusiasm to study. There is a sense, too, in which the first two profiles represent some kind of response to attrition - the first seeing it as an unequal struggle, whilst the second is a 'coping' through diligence and hard work. However, the third profile seems completely different - a sudden shift towards intrinsic motivation. Moreover, students with the third profile did not necessarily first display profile one and then profile two, as the following student clearly demonstrates:

> "I suppose I'm very glad to be in the Fourth Year. The trouble with the first two years is that you couldn't go back to it after the third year. Having done the third year they wouldn't be able to let us do the first two years again! It's quite a change from school - that's the first thing that strikes you. I suppose I was a bit shocked at the change. There was so much to it. Perhaps I didn't settle too well. And doing all these subjects. I suppose my problem was I didn't think of doing such-and-such to pass an exam. There's a difference, you know, about getting excited by the subject. It's all new and you're trying to find out about it. Then the exam comes along and you have to sit down and learn it all. I went to the lectures in the day and thought these were great. Then I'd come back and think 'well, I'll remember that', but of course I didn't. I didn't learn it as I went along. That's what you've got to do for the exams. I was very worried for the Primaries and I was disappointed to be referred in Pathology. At the time I thought I'd passed. I still don't understand why.
>
> "The second year was a bit different. As well as the basics, you've also got the clinician's approach which gives some relevance. It makes you feel that you ought to learn that, it's important. For a typical Systems Course, I'd go to the lectures, they're the basic part of it, and make sure that I'd got good notes. Then, for about a week before an assessment in the evenings I would build up to it, I'd make sure I'd gone through it all. The first year work is academic. It's separate from Medicine. There's not a patient in sight. In the second year you can see where the patient fits in.
>
> "The third year was quite a change. Generally I didn't do all I should have. I kept up with my work, but I think you've got to do a bit more. As you do each attachment you should go back and look at your previous notes, the Pharmacology and especially the Physiology. In the second year you learn things and put them aside. In the third year you concentrate on clerking patients. When you're asked questions on an attachment about knowledge

from the second year it's in the background. You knew it then, but you don't think about it now. It just wouldn't come.

"I've changed my mind about Part IIs. I failed it the first time round and passed it on the resit. The second time round I really enjoyed it. Every minute of it. The first time round I under-estimated the examination. I just couldn't get down to looking back at my systems course work. It's an exam about physiology, you know. That's not explained well enough to you. And it seems a strange place to put the exam. It would be much better at the end of Year Two. At the end of Year Three it could be more of a clinical exam, and by taking an exam at the end of Year Two you'd bring everything together then, which would mean that you'd get more out of the third year. But I suppose it's debatable. I suppose doing the exam at the end of the third year makes you see the second year work better. When I revised for my resit, I wasn't just refreshing my memory but actually learning things. I suppose this happened a bit the first time round, but I didn't realise it was happening. The second time round lots of things happened. I suddenly thought there's lots of things I'd better find out more about. Even when I wasn't revising it all ticked round in my mind and the week before I took it for the second time it all fitted into place. It was suddenly, I might be doing something different at the time but I'd suddenly begin to think 'it's all fitting together'. When I failed it the first time round I was very disappointed, but when I came to revise it again I thought I had no right to pass it knowing so little."

This student, then, shows a remarkable and dramatic transformation, not initially whilst revising for the Intermediate Part II as did other students who demonstrated the third profile, but during revision for his resit of that examination. Nevertheless, the shift shows all the characteristics of that third profile with its "fitting together", suddenness and intrinsic motivation. Moreover, this student only shows a first profile approach up to this point, there is no 'intermediary' second stage.

For these reasons it seems likely that the third profile represents a distinctly different approach from the other two, one which demonstrates the possibility of a 'qualitative' shift occurring in the learning of those students who adopt it.

Conclusions

In this chapter data have been presented from an interview survey of a large random sample of students in their fourth year at Southampton's Medical School in which they were invited to reflect on their experiences of the first three years of the curriculum. First, a chronological analysis of the data was undertaken which showed certain approaches to studying being associated with particular parts of the curriculum. A subsequent issue analysis provided evidence about four major concerns which seem to recur - load, motivation, relating and relevance. Then, it was found that these issues formed three groupings, described as 'learning profiles', which were presented as case studies of typical students. Subsequently, it was argued that these three learning profiles did not represent points on a single continuum, but that the third profile was qualitatively different from the first two, occurring only at the end of Year Three when students revised for the Intermediate Part II examination and being characterised by a sudden and unexpected "coming together" of information with an ability on the part of the student to retrieve and use that information in applied settings. It was suggested, too, that the third profile was associated not just with examination success but with a shift towards intrinsic motivation.

The evidence presented in this chapter has been ideographic, and it would seem appropriate at this point to discuss the methodological approach adopted here in terms of its strengths and weaknesses.

The interview technique was informal, open ended and low in direction. Such an approach is open to bias: that the findings reflect previous research both in Southampton and elsewhere might be accounted for because the researcher knew of these prior to undertaking the interviews. There are limits to controlling this in such a study. Other research might be undertaken using neutral interviewers with little or no prior knowledge of the curriculum or related research, and greater use might be made of triangulation (Adelman, 1984) with different researchers pooling findings and discussing their significance. However, arguably researchers can never be neutral: they begin with their own idiosyncratic views and by making a number of assumptions. It may not be possible to be value-free, though it might be possible to be value-aware. In this study, use was made of an outsider who read the interview notes and made his own independent summary of his observations (see Appendix 6). His report shows a high level of agreement with the data presented here (Appendix 4) and supports the reliability of the findings.

Potentially, interviews are a source of error, yet they can be highly productive. For example, it slowly began to emerge from these interviews that an important change was occurring in students' learning towards the end of Year Three. This was the basis of the third learning profile and its emergence will be seen in later discussion to be crucial to the present study. However, it is unlikely that this would have been identified by any other methodological approach than an ideographic one, that is by collecting qualitative data. Certainly, no quantitative data collection method would have detected it, though a questionnaire might examine it further once it had been identified.

It is important to note, too, that this finding emerged not just because of the way the data were collected, but also because of the way they were analysed, first chronologically, and then in terms of issues. Now, the weakness of an issue analysis is the degree of subjectivity surrounding the choice of issues, yet its strength lies in identifying commonalities and interrelationships that go beyond the chronological description. However, merely to identify and describe the issues might wrongly lead to attaching undue importance to them, just as a doctor might only treat a patient's symptoms and not the causes of some disease. An issue analysis only seems valuable if it allows the researcher to see where the people being observed 'stand' in relation to the issues, which, in turn, may reveal underlying mechanisms. In the present study, the issue analysis led to, and provided a basis for, the identification of the three learning profiles. The approach seems justified, and the issue analysis seems to have been an intermediate stage between topographical and topological description.

Finally, the criticism of subjectivity must be addressed. As noted in Chapter 2, any data collection method is open to bias on the part of the researcher, and subjectivity is not solely a weakness of ideographic approaches. Thus, all researchers must establish the reliability and validity of their findings. In so far as this is possible with only one source of data, particularly of a qualitative nature, it is felt that the interview survey presented here meets these demands, but further questions are raised by it which require additional investigation, and one such enquiry will be described in the next chapter.

CHAPTER 9

RESULTS 2: QUESTIONNAIRE SURVEY

Introduction

The interviews presented in Chapter 8 showed how students coped with their experiences and approached their studying. It provided a picture, or rather a series of pictures, indicating students' different perceptions of and reactions to a common entity - the first three years of Southampton's medical school curriculum. Out of the various analyses three learning profiles emerged. However, it is clear that certain questions remain unanswered and others are raised by these interviews.

The methodological approach adopted in Chapter 8 was ideographic, being based on informal interviews and retrospective observations, providing qualitative data. Whilst this allowed students relative freedom within which to express their own impressions, inevitably the approach raises questions. Were students free to comment? How much did the interviewer influence their responses? Did students feel that they had to respond in a particular way under those circumstances? Are the data presented here merely the view of a minority of students? Did the writer interpret what students were saying in a direction reflecting his own beliefs, assumptions, values and expectations? In addition to these doubts the interviews produced a wealth of information,making data handling difficult.

To check the reliability of these findings it was decided to follow-up the interviews nomothetically: with a questionnaire based on the comments students made. Moreover, this would also enable some lines of enquiry to be extended and to allow for cross-tabulation of responses and the calculation of correlations.

The questions being asked

During the interviews a number of issues appeared to emerge that seemed to warrant further study. For example, very few students entering their third year attachments appeared to be able to bring forward much of what had been taught and learnt in Years One and Two. Was this the case? Students reported different forms of forgetting. Which were the most common? Third year attachments seemed to be perceived by students in ways that were rather different from those of the curriculum planners. Was this so? Interviews suggested that when students approached their Intermediate Part II examination some did so in a way which was described as 'qualitatively' different. How common was this and what was associated with it? How did students feel about the timing of the examination? What was their experience of it? How permanent did they feel their knowledge to be? Did their knowledge gained for Part II examination carry forward into their electives? If so, for which students?

A questionnaire relating to these questions was devised based on students' observations made during the interviews. A pilot version was sent to a 10% random sample of the fourth year. On the basis of their comments the format of the questionnaire was modified (copy attached in Appendix 7). The form was coded for computer handling, printed and distributed in the Spring of 1983 together with a covering letter to all fourth year students (n=116). Two reminder letters were sent to non-responders and a reply rate of 85% (n=99) was obtained. Additional details were added (being taken from Faculty records) and these included information concerning students' examination and assessment performances. Replies were transcribed onto punched cards for computer handling and the data analysed, using a purpose-designed program together with SPSS - The Statistical Package for the Social Sciences (Nie et al., 1975, plus updates) on the University of Southampton's main computer. Statistical and computational advice was sought from relevant staff in the Faculty of Medicine.

Results

The raw percentage results are shown on a copy of the questionnaire in Appendix 7. Analysis of the results is presented here under four headings:

1. Remembering and forgetting on third year attachments;
2. The functions of Year Three;
3. Revising for the Intermediate Part II examination;
4. The permanence of Part II knowledge.

1. <u>Remembering and forgetting on third year attachments</u>

The questionnaire asked students to reflect on how much of the information taught and learnt during Years One and Two they felt able to remember during third year attachments. During the interviews it emerged that this became an issue during teaching rounds. The questionnaire posed such a situation and asked a number of questions relating to it. The results are shown in Appendix 7. Only 5% of students felt that they were able to answer questions more than three quarters of the time and only one per cent less than a quarter of the time. Nearly all students (94%) felt that they could answer questions between a quarter and three-quarters of the time. When asked how many of their answers they felt were correct, 86% felt that more than half were correct and 14% less than half. It seems, then, that students felt able to answer about half of the questions posed and most felt at least half their answers were right.

In the interviews students described different types of forgetting. The questionnaire explored this further and the results are shown in Appendix 7. Seventy-five per cent of students described experiencing the answer as being "on the tip of their tongue". They felt that they could remember the course, who gave the lecture, even what day it was, but still could not answer the question. However, when the answer was given they would say "Oh yes, of course, I knew that". Ninety-three per cent of students reported experiencing that it would "ring a bell": they knew that they had been taught it but could not necessarily remember which course or by whom, but, again, when they were told the answer they would say "Oh yes, I knew that". They could recognise but not recall what they were being asked to remember.

Another common response given by 78% of the students was not to give an answer in case they appeared stupid, even though often the answer would have been right. Ninety-three per cent of students, though, reported that when they could not recall an answer they would say "Sorry, I just don't know that".

About half the students reported attempting to "bluff through" an answer even though they knew it would not be right, and half the students reported "denial" - they might say "there is no point in pursuing this because we have never been taught it" - but when the answer was given they might say "that's interesting, no, we have never been taught that", yet later find it in their notes.

Thus, several types of forgetting were common. Their frequency and rank-order are shown in Appendix 7. The most common was "rings a bell" with second equal "tip of the tongue" and "keeping quiet." Next was "sorry I don't know", then "refusal to answer" whilst "bluffing" and "denying" came low down on the list. Both "rings a bell" and "tip of the tongue" are commonly associated with a poorly established memory but it is interesting to note that "keeping quiet" occurs frequently, perhaps indicating that many students felt unable to answer or lacked the confidence to do so.

During the interviews some students commented that they followed-up cases in order to check information they were unable to remember during discussion seminars, but many did not. The questionnaire asked the whole year group this. Only a quarter reported reading-up most of the cases they saw, nearly half read up some and 28% said that they read up a few. The questionnaire showed that 61% of students only read up cases in clinical textbooks, 1% only in basic science textbooks and no students only used their own notes. Eleven per cent of students looked up cases in a clinical textbook and a basic science textbook, and 20% of students in a clinical textbook and their own notes. Only 7% of students looked up cases in all three sources. It seems that generally students do not regularly and routinely read up the cases they are being shown. If they do then it is much more likely that they will use a clinical textbook and not a basic science one. It is very rare for students to refer to their own notes to look up cases. This again appears to confirm the interview data: it seems that students see clinical attachments as a time for learning about clinical medicine rather than consolidating their basic science knowledge even though they find they are unable to recall very much from the early years. Put another way, their inability to bring forward information does not seem to motivate them to re-learn it during the attachments.

2. Links between Year Three and the first two years

The questionnaire asked students to rank a list of 11 possible purposes of third year attachments. In addition, they were asked to say what they saw as the functions at the moment and what they felt they should be. The overall results are shown in Appendix 7. Students clearly see 'clerking a patient' as primary functions of third year attachments at present. However, they rank as eleventh 'learning the basic sciences', as sixth 'learning how to apply the basic sciences' and tenth 'learning how to apply the behavioural sciences'. It is interesting to note that students rank 'learning the behavioural sciences' higher than 'learning the basic sciences' though they rank 'applying the behavioural sciences' lower than 'applying the basic sciences'. Obviously care must be taken in interpreting a rank order greater than about five as it may be difficult to be able to rank with any accuracy more than about this number of items. Nevertheless, it seems clear that generally students felt that the most important functions of third year attachments were related to clinical medicine and that the least important were to do with consolidating basic knowledge.

When students were asked what the functions of the third year should be, the rank orders were similar. Spearman's rank correlation coefficient shows a high level of agreement (rho=0.9). However, learning the basic sciences and learning how to apply the basic sciences are now given a slightly higher ranking but the difference is not substantial and may be due to chance factors.

Correlations were calculated giving Pearson's coefficient (r) and probabilities (p). These are not tabulated here but their values are presented within the text where relevant. Rank orders of functions of attachments and performance in the Intermediate Part II examination show that students with a high grade in the examination believe that the third year attachments should be helping them to apply the basic sciences (r=0.2790, p=0.006), but there is no correlation between students' examination performance and their rank order of importance of applying the basic sciences as they see them at present. Similarly, students with higher scores in the examination felt that physical examination of patients and clerking should be ranked rather lower as functions of third year attachments (r=0.2813, p=0.005 and r=0.2288, p=0.018). Students who gained a higher score in their examination ranked diagnosing higher as a function of third year attachments than students who had a lower score (r=0.2179, p=0.0013). Thus, students who do better in this examination of their basic science knowledge consider that 'consolidation' should be rather more important during the attachments than it is at present, whilst clerking patients and clinical management should be rather less important. However, it is interesting to note that diagnosing is seen to be important to students who gain a high examination score - presumably partly because diagnosing is not possible without some understanding of disease mechanisms and partly because by engaging in diagnosing one consolidates one's basic knowledge.

The questionnaire asked students to comment on whether they felt that the first two years, as they are at the moment, form a good basis for the third year. Over a third of the students (38%) felt not. Indeed, nearly a fifth of the students (17%) felt that the first two years at the moment were irrelevant to the third year, and nearly half the students (43%) felt that the first two years did not form a good basis for the third year as it was at the moment. Correlating these findings with students' performance in Intermediate Part II gave an *interesting though not statistically highly* significant result. Generally, people who gained a higher mark in the examination felt that the first two years did not form a good basis for the third year attachments ($r=0.1875$, $p=0.040$). It seems that students who do well in the end of year examinations are critical of the basis provided by the teaching in the first two years for third year clinical attachments. The relatively high number of students actually saying that they felt the early years to be irrelevant is further confirmation of a problematic relationship between Year Three and the first two years. About 17% of students felt that the first two years as they are at the moment were irrelevant to the third year. Fewer students (11%) felt that the first two years were irrelevant to the third year as it *is at the* moment. This seems to suggest that students felt the third year overall to be more appropriate than the first two years. Put another way, students generally found more relevance in what they were doing in Year Three than in the first two years.

3. Revising for the Intermediate Part II examination

In their interviews a number of students suggested that the Intermediate Part II examination was important and stressing. In the questionnaire nearly 60% of the students said it was the biggest examination they had ever taken though 28% said that it was no bigger than any other and 13% that it was not as big as other examinations. However, nearly 40% of students suggested that, for them, it was "horrendous" (a term frequently used by students in their interviews, presumably a sub-cultural expression, and used here to characterise their observation). One third of students said that during the revision period they had suffered physically - the most common complaint being sleep loss - and a third psychologically - the most common complaint being anxiety. Eight per cent of students said they had to consult a doctor during this time.

There was a clear relationship between students saying it was the biggest examination they had taken and their reporting the experience as "horrendous". Cross-tabulations were obtained and their Chi Square value calculated. (See Table 9.1 at the end of the chapter.)

Correlating students' experience of the examination with their performance showed that students who gain a higher overall score did not find the examination to be as big as others they had taken ($r=0.2367$, $p=0.009$) though there was no such correlation with their MCQ score ($r=0.1237$, $p=0.110$). However, students who felt that the examination was "horrendous" gained a significantly lower MCQ grade ($r=0.2445$, $p=0.007$). This relationship was much less significantly marked with the overall score ($r=0.1595$, $p=0.466$). It seems that students who gain higher grades do not find the examination so stressful, but that those who find it stressful also do badly on their MCQ paper. Naturally, care must be taken in interpreting these results, particularly in assigning causality: the questionnaire was retrospective, being completed after the examination though some time removed from it (nine months). It may be that students' memory of the events had been influenced by their result. Nevertheless, the correlation between stress and the MCQ result is interesting and may reflect deeper underlying mechanisms.

The interviews had suggested a difference of opinion concerning the timing of the Intermediate Part II examination. As already noted, Southampton is unique (in the United Kingdom) in holding such an examination after rather than before students receive much clinical exposure. In the questionnaire 75% of students felt that the examination should come where it does at the end of Year Three. Nearly 60% of students reported that they had always felt this, but of the 43% who changed their opinion more than three-quarters now felt that the examination should come at the end of Year Three. When asked what had made them change their mind 90% made comments such as "its only now that the basic sciences make sense". Cross-tabulating choice of timing and whether students changed their mind is shown in Table 9.2. Statistically, there is no relationship but it is interesting to note that only 55% of students choosing the end of Year Three for the examination had always thought so but 65% of students choosing the end of Year Two did not change their mind: it was more likely for a student to change their mind if they now chose the end of Year Three. The correlation of timing choice and examination performance was highly significant. Those students who felt that the examination should come at the end of Year Three scored significantly higher overall in the Intermediate Part II examination than those students who felt that it should come at the end of Year Two ($r=0.2384$, $p=0.009$). Students who change their mind (irrespective of the nature of their choice) also do rather better ($r=0.2295$, $p=0.014$). Thus success in these examinations is generally associated with believing that they should come at the end of Year Three and with changing one's mind to believing so. Again, however, one must be guarded concerning causality: do students feel this because they had passed it with a good grade?

The interviews also suggested that some students felt their revision was a matter of "brushing up" on what they had previously learnt and that others felt that the information was now taking on a greater meaning. The questionnaire showed that only 8% of students believed their revision was a matter of "brushing up", 44% believed that their revision took on a greater meaning and 48% reported that their revision took on "a significantly greater meaning". Thus most students felt the information now meant <u>more</u>, but more for some than for others. However, this showed no correlation with their examination grade. It seems that if students felt they knew 'more' they did not necessarily do 'better'.

When students were asked how much influence they felt their clinical experiences had had on their revision, 10% reported no influence, 14% that the patients they had seen helped with their revision, 21% that attachments generally had helped them with their revision, and 55% that patients and attachments had helped. Thus most students reported that the attachments helped their revision. Cross-tabulating amount of meaning and clinical experiences gave no indication of any association, whilst the correlation between clinical experience and examination performance was almost zero.

During the interviews it appeared that for some students much of the information they were revising began to "come together". In the questionnaire it was rare for students to report that "it had all come together" before they had started revising, only two per cent did so. However, 26% said that it all came together, 66% said that some things came together, 5% a few things came together. Only 1% said that nothing came together. Correlating this observation with students' performance in the examination showed a highly significant relationship: those students with the highest score were those who reported more "coming together" ($r=0.3464$, $p<0.001$). It seems, then, that this experience of "things coming together" was a significant one for students. Those who experienced it did substantially better than those who did not. However, cross-tabulating this response with students' feelings about how much meaning their revising now had - shown in Table 9.3 - gave a non-significant association. This seems to suggest that "coming together" is not necessarily associated with greater meaning. However, cross-tabulating "coming together" and "the effects of attachments on revising" is significant - see Table 9.4. It seems then that "coming together" is associated with clinical experiences influencing revision. A further interesting cross-tabulation concerns students' feelings about their revision "coming together" and their choice of timing of the Intermediate Part II examination. Previously it was reported that many students felt a major factor influencing this choice was that "only at the end of

Year Three was it possible for the basic sciences to make sense". Cross-tabulation supported this as shown in Tables 9.5 and 9.6. Thus, students who experience more "coming together" support the timing of the examination at the end of Year Three. This is confirmed by another cross-tabulation between "coming together" and the reasons students give for changing their opinion concerning the timing of the examination - see Tables 9.7 and 9.8. Students who see their revision as "coming together" are also those who changed their mind in favour of the end of Year Three.

Taking all of this evidence together it seems likely that there is some association (and possibly connection) between students seeing their revision as "coming together" and a number of other factors: feeling that attachments helped their revision, preferring the examination to come at the end of Year Three, indeed changing to that opinion, and giving as a reason for this new preference that "it is only now that the basic sciences make sense". It also seems that "coming together" is associated with a high examination performance. However, "coming together" does <u>not</u> appear related to the amount of meaning students see their knowledge as taking on, nor does <u>amount</u> of meaning appear related to clinical experiences or to higher examination performances.

4. <u>How permanent is Part II's knowledge?</u>

The interviews had suggested that knowledge gained for the Intermediate Part II examination was rather more stable and durable than other knowledge acquired at medical school. The questionnaire attempted to examine this further. Only one student felt that knowledge now gained was "quite definitely permanent" but 67% of the students felt that the knowledge they had gained was more permanent than that learnt for other assessments and examinations. The remaining 32% felt that it was not likely to be permanent. Students were asked how this made them feel and were given the opportunity on the questionnaire to comment freely. Most did so. Half the comments suggested that students felt rather cynical and frustrated, but about the same now felt more optimistic, some much more confident. There was no correlation between feelings of permanence and students' performance in the examinations. However, cross-tabulation shows a considerable relationship - see Table 9.9. It seems that students who feel their new knowledge to be more permanent than for other examinations also felt optimistic. Perhaps this is to be expected. However, cynicism is roughly equally distributed between feelings of permanence and non-permanence. Comparing students' judgement of permanence with other variables, shows a general tendency towards some correlation with feelings that the knowledge was coming together during revision ($r=0.1727$, $p=0.043$), and that attachments helped ($r=0.1989$, $p=0.024$), though neither coefficient is very great. Cross-tabulating the same factors, however, confirmed some association. Permanence and coming together are shown in Table 9.10, though again this is not highly significant. However, cross-tabulating coming together and students' feelings of cynicism or optimism was significant - see Table 9.11. It seems that students who felt their knowledge was coming together also feel rather more optimistic, those who do not feel worried and cynical. Interestingly, a cross-tabulation of permanence showed a virtually zero association with how much meaning students felt the information was taking on in their revision and this supports observations presented above.

Another indication that students' knowledge might now be rather permanent emerged during the interviews, when some students expressed surprise at how much they found they could remember on their elective. When asked a similar question on the questionnaire, 36% of students felt that Part II's knowledge was not needed but 52% believed it was and that it helped them. Eleven per cent of all students reported that although Part II's knowledge was needed they found that they could not remember much of it. This result correlated significantly with students' feelings of permanence ($r=0.3593$, $p<0.001$). The cross-tabulations are shown in Tables 9.12 to 9.15. It seems that students who feel that the examination should come at the end of Year Three are more likely to be able to recall on their elective information learnt for it. Indeed, the result also shows that students who believe that the examination should come at the end of Year Two are more likely to believe that the knowledge gained for the examination is not required for the elective.

There was some indication also that remembering on electives is associated with "it all coming together" (r=0.1613, p=0.055) and that the attachments helped with their revision (r=0.1957 p=0.027). Cross-tabulating students' feelings about retrieval of knowledge on their elective with their feelings of permanence was also significant - see Tables 9.16 and 9.17. It seems that students who feel able to recall information on their electives are those who feel it is likely now to be more permanent than before. This is unsurprising, but it also shows that students who feel their knowledge is not likely to be permanent do not see it as being needed on their elective. There is some indication, too, that students who feel able to recall information on their elective also felt that their clinical attachments had helped them in their revision - see Tables 9.18 - 9.20. It strongly shows, too, that students who did not feel that clinical attachments helped their revision, also did not feel that Part II knowledge was needed on the elective.

Thus, there would seem to be grounds for believing that knowledge acquired during the revision period for the Intermediate Part II examination is likely to be rather more stable and durable than other knowledge acquired whilst at medical school. Here, though, there appears to be no possible interference with the result of students' knowledge of their examination scores. Furthermore, permanence seems to be associated with degrees of coming together and with clinical attachments helping revision but not with amount of meaning. It has links, too, with believing that the examination should come at the end of Year Three.

Conclusions

A purpose-designed questionnaire was devised partly to check interview data and partly to provide further information concerning aspects of students' experiences during the third year of Southampton's curriculum. The results are presented and generally confirm those obtained from interviews. In particular the questionnaire shows that many students feel unable to recall much from their early years when they find themselves on clinical attachments and that their most common experiences of forgetting suggest an ability to recognise but not recall information. It also confirms that students see the attachments as a time for learning about clinical medicine rather than for consolidating their basic knowledge. The questionnaire also supported the interview finding that the Intermediate Part II examination at the end of Year Three is "big" but that a large majority of students, having sat the examination, now favour its timing. Some changed their opinion and gave as the reason that it was only at the end of Year Three that the basic sciences could make sense. The questionnaire also confirmed an observation which emerged during the interviews that some students adopt a qualitatively different approach during their revision for the Intermediate Part II examination. This took the form of "things coming together" and was facilitated by their clinical experiences. It also correlated significantly with students' examination performance. No such relationships were found with the "amount of meaning" that students felt their knowledge was taking on during their revision. In other words the questionnaire confirms the claim made in the previous chapter that during the revision period 'knowing more' is not necessarily productive whilst 'knowing differently' - a qualitative shift in their knowledge - is highly productive. It also seems that many students were confident after the Part II examination that knowledge gained for it was rather more likely to be permanent than other knowledge acquired at the medical school and this, too, was associated with the 'qualitative shift'. In addition, the questionnaire confirmed that those students who had experienced the 'qualitative shift' felt more able to use their knowledge on their elective than those who believed they knew 'more', and this was not dependent on their examination grades.

How appropriate, methodologically, was the questionnaire? Clearly, it both supports some of the interview data and contributes further by permitting correlations and cross-tabulations. The issue analysis of the interview data was, in a sense, a cross-tabulation of qualitative data but a strictly numerical analysis of those findings was not possible because the students' comments were freely given. Since the questionnaire findings generally are in the same direction as the interview data it is reasonable to suggest that the questionnaire adds to the reliability and internal validity of the earlier findings.

It seems unlikely, therefore, that the interview findings were obtained by chance or through the influence of some form of interview bias. However, it must be acknowledged that any bias in the interviews might also have been present in the questionnaire. Bias as an explanation of the interview results cannot be ruled out from the questionnaire survey. A questionnaire remains a subjective instrument even though it provides quantitative data. For example, in this study the questions themselves were based on the interview responses of students and the choice of questions determined by the researcher. Furthermore, the questionnaire was a reflection of students' experience. It was retrospective. It is more than likely that their present feelings were influenced by their past experience, particularly since by the time they were surveyed they knew their examination grades. Thus, the data it has provided should not be considered more objective and certainly no more valid than the interview data. Rather, both combine to add strength to the findings.

It might be considered that a further survey needs to be undertaken, using the same or a similar questionnaire with another group of fourth year students to check the reliability of the present findings. It might also be felt important to extend it to third year students prior to their Intermediate examination, making it possible to use some of its findings prospectively. However, it is unlikely that such a study would substantially contribute to, or contradict, the present findings, yet it would expend considerable time and material resources, putting a number of people to some inconvenience for what appears to be little, if any, gain. What seems needed, then, is to extend the study to establish the external validity of these findings and this will be described in the next chapter.

	Horrendous	Not horrendous
Big exam	33	25
No bigger/ not as big	6	35

$\chi^2 = 17.97$
$p < 0.001$

Table 9.1 Crosstabulation of 'size' of exam and students' feelings

	Always felt	Changes opinion
End Yr. II	15	8
End Yr. III	39	12

$\chi^2 = 2.108$ (NS)

Table 9.2 Choice of timing of Part II and changing mind

	No meaning	Increased meaning
Came together	5	92
Nothing came together	1	0

$\chi^2 = 3.842$ (NS)
(with Yates' correction)

Table 9.3 Crosstabulating 'Coming Together' and 'Meaning'

	Attachments no help	Attachments helped revision
Lot coming together	6	86
Not much coming together	3	3

$\chi^2 = 8.085$
(with Yates' correction)
$p < 0.01$

Table 9.4 Crosstabulating 'Coming Together' and 'Attachments'

	End Yr. 2	End Yr. 3
Lot coming together	3	25
Some or not much coming together	22	48

$\chi^2 = 3.492$ (NS)
(with Yates' correction)

Table 9.5 Crosstabulating 'coming together' and exam timing (1)

	End Yr. 2	End Yr. 3
Lot coming together	3	25
Very little coming together	3	2

$\chi^2 = 4.010$
(with Yates' correction)
$p < 0.05$

Table 9.6 Crosstabulating 'coming together' and exam timing (2)

	Change to End Yr. 3	Change to End Yr. 4
A lot and some coming together	31	6
Very little and none coming together	0	2

$\chi^2 = 3.838$ (NS)
(with Yates' correction)

Table 9.7 Crosstabulating 'coming together' and changed opinion (1)

	Change to End Yr. 3	Change to End Yr. 2
A lot coming together	12	0
Very little coming together	0	2

$\chi^2 = 7.024$
(with Yates' correction)
$p < 0.01$

Table 9.8 Crosstabulating 'coming together' and changed opinion (2)

	Worried/Cynical	Optimistic
Permanent	15	33
Not Permanent	18	1

$\chi^2 = 19.484$
(with Yates' correction)
$p < 0.001$

Table 9.9 Crosstabulating 'permanence' and 'feelings'

	Permanent	Not Permanent
Lot coming together	21	5
Very little coming together	2	4

$\chi^2 = 3.34$ (NS)
(with Yates' correction)

Table 9.10 Crosstabulating 'coming together' and 'permanence'

	Worried/Cynical	Optimistic
Lot coming together	27	31
Very little coming together	5	0

$\chi^2 = 5.26$
(with Yates' correction)
$p < 0.05$

Table 9.11 Crosstabulating 'coming together' and attitudes

	End Yr II	End Yr III
Not needed on elective	13	20
Needed on elective	12	51

$\chi^2 = 4.655$
$p < 0.05$

Table 9.12 Crosstabulating exam timing and need for knowledge on elective

	End Yr. II	End Yr. III
Not needed on elective	13	20
Pt. II knowledge helped	6	46

$\chi^2 = 9.025$
$p < 0.01$

Table 9.13 Crosstabulating exam timing and using knowledge on elective

	End Yr. II	End Yr. III
Not needed or not recalled	19	25
Recalled and useful	6	46

$\chi^2 = 12.39$
$p < 0.001$

Table 9.14 Crosstabulating exam timing and usefulness of Pt. II knowledge

	End Yr. II	End Yr. III
Pt II knowledge recalled	6	46
Pt II knowledge not recalled	6	5

$\chi^2 = 14.55$
(with Yates' correction)
$p < 0.001$

Table 9.15 Crosstabulating exam timing and recall on elective

	Recalled	Not recalled
Permanent	41	4
Not permanent	11	7

$\chi^2 = 6.082$
(with Yates' correction)
$p < 0.02$

Table 9.16 Crosstabulating permanent and recall on elective

	Pt. II knowledge Not needed/avail.	Pt. II knowledge helped
Permanent	26	41
Not Permanent	21	11

$\chi^2 = 6.92$
$p < 0.01$

Table 9.17 Crosstabulating 'permanence' and elective knowledge

	Pt. II knowledge not needed/avail.	Pt. II knowledge helped
Attachments no help to revision	8	2
Attachments helped revision	38	5

$\chi^2 = 3.52$ (NS)
(with Yates' correction)

Table 9.18 Crosstabulating knowledge on elective and attachments

	Pt. II knowledge not needed	Pt. II knowledge helped
Attachments no help to revision	8	2
Attachments helped revision	27	50

$\chi^2 = 5.681$
(with Yates' correction)
$p < 0.02$

Table 9.19 Crosstabulating elective knowledge and attachments

	Pt II knowledge not needed	Pt. II knowledge needed
Attachments no help to revision	8	2
Attachments helped revision	27	61

$\chi^2 = 7.486$
(with Yates' correction)
$p < 0.01$

Table 9.20 Crosstabulating elective knowledge and attachments

CHAPTER 10

RESULTS 3: INVENTORY SURVEY
PART I: SOUTHAMPTON INVENTORY DATA

Introduction

Taken together, the data presented in the previous two chapters suggest that students responded to the early years of Southampton's curriculum by adopting a rote or memorising approach. At the same time there was a lowering of their motivation and commitment. Later, on their third year clinical attachments, many found it rather difficult to recall what had been taught and learnt. However, when at the end of Year Three students revised for an important examination, a number experienced what was termed a 'qualitative shift' in their learning - rather than knowing more these students now knew differently. This was characterised by a "coming together" of knowledge and seemed associated with higher examination scores and with a feeling that this new knowledge was likely to be more permanent than anything learnt before at the medical school.

Although the two sets of data generally confirm one another they do not, in themselves, eliminate the possibility of bias, nor do they indicate the range and amount of students' approaches to studying at different points during the first three years. They only suggest that students' approaches vary. Thus, as well as answering certain questions, the interview and questionnaire data raise further ones. For example, what approaches to studying do students adopt at different points during the curriculum? Are these linked with particular curricular experiences? What are the kinds of learning outcomes associated with particular approaches to studying?

To obtain answers to these questions it would seem necessary to adopt a different approach which looks at the average responses of large groups rather than the particular responses of individual people, that is to be nomothetic rather than ideographic. The questionnaire survey provided some quantitative data but was, in many ways, an extension of the interview survey. Now, use might be made of a 'standardised' and previously validated method of data collection.

Recently a suitable instrument has become available - Entwistle's Short Inventory of Approaches to Studying - and its development was detailed in Chapter 4. However, although it has been used with students in higher education, there are no published accounts of its use within the field of medicine. In addition, as noted in Chapter 4, the reliability of the inventory had not been established under differing presentation conditions. This means that it was not known whether it would give the same results on a retest nor whether completing it quickly in a large group would be the same as doing so at leisure alone. Since it was anticipated that it might be used here under these conditions, a pilot study was undertaken specifically to check the reliability of the instrument. This involved establishing a separate study in which inventory data were obtained from matched groups of students under two conditions of presentation and on retesting some days after initial completion. The design and results of this pilot study are given in Appendix 9. More particularly, there is no significant difference between scores obtained on short-term retest nor under varying conditions of administration. On the basis of this pilot study, the inventory (Appendix 8) was used here in the following manner.

Samples and data collection

Inventory data were obtained from five groups of students in Southampton. New entry students completed it during an introductory meeting (October, 1983) at the start of the course. First, second and third year students were surveyed in the middle of their second term (February, 1983). These groups are referred to in the tables as ENTRY, S1, S2 and S3(i) respectively. The third year group was retested at the end of the year (July, 1983) and is referred to as 3(ii). Sample sizes and returns are given in Table 10.1 at the end of the chapter.

The method of data collection was as follows. The investigator identified an occasion when most students in a year group were likely to be attending a lecture and a copy of the inventory was distributed to each one present. The investigator briefly described the purpose of the study and asked students to complete the inventory so as to indicate how they approach their study. Students were asked to give their name and year group for record purposes and assurances were given concerning confidentiality. Students completed the inventory within about five minutes. From a class list it was possible to identify students not present. They were mailed a copy of the inventory and a covering letter.

The procedure described above was not used for the retest of third year students. From the interviews and questionnaire it seemed that certain changes might be occurring during the revision period at the end of Year Three (from about Easter until the Part II examination in early July). It was felt important to obtain inventory data before and after this period. The 'before' survey was carried out as described above but the 'after' survey required another approach since lectures were not then being held. In addition, there appeared to be an ethical problem. The interviews and questionnaire had indicated that the revision period was stressful for many students. It was felt to be unjustified to add to this burden by asking students to complete an inventory during their revision nor was it felt right to do so in the examination period itself. However, it was felt essential to obtain the data before students received their examination results - one potential weakness of the interview and questionnaire data in correlating responses with examination grades was their retrospective nature. It was decided therefore to mail all third year students a copy of the inventory with a covering letter in the period between completion of the last examination and receiving the results - a gap of about ten days. With one reminder to non-responders a very high return was obtained.

Completed inventories were scored in accordance with Entwistle's procedures, transcribed onto punched cards and computer analysed. Additional information concerning students' examination and assessment grades (obtained from Faculty records) was added.

Results

The data were computed using a purpose-written program and statistical analysis was carried out using SPSS (Nie et al., 1975). Originally, Entwistle (1981) intended there to be eight dimensions. However, subsequent work using the inventory indicated the advisability of separating comprehension learning and operation learning from their respective pathologies - globe-trotting and improvidence - giving ten dimensions in all (Ramsden, 1983). Means and standard deviations are given in Table 10.2 under the column headed Southampton. Differences between means (with t-values and probabilities) are shown in Table 10.3.

To comment on the data it would seem reasonable to proceed in chronological order through the curriculum. On entry, students appear to show a rather high achievement motivation, a low reproducing orientation and high meaning, comprehension learning, operation learning, and versatility, with low learning pathologies and a high prediction of success score. Before comparing these results with subsequent years it first seems necessary to establish criteria for doing so. At the outset it must be noted that comparison is being made here largely between two sets of 'transverse' data and not between successive samples from the same students. The null hypothesis, then, rests on the assumption that the groups of students being compared are matched in all relevant characteristics other than their different point within the curriculum. From the earlier discussion of the development of the inventory it would seem reasonable to proceed by making this assumption, but the level of difference needs to be establised. Here it would seem reasonable to take p=0.01 as a conservative minimum acceptance level of probability (Jolly & Gale, 1976) but also noting values at the 5% level. Table 10.3 has a comparison of means on the ten dimensions for the following pairs of data from Southampton students: new entry/Year 1; Year 1/Year 2; Year 2/Year 3(i); Year 3(i)/Year3(ii). Other correlations were calculated but have not been tabulated. Where these are relevant they will be included in the text giving their t and p values.

Comparing the new entry and Year One data shows a substantially lower achievement motivation score in Year One with a greater orientation towards reproducing and a lower orientation towards meaning. Comprehension learning is significantly lower with operation learning non-significantly lower. Improvidence is marginally greater with globe-trotting greater at the 5% level. Year One students' versatility is significantly lower than on entry and their learning pathologies significantly greater with their prediction of success score significantly lower. Two points seem to emerge. The first is that there are large differences between the new entry and Year One data; differences which require some explanation since they do not appear to have occurred through chance. Second, there seems to be a pattern in the differences: lower scores in Year One than on entry in achievement motivation, meaning, comprehension learning, versatility and prediction of success with higher scores on reproducing and learning pathologies.

Comparing Year One and Year Two data indicates no differences at the 1% level of significance. The achievement motivation score is lower in Year Two and the difference is approaching the 5% level. Reproducing is also lower, though not significantly, as in the meaning score. Comprehension learning is slightly lower in Year Two whilst operation learning is only significantly lower at the 5% level. Versatility is also lower and the difference is approaching significance. So are learning pathologies and the prediction of success score though neither are significant statistically. It seems then that Year Two scores are rather similar to those obtained from Year One students.

Comparing Year Two and Year Three(i) scores again shows few significant differences. Achievement motivation is again lower and although the difference compared with Year Two is not significant it is when compared with Year One ($t=2.35$, $p=0.002$). Reproducing, too, is lower though not significantly different from Year Two but the difference is significant compared with Year One ($t=2.67$, $p=0.008$). The meaning score is slightly higher in Year Three than Year Two, though not significantly. However, the comprehension learning score in Year Three is higher than that for Year Two at the 1% level. Versatility is just higher in Year Three than Year Two at the 5% level of significance but learning pathologies are about the same. The prediction of success score is higher in Year Three than Year Two though not significantly.

Year Three students were retested - 3(ii) - five months later, the intervening period largely being spent revising for the Part II examination. Comparing these with the 3(i) data shows some differences. The achievement motivation score for 3(ii) data is significantly greater than that for 3(i) and is now marginally greater than for Year One students. The reproducing score for 3(ii) is non-significantly lower than for 3(i) but is now very significantly lower than for Year One though still significantly higher than for new entry students ($t=3.63$, $p<0.001$). The 3(ii) meaning score, though, is about the same as for 3(i). Comprehension learning, however, is greater in 3(ii) than 3(i), though not significantly, but this difference is statistically very significant when compared with Year Two ($t=-3.94$, $p<0.001$). Operation learning for 3(ii) is about the same as for 3(i). Versatility is about the same as for 3(i) but learning pathologies are less (though non-significantly). However, the learning pathology scores in 3(ii) are very significantly lower than for Year One ($t=3.02$, p=0.003). The 3(ii) prediction of success score is non-significantly greater than for 3(i) and, though very much greater than for Year Two (t=-2.70, p=0.008), remains significantly lower than for new entry students.

Thus the Year Three inventory data seem to indicate a mixture of results. When surveyed <u>during</u> the year students appeared to show relatively few differences compared with Year Two with the exception of comprehension learning which is significantly greater. However, when retested five months later there are rather more differences - in achievement motivation (greater on retest) and improvidence (lower) with non-significant differences in comprehension learning (greater), learning pathologies (lower) and prediction of success (greater).

Taken together, the inventory results show certain important differences. By far the greatest, both in number and magnitude, occur between the new entry data and Year One - just five months into the course. The remaining data show far fewer differences between succeeding years, though those between the two sets of Year Three data are rather more notable, partly because they show some statistical significance but also because they occur over a relatively short period of time. In other words, ignoring for the present the new entry data, variation of students' approaches to studying between years is relatively slight. If, however, one looks at variation over longer periods other differences emerge which not only are greater in magnitude but appear to be indicative of certain trends. For example, achievement motivation, which is relatively high on entry, is lower in each of the first three years, only rising again at the end of Year Three. Reproducing, low on entry, is substantially greater in Year One but appears to reduce steadily over the three year period. The meaning orientation, which is high on entry, reduces for the first two years, rising somewhat in Year Three. Comprehension learning, which is also high on entry, drops in Years One and Two, rising in Year Three. Operation learning is rather higher on entry and appears to drop steadily during Years One and Two. Improvidence remains rather stable but globe-trotting increases to a peak during Year Three. Versatility is rather high on entry but drops during Years One and Two, showing a slight rise in Year Three. Learning pathologies, however, are rather low on entry but show a dramatic increase in Year One with a gradual reduction by the end of Year Three. The prediction of success score is high on entry and much lower in Years One and Two, only showing an increase towards the end of Year Three.

Thus, the inventory results suggest some agreement with data obtained from the interviews and the questionnaire. Years One and Two appear to be particularly associated with low motivation and a high orientation towards reproducing. It also seems that these orientations are not present at entry but that they emerge quite rapidly during the first year. The data also show that Year Three, and particularly its final phase, is associated with some rather substantial changes in approaches to studying - higher motivation, less reproducing, greater comprehension learning, more versatility and fewer pathologies - though these scores are still rather different than those of the new entry students.

Approaches to studying and examination performance

Students' examination scores were correlated with their inventory results using SPSS to obtain Pearson Coefficients (r) and probabilities (p) - see Table 10.4. The correlations obtained by Entwistle (1981) are also given for comparison. It is interesting to note that few of the Southampton coefficients are as great as Entwistle's, though most have the same sign.

The Year One grades used for these correlations include an in-course Anatomy assessment held at about the time the inventory was being completed, the three Primary examination courses (Anatomy, Biochemistry and Pathology) and the overall Primary examination grade. (It is worth noting here that the Primary examination was held about four months after the inventory data were obtained.) Inspecting Table 10.4 shows that students' achievement motivation score correlates positively and very significantly with all grades. It seems that in Year One students with well organised study habits and a high hope for success also do well in the examinations. This appears to confirm Entwistle's finding. The reproducing orientation shows no significant correlation though generally the sign is negative. The meaning scores correlate significantly with the Pathology and overall Primary grades. Correlations between students' examination grades and their inventory scores on comprehension learning, operation learning, improvidence and globe-trotting were not significant. The prediction of success score correlates significantly with all five first year grades though not to the same extent that Entwistle's findings show.

For Year Two the grades used to correlate with second year students' inventory scores were from courses running at about the time the data were collected - the end of course assessments for the Cardiovascular System, the Musculo-Skeletal System and the Pharmacology course as well as the Intermediate Part I grade (comprising project marks for Psychology, Sociology and Epidemiology and an examination grade for Epidemiology and Medical Statistics). Table 10.4 shows that the achievement motivation score correlated significantly with the Intermediate Part I but not with the other three grades. However, those with the Musculo-Skeletal System Course and the Pharmacology examination were approaching the 5% level of significance. The reproducing orientation correlates significantly though negatively with the two systems course assessments and thus seems counter-productive, but not with the other two grades (though their sign was also negative). The meaning scores correlated significantly and positively with the Pharmacology and Intermediate Part I grades but not with the other two, though the sign of both is positive. Comprehension learning correlated just significantly (at the 5% level) with the Musculo-Skeletal grade and the operation learning score correlated negatively but just outside the 5% level with the same course. Improvidence also correlated with this course -

significantly but negatively - whilst globe-trotting correlated negatively with the Intermediate Part I grade. The relationship between the Intermediate Part I grade and globe-trotting suggests that students who are rather superficial do rather badly in that examination.

Second year students' versatility correlated significantly and negatively with their Musculo-Skeletal grade but not significantly with the remaining grades. Learning pathologies correlated negatively with all four grades, the ones with Musculo-Skeletal and Part I being significant (and that with Pharmacology approaching the 5% level). The prediction of success score correlated significantly with the Pharmacology and Part I grades but not with the other two. Thus, the Year Two inventory data show rather fewer significant correlations with examination grades than Year One, particularly in magnitude.

The Year Three examination, the Intermediate Part II, comprises three major elements - essays, an MCQ and a problem solving paper. Students' grades on these, together with their overall result, were correlated with the 3(ii) inventory data. The results, shown in Table 10.4, indicate fewer significant correlations than for the previous years. Achievement motivation correlated significantly with the essay grade and the overall result but not with the other two. None of the other dimensions gave significant correlations.

Overall, the inventory scores appear to correlate in the direction predicted by Entwistle's findings with students' Year One examination performances, less in Year Two and rarely in Year Three. The relative failure of the inventory to predict examination grades, particularly in Years Two and Three, is an interesting, if unexpected, finding.

Summary of Southampton inventory data

The survey of Southampton students' approaches to studying appears, in general, to confirm much of what has already been described from the interviews and the questionnaire. In doing so it adds validity to those earlier findings particularly since it uses a standardised instrument developed outside Southampton. In particular it indicates a dramatic difference in approach between entry and Year One; lower motivation, higher reproducing, lower meaning, lower comprehension learning, lower versatility, higher learning pathologies and a lower prediction of success score. In addition, data for Years Two and Three indicate certain trends - lower motivation but lower reproducing than in Year One - though in Year Three there is more comprehension learning and versatility. Towards the end of Year Three there appears to be a change towards more motivation and comprehension learning, with less reproducing and learning pathologies - a finding which lends support to the notion developed in Chapters 8 and 9 of there being a 'qualitative shift' in students' learning at that time. The survey also indicated that certain approaches to studying correlated with examination performance early on, but not later on.

These data seem to support a notion that Southampton's curriculum may be influencing students' approaches to studying which may determine possible learning outcomes. However, the nature of that influence remains unclear from the survey. To clarify this it would seem necessary to obtain some comparative data.

PART II: COMPARATIVE INVENTORY DATA

On the basis of the inventory survey in Southampton it was decided to carry out a comparative study using the same inventory at other medical schools. Since the major aim of this enquiry was to investigate the relationship between curriculum and learning it was felt important to see how students approach their studying under different, but identifiable, curricular conditions. From the discussion in Chapters 5, 6 and 7 it seemed that Southampton's curriculum was planned in response to problems which had perennially faced the conventional pattern. Thus, it would seem reasonable to obtain inventory data from students in a conventional curriculum. A suitable United Kingdom medical school was identified and contact established. It is at a large provincial university and has a pre-clinical/clinical curriculum featuring disciplines rather than 'systems'. The teaching is mostly by lectures to large groups of students.

The earlier discussion also indicated that Southampton's approach was by no means the only alternative to the conventional pattern and it was suggested that vertically integrated curricula, and in particular those featuring problem-based learning, appeared rather successful. Thus it seemed appropriate to include a problem-based medical school here. However, there is no such school in the United Kingdom and the one chosen is a new medical school in a European country near to, and culturally very similar to, this one. (To preserve confidentiality neither this medical school nor the one with the conventional curriculum will be named here.) Most students there enter straight from school, unlike in McMaster where all students are post-graduate. The curriculum is problem-based - similar to that described in Chapter 6. A pilot study there established that students had an excellent working knowledge of English and could easily complete the inventory. Students at the conventional school appear to match Southampton students in age, sex and entry qualifications (Fleming, 1983). Those at the problem-based school are similar, though the entry criteria are rather broader than in the United Kingdom (Graat, 1983) - school leaving grades are not of such primary importance. At all three schools, the staff/student ratio is comparable (Stalenhoef, 1984). Thus, it is possible to test the null hypothesis that there should be no differences between inventory scores at the three medical schools.

Samples and data collection

Inventory data were collected from medical students at the same curriculum stages as the Southampton data i.e. on entry and during the first three years. The data collection method at the conventional school was the same as in Southampton. At the problem-based school there were far fewer occasions when students met together and an alternative approach was adopted - mailing inventories (in English) to students with a covering letter (in their own language). At both the conventional and problem-based schools anonymity was preserved but this made remailing difficult. Largely for this reason the response rates are not as high as that in Southampton (see Table 10.1). The rather low response from the problem-based school is perhaps to be expected under these circumstances but it gives rise to some concern regarding the representativeness of the replies received. Certainly the data for Year Three must be treated with some caution, and, even though the response for Years One and Two is around 50%, care is needed in its interpretation. For this reason only p-values of 0.001 or less will be used to indicate significant differences for this set of data. Having said this, it is argued in the conclusion of this chapter that there appear to be very good reasons for including even these data.

Data were collected after Easter (1983) at both the conventional (C) and problem-based (P) schools. This meant that these students were about two months further into their course than Southampton students in Years One, Two and Three(i) but about three months before the Southampton 3(ii) data were collected. The new entry data were obtained from problem-based students in mid-September, 1983, (about ten days after the start of their academic year) and in late September 1983 at the conventional school (in the first week of term). Forms were returned to Southampton, scored, transcribed, and handled by computer using the same programs and statistical packages as for the Southampton data.

Results

Means and standard deviations for the ten dimensions for each year are shown in Table 10.2. Differences between these means and their probabilities are shown in Table 10.3 for within school comparisons and in Table 10.5 for between school comparisons.

Comparing the entry data (Table 10.5) shows remarkable similarities between all three schools - any differences are of rather low statistical significance. The achievement motivation score at entry is marginally higher in Southampton than the conventional school but rather lower than the problem-based school. The difference on this dimension is rather greater between the conventional and the problem-based school. A similar difference is seen in the reproducing score - Southampton lower than the conventional school with the problem-based school even lower. The meaning scores at the three schools are virtually identical as are the comprehension learning scores at Southampton and the conventional school. However, at the problem-based school the comprehension learning score is higher. Of the remaining dimensions only the learning pathologies score shows much difference between the schools. On entry the scores at both Southampton and the problem-based school are very similar but both are lower than at the conventional school. On balance, then, the three sets of new entry scores generally support the hypothesis of no difference between approaches to studying at the three schools.

Comparing now the differences <u>within</u> schools, it is clear from Table 10.3 that there are more differences between the years in Southampton than at the other two schools. Indeed, if one ignores for the moment the new entry data, the other two schools show only one statistically significant difference greater than the 1% level of probability. To put this another way, there is considerable variation in students' approaches to study in Southampton over the first three years but at the other two schools there is considerable stability.

Now taking into consideration the new entry data one sees interesting differences within schools. At the conventional school the differences between entry and Year One appear similar to those already described for Southampton - a marked reduction in motivation, significantly greater reproducing, decreased meaning, etc. At the problem-based school there is a lower achievement motivation score in Year One compared with the new entry, but the reproducing score is also lower - the reverse of that in Southampton and at the conventional school. Other dimensions show a similar change: Southampton and the conventional school show lower comprehension learning, decreased versatility, increased learning pathologies and a decrease in the prediction of success score between entry and Year One, but this is not seen at the problem-based school.

Turning now to differences between schools (Table 10.5) one immediate observation suggests greater variation in the earlier years than in Year Three. Of the 48 comparisons given for Years One and Two in all three schools, 33 are statistically significant. Of the 40 values given for Year Three only 15 are significant. Moreover, it should be noted that this figure is artificially inflated since the Southampton data provides two sets of scores for Year Three. Taking the 3(i) scores with C3 and P3 shows that ten of the 24 differences are significant, whilst taking the 3(ii) scores shows that only eight of the 24 are significant. This further suggests that later scores show fewer differences between schools than earlier scores.

In Year One it seems that Southampton students score significantly higher on reproducing and on learning pathologies than students at the conventional school but lower on the prediction of success score. Comparing Southampton and problem-based students shows significant differences on many dimensions - higher reproducing, lower meaning, lower comprehension learning, lower versatility, higher learning pathologies and a lower prediction of success score. Conventional students have a substantially higher reproducing and lower meaning score than problem-based students, their comprehension learning and versatility scores are lower, their learning pathologies significantly higher and overall prediction score significantly lower.

In Year Two Southampton students' achievement motivation score is very significantly lower than at both of the other two schools. The score for conventional students is non-significantly lower than at the problem-based school. Southampton second year students' reproducing score is non-significantly higher than the conventional students', but very significantly higher than the problem-based, as is the conventional students' score. On the meaning dimension, second year Southampton students' score is significantly lower than both conventional and problem-based students'. So too the conventional students' score is lower than that for problem-based students. On comprehension learning Southampton students show a non-significantly lower score than conventional students but this difference is very significant compared with the problem-based students - the difference between these scores at the two other schools is also significant. There is little difference between the three schools on operation learning but on versatility Southampton students are significantly lower than both conventional and problem-based students. The difference between second year students at the other two schools on versatility is less marked, though still significant. On the learning pathologies dimension, Southampton students are significantly higher than conventional students but very significantly higher than for problem-based students. Conventional students are also significantly higher on learning pathologies than problem-based students. On the prediction of success score Southampton students are very significantly lower than those at the other two schools. Conventional students are also very significantly lower on this than problem-based students.

Overall in the second year a pattern emerges that is very similar to that in Year One. Southampton students differ from conventional students in showing a lower achievement motivation, lower meaning orientation, lower comprehension learning, lower versatility, greater learning pathologies and a lower prediction of success score. Compared with problem-based students they differ on the same dimensions (often more significantly) and show a far greater reproducing orientation. It may also be noted that the conventional students differ from problem-based students in much the same way (though possibly to a lesser degree) but the range of difference is less (e.g. no differences in achievement motivation or learning pathologies). In certain respects conventional students in Year Two seem rather more similar to problem-based students than to Southampton's.

In Year Three, as already noted, the differences are markedly fewer than those in Years One and Two. However some results are worthy of comment. Southampton's 3(i) students have a significantly lower achievement motivation score than students at the conventional school but no other dimensions show significant differences at this time. Compared with problem-based students, Southampton 3(i) students show a very significantly higher reproducing score, lower meaning score, and more learning pathologies. They show more improvidence and their versatility score is significantly lower. The overall prediction of success score shows no significant difference between Southampton's 3(i) and the conventional students' but both show very significant differences when compared with the problem-based school.

Thus, the third year results indicate similarities between the schools though Southampton students continue to show rather different approaches to studying from the problem-based students. However, as has already emerged, the data collected from 3(ii) Southampton students indicated something of a shift - their achievement motivation and comprehension learning scores being substantially higher. The only significant difference now between Southampton and conventional students is a greater comprehension learning score. Comparing Southampton and problem-based students shows a higher reproducing and lower meaning score but a non-significant difference in versatility, though the learning pathologies score in Southampton remains significantly higher. The prediction of success score is significantly lower in Southampton than at the problem-based school though the difference is less marked. However, the comprehension learning score in Southampton is now about the same as for problem-based students.

In many respects, then, Southampton students' scores at the end of Year Three show a far greater similarity to those at the other two schools than at any time since entry. Indeed, on some dimensions Southampton students' approaches to studying appear more similar to the problem-based students than to conventional students.

Summary of comparative data

The Short Inventory of Approaches to Studying was administered at two medical schools deliberately chosen to represent conventional and problem-based curricula. The results were compared with those already obtained in Southampton. Scores within the two additional schools appear rather consistent and, unlike Southampton, show little variation from year to year. Results from new entry students showed remarkable similarities between the three schools suggesting that, despite differences in location, nature and selection, these three medical schools admit students with very similar approaches to studying. These are characterised by a high level of motivation, low reproducing, high meaning, high versatility, low learning pathologies and a high prediction of success. However, in the succeeding years, there are many more differences between the schools, especially early on. Scores for first year students in Southampton and at the conventional school show substantial differences compared with new entry scores - more reproducing, lower meaning, lower comprehension learning, lower versatility, higher learning pathologies and lower prediction of success. The same trend was not seen at the problem-based school, indeed on their reproducing orientation the opposite occurred. Data from the succeeding years suggest that students at all three schools continue to adopt much the same pattern of approaches to studying as in Year One. In some ways conventional students are closer to problem-based students than to Southampton's in their approach to studying, particularly in Years One and Two. In Year Three, however, Southampton students showed significant shifts towards the scores found at the two other schools. Put another way, a change occurs during Southampton's third year which is not seen in the other two schools between their Year Two and Year Three scores.

The inventory survey seems to have provided some interesting data, but how appropriate has it been methodologically? As argued in Chapter 2, some kind of nomothetic follow-up enquiry was anticipated to extend the reliability and validity of the ideographic data. In many ways the inventory has done this, but some questions remain concerning its suitability here.

The inventory's development was described in Chapter 4 where it was noted that substantial claims had been made for its reliability and validity. Indeed, it gains strength from its empirical and theoretical basis and provides externally standardised data for comparison. However, for its use in the present study a further investigation was carried out to check its reliability under differing modes of presentation and its test/retest reliability (see Appendix 9).

The use of an externally developed inventory provides an opportunity not just to examine the approaches to studying of a large number of Southampton students but also to compare the findings with the interview and questionnaire surveys. Generally it supported the other data. Moreover, using an inventory allows for large groups to be surveyed in different locations, for general trends to be identified and for cross-correlations to be made with other quantitative data such as examination grades. At a practical level, computer handling of the data is possible, which facilitates analysis. However, an inventory remains a questionnaire with all the limitations discussed at the end of the previous chapter.

One potentially serious limitation of the present data must be noted. The returns at the problem-based school were rather less than might be felt desirable (see Table 10.1). As was suggested earlier, probably this was because of the nature of the institution in which these data were collected. Unlike the other two medical schools, it holds very few large group sessions, making it necessary to collect the data by post which seems to give a lower return. Moreover, because of the strict emphasis placed by the study on anonymity, it was rather difficult to identify and hence follow up the non-responders. In addition, the problem-based survey was carried out at a medical school in another European country, and communications with those involved were not as easy as within the United Kingdom.

In any survey of this nature, a return of between fifty per cent and sixty per cent might be considered the bare minimum to give reliable data. Thus, certain of the inventory results from the problem-based school might be thought of as being no more than indicative and provisional. As suggested earlier, an attempt was made to limit the effect of this low return by only taking into consideration high t-values which had a probability less than 0.001. Nevertheless, it is important to note that even with this very strict criterion many of the comparisons between the means of the problem-based school and the other two schools are very highly significant, indicating huge differences which support the arguments being made. Moreover, there are other reasons to suggest that the low return from the problem-based school does not make the findings unreliable.

One is concerned with the consistency of the arithmetical means of the data in different years at the problem-based school. If the data were to have been affected by a sampling error it is unlikely that these means would remain as consistent as they do. A similar reason for accepting these data concerns the standard deviations obtained. Not only are these consistent within the problem-based data but are about the same value as those obtained from the other two schools. Again, any error due to small sampling might be expected to result in a greater variation within the data, hence standard deviations of higher value at the problem-based school. This did not occur and the results seem reliable.

In addition, a re-examination of the data at the problem-based school suggests that the results are acceptable. Assuming a minimum desirable return of sixty per cent, it is possible to calculate what scores would be needed in the additional data to alter the means to show no significant difference. For example, on the reproducing dimension, if all of the 'extra' cases gave the maximum score on that dimension (which was found in just one of the existing sample) then the mean score would only rise from 10.8 to 13.6, and this would still be highly significantly different from the Southampton mean ($p<0.001$). Indeed, if a one hundred per cent return was achieved, the remaining returns would need to average 17.0 (that is +2.5 standard deviations greater than the present mean) for the overall new mean to rise to a point of non-significance in comparison with the Southampton mean.

Support for accepting this low return from the problem-based school as being reliable also comes from two studies carried out after the data presented here were collected. A longitudinal inventory survey of students in the three schools gave results which were very similar to the transverse survey reported in this chapter (Coles, 1985 - see Appendix 10).

Furthermore, a similar study in Australian medical schools using a related inventory gave remarkably comparable results (Newble & Gordon, 1985; Newble, 1985).

Other data presented earlier in this report also support the problem-based inventory results and indicate not just their reliability but also their validity. In Chapter 6, research evidence not using an inventory in problem-based schools was reported, which seems consistent with the present inventory findings. Indeed, an inventory survey outside medical education lends support. Ramsden (1983) obtained data using the same inventory as here at two different sixth form schools, one traditional, the other innovative. His findings mirror those described in this study.

Taken together, these observations strongly support the reliability and validity of the inventory data presented here from the problem-based school, despite the low return.

This comparative study completes the results being presented here in an attempt to identify the nature of the relationship between medical curricula and student learning. The findings will now be discussed (Chapters 11 to 13) and conclusions drawn (Chapter 14).

Medical School	Year	Total	Return	%
Southampton	New entry	124	123	99.2%
	Yr. 1	135	127	94.1%
	Yr. 2	128	123	96.1%
	Yr. 3 (i)	116	105	90.5%
	Yr. 3 (ii)	116	99	85.3%
Conventional	New entry	160	150	93.8%
	Yr. 1	159	134	84.3%
	Yr. 2	160	134	83.7%
	Yr. 3	160	96	60.0%
Problem-based	New entry	150	93	62.0%
	Yr. 1	148	70	47.3%
	Yr. 2	124	59	47.6%
	Yr. 3	101	34	33.7%

Table 10.1 Inventory returns

		Southampton					Conventional				Problem-Based			
		Entry	Yr.1	Yr.2	Yr.3(i)	Yr.3(ii)	Entry	Yr.1	Yr.2	Yr.3	Entry	Yr.1	Yr.2	Yr.3
Achievement Motivation	$\bar{x}$	16.3	12.1	11.1	10.7	12.3	16.5	13.1	13.2	12.7	15.0	13.4	14.0	12.2
	SD	3.60	4.43	4.19	5.04	4.38	3.59	4.40	4.21	4.27	3.40	3.46	3.85	3.56
Reproducing	$\bar{x}$	12.4	16.1	15.4	14.6	14.1	13.3	14.6	14.6	14.2	11.8	10.8	11.4	10.9
	SD	3.47	4.03	4.17	4.24	4.13	3.59	3.60	4.00	4.02	3.34	3.14	4.18	4.24
Meaning	$\bar{x}$	16.4	13.0	12.5	13.3	13.2	16.1	13.7	14.2	13.1	16.6	15.7	16.1	15.4
	SD	3.42	4.11	3.50	4.15	4.32	3.63	3.87	3.63	4.55	3.80	4.03	3.67	3.24
Comprehension Learning	$\bar{x}$	8.7	7.9	7.7	8.5	9.1	8.6	8.0	8.3	8.1	9.4	9.1	9.5	9.1
	SD	2.38	2.49	2.39	2.45	2.16	2.47	2.50	2.36	2.60	1.85	2.29	2.04	2.39
Operation Learning	$\bar{x}$	9.3	8.8	8.2	8.3	8.2	8.8	8.5	8.7	8.3	8.4	8.1	7.9	8.1
	SD	1.92	1.97	2.32	2.23	2.08	2.19	2.18	2.15	2.39	2.21	2.21	2.06	2.26
Improvidence	$\bar{x}$	4.4	4.7	4.4	4.7	3.7	4.7	4.3	3.9	4.0	4.7	4.1	4.6	3.2
	SD	2.18	2.21	2.45	2.57	2.17	2.31	2.04	2.24	2.47	2.10	2.39	2.37	2.00
Globetrotting	$\bar{x}$	4.8	5.6	5.6	6.0	5.8	5.6	5.4	5.2	5.6	4.9	5.0	5.4	5.6
	SD	2.63	2.22	2.27	2.57	2.49	2.80	2.48	2.24	2.28	2.11	2.34	2.12	1.83
Versatility	$\bar{x}$	34.5	29.8	28.4	30.1	30.5	33.5	30.2	31.2	29.6	34.4	32.9	33.6	32.7
	SD	5.99	6.47	6.31	6.69	6.77	6.14	6.33	6.09	7.56	5.99	6.32	5.46	5.79
Learning Pathologies	$\bar{x}$	21.6	26.6	25.8	25.7	24.3	23.7	24.4	24.1	24.0	21.4	20.0	21.8	19.9
	SD	6.12	5.55	6.39	6.13	5.68	6.25	5.68	5.66	5.96	5.06	5.54	5.76	5.79
Prediction of Success	$\bar{x}$	76.8	63.3	61.6	62.8	65.8	74.3	66.8	67.9	66.5	75.9	74.2	74.2	72.6
	SD	10.55	11.81	10.35	12.44	11.88	9.92	10.88	10.67	13.24	10.39	9.75	9.52	9.87

Key: $\bar{x}$ = Mean
SD = Standard deviation

Table 10.2 Inventory data – means and standard deviations

		Southampton				Conventional			Problem-based		
		Se-S1	S1-S2	S2-S3i	S3i-S3ii	Ce-C1	C1-C2	C2-C3	Pe-P1	P1-P2	P2-P3
Achievement Motivation	t	8.10	1.93	0.68	−2.52	7.12	−0.14	0.83	2.85	−0.83	2.27
	p	0.000***	0.055	0.495	0.012*	0.000***	0.887	0.406	0.005**	0.410	0.026
Reproducing	t	−7.66	1.34	1.36	0.92	−2.87	−0.06	0.74	2.09	−0.96	0.51
	p	0.000***	0.181	0.174	0.356	0.004**	0.949	0.458	0.038	0.338	0.610
Meaning	t	7.09	1.04	−1.49	0.19	5.35	−1.22	2.09	1.45	−0.58	0.99
	p	0.000***	0.299	0.139	0.850	0.000***	0.223	0.038*	0.149	0.563	0.326
Comprehension Learning	t	2.65	0.79	−2.64	−1.73	2.18	−1.06	0.44	0.82	−1.08	0.78
	p	0.009**	0.432	0.009**	0.086	0.030*	0.292	0.662	0.415	0.282	0.441
Operation Learning	t	2.22	2.20	−0.44	0.30	1.06	−0.67	1.41	0.97	0.38	−0.49
	p	0.27*	0.029*	0.664	0.762	0.288	0.505	0.160	0.331	0.707	0.624
Improvidence	t	−0.77	0.78	−0.69	2.69	1.40	1.69	−0.47	1.51	−1.25	2.96
	p	0.441	0.435	0.49	0.008**	0.162	0.091	0.637	0.132	0.215	0.004**
Globetrotting	t	−2.54	0.04	−1.38	0.46	0.45	0.68	−1.33	−0.42	−0.94	−0.49
	p	0.012*	0.970	0.170	0.645	0.65	0.498	0.186	0.673	0.349	0.628
Versatility	t	5.87	1.79	−2.02	−0.37	4.46	−1.41	1.73	1.55	−0.64	0.71
	p	0.000***	0.741	0.045*	0.709	0.000***	0.161	0.085	0.123	0.524	0.479
Learning Pathologies	t	−6.58	1.12	0.07	1.65	−1.06	0.53	0.14	1.60	−1.75	1.51
	p	0.000***	0.264	0.947	0.101	0.288	0.600	0.885	0.112	0.083	0.135
Prediction of Success	t	9.25	1.21	−0.80	−1.65	5.88	−0.79	0.79	1.03	0.04	0.74
	p	0.000	0.229	0.426	0.101	0.000	0.430	0.430	0.305	0.969	0.463

Key: t = t test value
p = probability
* = $p < 0.05$
** = $p < 0.01$
*** = $p < 0.001$

Table 10.3 Differences between means (t-test) within schools

		Year 1					Year 2				Intermediate Pt. II				
		Anat (c)	Anat	Bio	Path	Ov	CVS	M.S.	Pharm.	Int. Pt. I	Essay	MCQ	P-S	Ov	Entwistle (1981)
Achievement Motivation	r	0.35	0.27	0.34	0.32	0.26	0.09	0.13	0.14	0.20	0.26	0.06	0.08	0.19	0.32
	p	0.000***	0.001***	0.000***	0.000***	0.002**	0.167	0.072	0.056	0.014*	0.005**	0.283	0.212	0.031*	
Reproducing	r	−0.06	0.02	−0.09	−0.05	−0.04	−0.16	−0.18	−0.07	−0.10	−0.05	−0.11	−0.03	−0.09	−0.25
	p	0.239	0.343	0.147	0.299	0.340	0.039*	0.025*	0.236	0.146	0.330	0.143	0.393	0.196	
Meaning	r	0.25	0.08	0.09	0.18	0.16	0.05	−0.09	0.17	0.17	0.10	0.06	0.09	0.10	0.28
	p	0.003**	0.189	0.149	0.025*	0.033*	0.296	0.165	0.034*	0.034*	0.163	0.265	0.203	0.158	
Comprehension Learning	r	0.10	0.05	0.04	−0.03	0.05	−0.02	−0.15	0.02	−0.01	−0.07	0.02	−0.08	−0.03	N/A
	p	0.132	0.299	0.348	0.362	0.297	0.400	0.047*	0.406	0.456	0.232	0.399	0.199	0.365	
Operation Learning	r	0.07	−0.13	−0.08	0.02	−0.11	0.00	−0.15	0.01	0.08	−0.09	0.01	−0.12	−0.06	N/A
	p	0.232	0.077	0.177	0.415	0.115	0.485	0.051	0.439	0.177	0.174	0.476	0.094	0.265	
Improvidence	r	0.06	0.09	0.14	0.15	0.11	−0.09	−0.24	−0.02	−0.09	−0.09	0.00	−0.14	−0.07	N/A
	p	0.269	0.166	0.064	0.057	0.105	0.158	0.004**	0.410	0.176	0.181	0.488	0.071	0.225	
Globetrotting	r	−0.04	−0.05	−0.08	0.03	0.02	0.08	−0.03	−0.09	−0.17	−0.08	0.01	−0.12	−0.06	N/A
	p	0.315	0.284	0.186	0.349	0.427	0.192	0.362	0.169	0.030*	0.206	0.469	0.099	0.274	
Versatility	r	0.22	0.03	0.04	0.10	0.09	0.02	−0.16	0.11	0.12	0.00	0.00	0.02	0.01	0.26
	p	0.008**	0.371	0.333	0.131	0.157	0.414	0.037*	0.124	0.095	0.488	0.498	0.423	0.466	
Learning Pathologies	r	−0.07	−0.02	−0.09	−0.02	−0.03	−0.12	−0.30	−0.15	−0.22	−0.09	−0.02	−0.06	−0.08	−0.29
	p	0.227	0.413	0.163	0.412	0.377	0.109	0.001***	0.055	0.008**	0.202	0.428	0.293	0.225	
Prediction of Success	r	0.32	0.19	0.22	0.24	0.21	0.09	0.12	0.22	0.27	0.13	−0.03	0.03	0.08	0.41
	p	0.000***	0.022*	0.010*	0.004**	0.011*	0.154	0.109	0.008**	0.001**	0.108	0.393	0.377	0.233	

Key:
p = probability
* = $p < 0.05$
** = $p < 0.01$
*** = $p < 0.001$

Table 10.4 Correlations between inventory dimensions and exam. performances

		Entry			Year 1			Year 2			Year 3				
		Se-Ce	Se-Pe	Ce-Pe	S1-C1	S1-P1	C1-P1	S2-C2	S2-P2	C2-P2	S3i-C3	S3i-P3	S3ii-C3	S3ii-P3	C3-P3
Achievement Motivation	t	−0.64	2.69	3.42	−1.82	−2.28	−0.54	−4.06	−4.61	−1.24	−3.12	−1.95	−0.66	0.19	0.74
	p	0.525	0.008	0.001	0.069	0.024	0.592	0.000	0.000	0.219	0.001	0.055	0.507	0.853	0.463
Reproducing	t	−2.13	1.25	3.30	3.18	10.21	7.78	1.54	6.00	4.94	0.73	4.40	−0.20	3.74	3.89
	p	0.034	0.212	0.001	0.002	0.000	0.000	0.126	0.000	0.000	0.468	0.000	0.841	0.000	0.000
Meaning	t	0.83	−0.46	−1.19	−1.32	−4.51	−3.53	−3.86	−6.33	−3.34	0.35	−3.11	0.16	−3.18	−3.25
	p	0.408	0.646	0.237	0.187	0.000	0.000	0.000	0.000	0.001	0.729	0.003	0.875	0.002	0.002
Comprehension Learning	t	0.46	−2.22	−2.78	−0.14	−3.36	−3.28	−2.03	−5.39	−3.71	1.11	−1.29	2.77	−0.12	−2.07
	p	0.648	0.027	0.006	0.891	0.001	0.001	0.044	0.000	0.000	0.269	0.201	0.006	0.906	0.043
Operation Learning	t	1.96	3.14	1.43	0.84	2.20	1.48	−2.00	0.70	2.44	0.01	0.31	−0.27	0.11	0.29
	p	0.051	0.002	0.155	0.400	0.030	0.140	0.047	0.483	0.016	0.989	0.756	0.786	0.916	0.770
Improvidence	t	−0.89	−0.73	0.10	1.26	1.56	0.63	1.84	−0.57	−2.06	1.72	3.25	−0.86	1.16	1.79
	p	0.373	0.464	0.924	0.211	0.121	0.531	0.067	0.569	0.042	0.087	0.002	0.394	0.250	0.078
Globetrotting	t	−2.36	−0.35	2.10	0.50	1.52	1.07	1.17	0.40	−0.57	1.09	0.95	0.61	0.54	0.02
	p	0.019	0.725	0.036	0.618	0.130	0.288	0.242	0.688	0.573	0.276	0.345	0.542	0.591	0.985
Versatility	t	1.33	0.04	−1.18	−0.47	−3.26	−2.93	−3.73	−5.74	−2.63	0.47	−2.20	0.80	−1.87	−2.45
	p	0.186	0.968	0.238	0.641	0.001	0.004	0.000	0.000	0.010	0.640	0.032	0.424	0.066	0.017
Learning Pathologies	t	−2.66	0.31	3.07	3.07	7.80	5.24	2.18	3.96	2.37	1.95	4.87	0.37	3.73	3.39
	p	0.008	0.756	0.002	0.002	0.000	0.000	0.030	0.000	0.020	0.053	0.000	0.714	0.000	0.001
Prediction of Success	t	2.02	0.64	−1.19	−2.41	−6.74	−4.83	−4.69	−7.77	−3.88	−1.92	−4.52	−0.39	−3.19	−2.70
	p	0.044	0.520	0.234	0.017	0.000	0.000	0.000	0.000	0.000	0.057	0.000	0.699	0.002	0.009

Key: t = t test value
p = probability
* = $p < 0.05$
** = $p < 0.01$
*** = $p < 0.001$

Table 10.5 Differences between means (t-test) between schools, by year

CHAPTER 11

DISCUSSION 1:
THE PSYCHOLOGY OF MEDICAL STUDENT LEARNING

Introduction

In this chapter the findings just reported will be brought together to describe the kinds of learning occurring in the three medical schools, and accounted for in the psychological terms established in Chapters 3 and 4. In Chapter 8 the interview data were analysed, giving three learning profiles, chosen because of their typicality and relative stability. The data subsequently gathered from the questionnaire and the inventory largely support this classification and it would seem reasonable to begin this discussion by looking at these three profiles in more detail.

Restricted learning

Students with the first learning profile saw themselves as having a heavy work load, to which some responded in an apparently bizarre manner. They had a low sense of motivation bordering on cynicism, did not integrate what they were learning and had a poor perception of the relevance of what they were being taught. These students saw the courses they were studying as being quite separate from one another and they adopted what seemed to be a rote or memorising approach. They focused their efforts on current tasks, which frequently meant finding ways of passing the next assessment or examination. There was a sense of immediacy about the learning, it was directed towards short term rather than longer term goals: the learning was 'restricted' in nature. This notion is supported by the inventory survey which, in the mean scores, showed that many Southampton students, particularly in Year One, had low achievement motivation and high reproducing with low meaning orientation, low comprehension learning, low versatility and high learning pathologies, with a low prediction of success.

Moreover, the comparative inventory survey showed that this learning profile was not unique to Southampton students. The pattern at the conventional school was very similar. This, together with the evidence from other studies reported in Chapter 5, seems to suggest that the restricted approach is common in medical students. What might account for this? Is it, perhaps, an inevitable consequence of medical education, possibly because of the large amount of information needing to be taught, its variety, and the limited time available? Clearly this is not the case, as shown by the response by students at the problem-based school. Students there adopted a quite different approach, even in their first year, with low reproducing and learning pathology scores and high scores for meaning and versatility.

Is, then, the approach of the conventional and Southampton medical student due to the effects of their previous schooling? Do 'A' level courses and the pressures on students to gain high grades instil a restricted approach to learning which is carried over into medical school? Again, the results do not support such an explanation. Students' inventory data on entry to the three schools were remarkably similar, with high scores on motivation, meaning and versatility, with low scores in reproducing and learning pathologies. It was only during Year One that these scores shifted dramatically towards a restricted approach. It seems that, on entry, students' approaches to studying are enviable but change markedly during the first year.

How reasonable is this assertion that students begin their medical education with desirable approaches to studying? It seems likely that some, possibly many, candidates for the 'A' level examinations adopt a restricted approach, committing much of what they learn to memory. However, Entwistle's work (1981) suggests that students preparing for any examination by memorising would not gain very high grades. Some research in schools by Ramsden (1983) supports this view. Thus, students who do obtain high 'A' level grades probably had adopted approaches to studying whilst revising which were low in reproducing but high in meaning and achievement motivation. It would be from this population of school leavers, with high grades through a low memorising approach, that entrants to medical school generally are selected. It is unsurprising, then, that the inventory scores of medical students on entry show the kinds of approaches to studying found here.

Is restricted learning found only in students' early years at a medical school? Again, the evidence from all three schools seems to suggest not. The interviews in Southampton indicated that although many students adopted a restricted approach in Year One, rather fewer did so in subsequent years. Nevertheless, some students even at the end of Year Three still learnt in this restricted manner. The inventory survey supports this finding. For example, the reproducing score of Southampton students in Year One is remarkably high, though it reduces in subsequent years. Nevertheless, even at the end of Year Three, the mean reproducing score was significantly greater, not just than students' entry scores but also when compared with the problem-based students, though it was about the same as students at the conventional school. Restricted learning, then, may be greatest in Year One and may decrease with time, but is still present in a substantial number of students at the end of Year Three in Southampton and the conventional school.

Is a restricted approach a reflection of students' learning style - a more or less permanent indication of their personality or habits as some researchers have suggested (Entwistle & Ramsden, 1983; Newble & Gordon, 1985)? Again, this seems unlikely from the evidence. Students enter medical schools with a very different and apparently more desirable learning profile. Any change that occurs seems to be the result of the experiences they have. So, is restricted learning a strategic response suggesting some conscious decision to study in a particular way (Laurillard, 1979)? The interviews suggest this probably is not the case for many students. Restricted learners do not seem happy about studying in this way. Certainly, their motivation is substantially lower than it was, and it is difficult to imagine that they choose to work in this way. Rather, they may feel they have no alternative.

What, then, might account for restricted learning? Current psychological theories of learning focus on an information processing model as seen in Chapter 3. This holds that the process of learning rests on certain identifiable criteria. Hence, the restricted learning of medical students is likely to be a consequence of certain factors in their learning situation. What, in general terms, are these and how are they operating here?

Ausubel (Ausubel et al., 1978) speaks of learning as being either rote or meaningful and that the former occurs when students do not relate what is being learnt to something they already know:

> ...if the learner lacks the relevant prior knowledge necessary for making the learning potentially meaningful.

Much the same distinction is made by Marton and his colleagues, as reported in Chapter 4. Observing university students and analysing their learning experiences, Marton and Säljö describe what they call "surface processing" in which:

> ...the student directs his attention towards learning the text itself (the sign) i.e. he has a reproductive conception of learning, which means that he is more or less forced to keep to a rote learning strategy. (1976a)

Medical students showing restricted learning, then, may be adopting a rote or surface approach because they focus their efforts merely on learning separate items of information. Support for this comes from the interview survey. These students did not relate together information in any way.

Marton and Säljö (1976b) also found a clear relationship between surface processing and poor examination performance. Much the same finding emerged from the interviews here:

students who adopted a restricted approach appear to be those who performed rather badly. This result receives some support from the inventory where no correlation was found between the students' reproducing score and their examination grade (Table 10.4). Entwistle had found a significant negative correlation between the two, but the present study showed merely that a reproducing orientation is non-productive. It is interesting to speculate at the discrepancy between the two findings. Possibly the explanation is in the nature of the examination itself. It may be that the Primary examination in Southampton Medical School tests factual knowledge and students respond to it by committing to memory what they are learning. Their success, in that relatively few actually fail, probably is due in some cases to 'overlearning' where a rote orientation may prove partially useful in the short term. Constant repetition allows opportunities for linkages to occur between cognitive structures (Klatsky, 1980). However, these links are simple and probably unstable. Thus, even these students find in the longer term that they cannot retrieve the information they 'overlearnt'. Moreover, it must be emphasised that a restricted approach shows no correlation with examination grades which, whilst not entirely confirming Entwistle's finding, does not in any way suggest that rote learning is productive. Cramming does not 'pay off'. As Dahlgren (1978) notes:

> It is certainly possible to pass an examination without understanding, if only the necessary rules are correctly memorised... but a lot of time will be required; the resulting knowledge will be a mass of logically and psychologically inconsistent fragments; and the practical usefulness of the individual's efforts will, in the last analysis, be highly questionable.

Dahlgren's observations suggest that surface processing is not only associated with poor examination performance but also with inadequate long term memory retention. Much the same was found in the interview survey: students with this learning profile were unable to retrieve much of what they learnt in Years One and Two when subsequently they found themselves in clinical attachments in Year Three. Findings from both the interview and questionnaire surveys support this: on a teaching round, when students were asked questions referring to information taught in the first three years, many reported that the answer was "on the tip of their tongue" or that it "rang a bell". Both responses seem to suggest an ability merely to recognise information, but not to recall it, and this indicates incomplete cognitive structures (Klatsky, 1980) that are chaotically organised (Ausubel et al., 1978). Moreover, some students even described that when the answers were given they would deny ever having been taught it, only to find the information later when they looked at their own notes. Studies elsewhere, reported in Chapter 5, also show that failure to retrieve previously learnt information is common in medical education.

Why is it, then, that restricted learning is associated with poor retrieval? In Chapter 3, psychological evidence was presented which suggests two important factors. First, the effectiveness of one's ability to retrieve information is determined at the time the information is being stored. Appropriate encoding of the information is essential for effective retrieval (Tulving & Thomson, 1973). For this to occur, new information must, at the time it is learnt, 'become attached to' other information already stored in memory. Second, a "clear path" (Broadbent, 1975) must lead to the information. As Ausubel (1968) notes, "if cognitive structure is unstable (and) ambiguous, it tends to inhibit retention". Baddeley (1976) supports this view, arguing that effective retention is dependent on our ability to distinguish the required information from what he calls "the background noise".

This explains why restricted learning may result in poor retrieval but not the negative association which Entwistle found between reproducing and examination performance. This suggests that learning in a particular way may even be counter-productive. Klatsky suggests (1980) that memory failure is best accounted for in terms of interference rather than decay of the trace. Thus, if information is stored in separate cognitive structures it may be difficult to retrieve single items because of interference with similar information. There is even the suggestion that learning something in a restricted way early on may make it more difficult to learn something similar later on. Novak (1977) has argued that:

> Information learnt by rote inhibits subsequent learning of additional similar information. Moreover, even information learnt by rote that is forgotten inhibits learning of similar new information.

In Chapter 3 it was noted that a phenomenon known as pro-active inhibition, in which early learning makes later learning more difficult, is by no means uncommon. This might account for the questionnaire findings where some students felt that the first two years had not helped them in their third year. Not only were they unable to see in what ways the information taught and learnt during the early years helped them with their clinical work but they could not recover much of it anyway. It was also a very common observation in the interviews that, in clinical attachments, many students did not use or even refer to knowledge acquired in Years One and Two. Indeed, when they revised this information at the end of Year Three, many found that they were looking at this information for the first time since the notes had been taken, some not even recognising that they had once written them.

All of this suggests that restricted learning, which seems to equate with rote learning and surface processing, is unproductive, possibly counter-productive, and that it occurs because the conditions at the time constrain the learners: they cannot relate what they are learning to something they already know. The cognitive structure that this type of learning generates seems to be chaotically organised (Ausubel et al., 1978), with few, if any, interconnections between items of information. Memory of it is only possible if, at the time of retrieval, exactly the same, or at least very similar, cues are present as at the time of encoding. Indeed, because the structure is disorganised, interference between retrieval pathways is not uncommon.

Such an approach to learning is intellectually unsatisfying (Bruner, 1960) and seems unnatural (Entwistle & Ramsden, 1983), having little, if any, 'survival qualities'. It is highly unsatisfactory that so many medical students come to adopt such an approach, particularly in the early years, especially as it is contrary to how they previously learned, and more so since it appears to be the result of the experiences they receive on arrival at medical school. The term 'restricted' seems an appropriate characterisation for it.

Adequate learning

The second learning profile to emerge from the analysis of the interview data from Southampton students was somewhat different from restricted learning. Some students reported "getting themselves organised" despite feeling heavily loaded. As with restricted learning, their motivation remained dependent upon extrinsic rewards - they did not learn things for their own sake - but they saw more relevance in what they were studying, and attempted to understand what they were learning - they tried to make sense of it. They performed reasonably well in examinations, particularly in the early years, though for the Intermediate Part II examination at the end of Year Three they obtained roughly average grades. However, this learning was not productive in the long term - even these students found difficulty in retrieving in their third year clinical attachments much of what they had been taught in Years One and Two, though this was rather more variable than it had been for the restricted learners. Thus, students with this profile coped reasonably well on a day to day basis, and experienced even a modicum of success, though not in the long term. For these reasons their learning might be characterised as being 'adequate'.

It was found in the interviews that students demonstrating this profile appeared to be learning by 'fitting in' information - attaching it to what they already knew at the time they learnt it. For example, students who succeeded most in their Anatomy and Biochemistry were those who related what they were learning to something that they already knew from their previous educational experience at school or another first degree. Others did reasonably well if they prepared for the dissection room by first reading in a textbook something which they thought would be appropriate. Similarly, the questionnaire showed that many third year students saw attachments as a time for fitting in their clinical experience with some reading in a textbook. However, the questionnaire also showed that the amount by which students used clinical experiences for their revision did not correlate with their grade in the Intermediate Part II examination. Thus a 'fitting in' approach appears to be associated with examination success in the first two years, but not necessarily in the third year. The inventory data also support this notion. The students who achieved high examination grades in Years One and Two also had high inventory scores in achievement motivation - the amount by which they organised their study time and wanted to succeed - and also in meaning - the amount by which they attempted to understand what they were learning. These dimensions did not correlate with examination success in Year Three. Indeed, far fewer inventory dimensions correlated with examination grades in Year Three than in Years One and Two. How is it possible to account for these findings?

In psychological terms, adequate learning might best be described as 'meaningful learning', which Novak calls "a process by which new information is related to an existing relevant aspect of an individual's knowledge" (1977). Much the same point is made by Marton in describing what he calls "deep processing":

> The student is directed towards the intentional content of the material (what is signified)...towards comprehension. (Marton & Säljö, 1976a)

Thus, adequate learning, which seems to equate with meaningful learning or deep processing, occurs when learners relate what they learn to what they already know (Ausubel et al., 1978).

Unlike restricted learners, their cognition is more highly organised, with clear pathways leading to the stored information, but although this structure is embellished - students gain a deeper knowledge of something - there are likely to be few, if any, interconnections between cognitive structures. There has been internal rather than external connectedness (Mayer & Greeno, 1972). Why, then, is it that even these students find difficulty in retrieving this information in the long term?

The psychological explanation rests on the differences between the settings in which the information was acquired and that in which retrieval is required. Southampton students in Years One and Two learn the information presented to them largely through lectures to pass examinations. However, the setting for which it is required - clinical attachments - is altogether different. There, the students (and doctors) obtain information from a patient and need to interpret this to understand the patient's condition based on what they already know. However, their early learning reflects book knowledge rather than patient knowledge (Blecher, 1978). Students with adequate learning may have a clear pathway to some stored information if they know in which knowledge area to search - as probably they can when answering examination questions during the pre-clinical years - but the clinical setting does not provide the same cues or 'forceful features' (Gale, 1980) needed for successful retrieval as the ones encoded at the time of learning. There is considerable psychological support for this notion that retrieval depends on a similarity between the learning and the retrieval settings. Craik and Tulving (1975) suggest that:

> ...memory performance is enhanced to the extent that the context, or encoding question, forms an integrated unit with the word presented. A congruous encoding yields superior memory performance because a more elaborate phrase is laid down, because in such cases the structure of semantic memory can be utilised more effectively to facilitate retrieval.

Thus, in the Southampton curriculum, and possibly also in the conventional medical school, it is likely that there is little congruity between the settings of information acquisition and later retrieval. Not only this, but the 'encoding question', (that is, aspects of the retrieval setting) do not form an integral unit with the information being stored. In other words, at the time of learning, students do not also store information about the retrieval setting. If they did, at the time of retrieval some cue might 'trigger' the students' memory. Thus, whereas adequate learning may be quite productive in tests of the short term retention of knowledge, certainly being more so than restricted learning in passing examinations, it may be insufficient when the test of performance is the student's ability to retrieve and use that information under different conditions, which Mayer (1979a) calls the "far transfer" of knowledge.

Adequate learning, then, seems to have considerable 'survival qualities': it is "natural" (Entwistle & Ramsden, 1983), learners adopting it do rather better in the early years than restricted learners, indeed, they 'make sense' of what they are learning and 'fit it in' to what they already know. In this sense, adequate learning could be said to be more worthwhile than restricted learning at that time, but why is it that adequate learners did not perform so well in the Intermediate Part II examination at the end of Year Three? As will now be argued, the reason probably lies in the emergence at that time of a third learning approach - elaborated learning - which cannot occur for most students during Years One and Two.

Elaborated learning

The third learning profile to emerge from the analysis of the interview data is only seen clearly at the end of Year Three in Southampton, not during students' clinical attachments, but whilst revising for the Intermediate Part II examination which tests their theoretical knowledge. These students reported that whilst revising they learned in a way which was quite different from how they had studied previously at medical school. Although they felt heavily pressurised by the examination, they found that they could cope quite well, some even enjoying the experience. Only then could they see clearly the relevance of what they were doing. Their experience was characterised by them as "things coming together" and, for this reason, it will be described here as 'elaborated learning'.

From the interviews it was clear that when students started to revise at the end of Year Three many set out by studying in much the same way as previously, but some found they could not sustain this. Instead, third year clinical experiences began, as it were, to intrude into their minds. Ultimately, these students used this experience to help them with their revision and, apparently as a consequence, found that information, which until then had remained distinct, suddenly began to coalesce.

Some of the questionnaire data support this notion. The amount by which students saw their learning as 'coming together' correlated positively and very significantly with their Intermediate Part II examination performance. Indeed, there was a strong correlation of this 'coming together' and students' approval of the timing of the examination. There was also a positive correlation between this 'coming together' and students changing their mind towards now believing that the examination <u>should</u> occur towards the end of Year Three rather than at the end of Year Two, largely, as many noted, because it was only at this point that they felt the basic sciences could make sense for them. Moreover, this 'coming together' also correlated with a feeling by students that what they had now learnt was likely to be more permanent than anything they had learnt in the medical school so far. Indeed, they were optimistic about the possibility of subsequent recall. There was even a suggestion that learning in this way allowed retrieval on clinical electives in the summer vacation between Years Three and Four. Indeed, perhaps more significantly, these students perceived the elective period as one for which their Part II's knowledge might be needed.

In the light of these clear and substantial correlations between particular observations on the part of students and certain key indications of learning success it is highly surprising that, as noted during the discussion on adequate learning, students' inventory scores in Year Three failed to correlate with their examination performance in the Intermediate Part II. The only dimension to correlate at all was achievement motivation and then only with essay grades and overall score (see Table 10.4). Indeed, this result is even more surprising since many of the dimensions from Year One correlated very significantly in the predicted direction with Primary examination grades. Why might this be so? The answer may lie in the nature of the inventory itself.

As noted in Chapter 4, Entwistle's inventory was developed through a rigorous process of testing and analysis giving rise to an instrument which apparently is reliable and valid. However, it must be recognised that the population on which it was based was university students from a wide range of subject areas but it did not include medical students. It must also be acknowledged that Marton's work in Sweden involved a similar population. Now, success in higher education may indeed result from increased depth of knowledge on the part of students. Thus, by basing an inventory's development on such a population, depth of learning may not only become highly represented in its items (through the process of factor analysis) but also may appear to correlate with success. This may explain the significant correlations between approaches to studying and students' examination grades in Years One and Two in Southampton. There, depth of knowledge is being rewarded - adequate learning is the most suitable approach at that time, but only because the alternative - restricted learning - is so unproductive. However, in Year Three, elaborated learning occurs and is then the most successful approach. Those students adopting it gain the highest grades, displacing the adequate learners, who are no less effective than they were, merely not now as successful as the elaborated learners. If the inventory largely detects adequate but not elaborated learning, then fewer significant correlations with examination performance would be seen at the end of Year Three when elaborated learning also occurs.

Even a brief analysis of the inventory items supports this view. There are six questions each for the 'depth' dimensions of reproducing and meaning but only three each for what might be called the 'breadth' dimensions - comprehension learning and operation learning. Having said this, not even the comprehension learning dimension correlates significantly with students' Intermediate Part II examination scores. Probably this is because its items do not clearly reflect the 'coming together of information' which so clearly characterised elaborated learning in the interviews. Again, this might be expected if the population from which the inventory items emerged did not greatly, if at all, feature elaborated learning because few, if any, suitable items would then appear in the inventory.

Nevertheless, the inventory does give some indications that the learning occurring at the end of Year Three is somewhat different from the early learning. The survey in Southampton incorporated a longitudinal study comparing the same students' inventory scores before and after the third year revision periods. The results showed a significant shift even over a short time. There were substantial increases in achievement motivation, comprehension learning and the prediction of success score, and a significant decrease in students' learning pathologies. It must be stressed, too, that the retest was carried out before students had their results. Moreover, compared with scores at the conventional school, Southampton students at the end of Year Three showed a very significantly greater comprehension learning score: they now related what they were learning to its broader context. Indeed, at the end of Year Three, these scores were as high as those of the problem-based students.

Why is it, then, that elaborated learning occurs only at the end of Year Three and not earlier? Indeed, how is it that elaborated learning apparently is more successful than adequate learning? How might all of this be accounted for in psychological terms?

Psychological explanations for the notion of elaborated learning come largely from the work of Mayer, outlined in Chapter Three. He found that only students showing what he called "external connectedness" were able to transfer knowledge to other situations (Mayer & Greeno, 1972), and this finding led to his notion that this particular kind of learning could be described as "elaboration to schema" (Mayer, 1979a). In what ways, though, is this different from meaningful learning or deep processing, which respectively Ausubel and Marton see as the high point of learning? Answering that question first requires a closer examination of the psychological mechanisms of elaborated learning.

In Chapter 3 it was suggested that learning might be facilitated in an educational context by providing learners with a 'bridge' between what they knew and what they needed to know in order to learn something. This notion formed the basis for what Ausubel described as "advance organisers" (1960), which he said were necessary for meaningful learning. Although some researchers (Barnes & Clawson, 1975) failed to establish the effectiveness of advance organisers, Mayer (1979a) noted:

> (They) serve as an assimilative context...
> if used in appropriate situations.

What, then, are these appropriate situations? Central to Mayer's acceptance of advance organisers, or as he calls them "assimilative contexts", as facilitators of learning is the way in which that learning is tested. Where this is merely a test of retention, that is of immediate recall, then the introduction of advance organisers appears to be of no benefit, but where the test of learning is what he calls "far transfer" (ibid.) then introducing advance organisers shows a clear advantage over learning without. Other researchers, supporting this view, also suggest that the effectiveness of advance organisers depends on the nature of the content to be learnt. For example, Grotelueschen (1979) notes:

> (Learners), with little prior knowledge benefited most from materials structured to progress from the concrete to the abstract, whilst (those) with a high level of prior knowledge benefited more from materials that were abstract throughout.

Mayer (1979b) brought these two threads - the nature of both the tests and the content - together to suggest that:

> Advance organisers will result in broader learning...when the material is potentially conceptual, but appears unorganised or unfamiliar to the learner, where the learner lacks a rich set of knowledge or abilities, when the organiser provides a higher level of context for learning and when the test measures... transferability.

Much the same situation appears to pertain in medical education. Students enter with some prior knowledge in certain areas, but by no means for all the subjects that they will be expected to cover. It is quite possible, too, that the material they are taught appears to them, especially at the beginning, to be abstract and unorganised. Certainly this is borne out by the interviews: many students found the information they were being taught was new. Thus, elaborated learning would not occur in the first two years of the Southampton curriculum because students do not have at that time the necessary background knowledge to handle the information. They are not in any position to 'organise' the information being taught. They do not have appropriate assimilative contexts. However, by the time they start to revise for their Intermediate Part II examination at the end of Year Three and begin, as it were, to revisit their notes, they now have had considerable concrete experience in the form of clinical attachments during Year Three, which provides them with an assimilative context that is concrete and general, and allows them not just to 'fit in' the somewhat abstract information they are revising but also to 'fit it together' - that is to learn it in an elaborated manner. It seems, then, that elaborated learning is different from meaningful learning or deep processing. Rather than producing a depth of knowledge as does adequate learning, it creates a knowledge which is both broad and deep: the cognitive structure being created is one of multiple interconnections and this differs markedly from the embellished but unconnected structures formed through adequate learning.

Elaborated learning, then, appears highly successful, but not all students experience it at this time, indeed from the questionnaire survey it would appear to be roughly normally distributed throughout the class. Broadbent (1975) has observed that any theory of learning must account for not just why some people learn something but also why others in the same setting do not. How might we explain this here? This is a particularly important question since the conditions for elaborated learning not only appear to be present at the end of Year Three but are available to all students. Clearly, the mere availability of the conditions needed for elaborated learning does not automatically ensure its occurrence.

The interviews and questionnaire results suggest that elaboration occurs when students revise at the end of Year Three. That is when specific information (notes to be learnt) is <u>attached</u> to other information in the presence of a more general background (clinical experiences). It seems that those students who experience a 'coming together' are actively, though perhaps unconsciously, <u>relating</u> information. Such a view gains some theoretical support from the work of Pask, outlined in Chapter 4. He distinguishes between what he calls comprehension learning and operation learning, suggesting that although learners may have a predisposition to one or the other reflecting their learning style, <u>both</u> approaches are needed for complete understanding to occur. If a learner's habitual learning style makes it difficult to utilise both of these, then there might be said to be a high level of learning pathology. However, adaptable learners who are able to adopt both approaches in appropriate situations are described as being versatile.

Towards the end of Year Three in Southampton, students show a significant shift towards higher comprehension learning and lower pathologies, with higher versatility. Conventional students did not show this pattern. Why does this shift occur in Southampton and why does it not occur in the conventional school?

Pask suggests that versatility involves a "conversation" (Pask 1976a). Entwistle (1978) describes this as occurring when learners understand the relationships between concepts through some kind of 'manipulation'. In much the same way, Heath (1964) describes the approach of some students who he calls "reasonable adventurers" with:

> ...the ability to create (their) own opportunities for satisfaction... the combination of the two mental attitudes: the curious and the critical.

Perry (1970) similarly describes the shift in some students from dualism to relativism:

> ...where knowledge consists of facts... the students collect (them)... Where knowledge is contextual and relative... the students' task is more integrational.

In Southampton, it is likely that students who perform best at the end of Year Three - the elaborated learners - are actively relating together the information they are learning. However, this still does not explain why many Southampton students do not become elaborated learners at the end of Year Three. Probably, they do not see their task as one of 'bringing things together'. Researchers elsewhere suggest that students' perceptions of the demands being made of them are crucial in determining the kind of learning that occurs (Fransson, 1977; Entwistle & Ramsden, 1983). Some support comes from the interviews, particularly in the early years, where students adopted a restricted approach because they saw their task as one of merely 'collecting' information. What is most likely is that the students for whom things do come together as it were 'stumble over' the approach. In one interview a student expressed great surprise at learning in this way. However, once this occurs, it becomes highly motivating and rewarding in an intrinsic way. One student spoke of this time as being the most enjoyable part of the course so far. This is understandable. When 'things come together' there is a sense of achievement on the part of the learner. It is what some psychologists call the "aha!" phenomenon (Kretch & Crutchfield, 1958). Those students who have this experience probably then continue learning in this way because of the personal rewards it brings. Indeed, the sensation of 'things coming together' would seem to be a useful indicator that elaboration is occurring. However, those students who do not learn in an elaborated way do not have this experience. In a very real sense they do not know what they are missing.

The important and necessary mechanism, then, for elaboration to occur is that students relate information through a process of 'conversation'. However, it is also very clear from this study that this is most likely to occur when students first have had some concrete, general experience prior to receiving much specific information. Students then relate together this specific information within the context of those general experiences - they, as it were, 'oscillate' between specific and general knowledge. The result is not just a depth of knowledge but also a breadth or richness because well established cognitive structures have been interrelated.

Elaborated learning has been seen occurring in Southampton students towards the end of Year Three, and from the present analysis seems to require three psychological components in a particular sequence: an appropriate assimilative context, then relevant information followed by opportunities for oscillation. Is this, though, the only explanation? Might elaborated learning occur when students' clinical experiences as it were 'reactivate' otherwise dormant prior learning? The evidence suggests not. The inventory survey in Southampton showed large shifts in students' approaches to studying between the middle and the end of Year Three, and the questionnaire confirmed the interview observation that the most successful students in the Intermediate Part II examination were those who "saw things coming together" whilst revising. Moreover, the inventory survey in the conventional school did not detect shifts in students' approaches to studying between Years Two and Three, which might have been seen if any reactivating and restructuring was occurring during clinical attachments. Elaborated learning seems not to be 'retrospective'. Of course clinical attachments might give rise to it, but probably only if they encourage students to relate theory and practice.

Is there any evidence to suggest that elaborated learning may be occurring in the conventional school? The inventory results there show consistently low achievement motivation, meaning, versatility and prediction of success, but high reproducing and learning pathologies scores compared with students' approaches to studying not just on entry but also those at the problem-based school. Such a profile is unlikely to indicate much elaborated learning. In terms of the three factors needed for its occurrence this would be because students do not have assimilative contexts nor opportunities for oscillation at the time they are acquiring information. From a knowledge of the conventional curriculum this seems a reasonable explanation and will be discussed further in the next chapter.

However, from the inventory data there appear to be good grounds for suggesting that elaboration is to be found in the problem-based school. Consistently throughout the three years being surveyed students there showed high scores in achievement motivation, meaning, versatility and prediction of success, with low scores in reproducing and learning pathology. Even at the end of Year Three in Southampton when elaboration is known to be occurring in some students, the overall scores for meaning and prediction of success were significantly lower than those for problem-based students, and their reproducing and learning pathology scores remained significantly greater. It is perhaps significant that the shift in the Southampton students' approaches to studying at the end of Year Three is in the direction seen throughout at the problem-based school. If elaborated learning is occurring in Southampton, it is likely to be even more common in the problem-based school, but why would this be?

In the problem-based school, at the start of any learning sequence students are presented with a biomedical problem in the form of a clinical case or health care situation. Following this, students acquire information relevant to the problem which they then attempt to solve. Quite probably the problem acts as an assimilative context for the subsequent learning. Certainly it has all the characteristics which the earlier discussion described such a context as needing: it is general and more inclusive than the information which subsequently needs to be learnt, and it is concrete rather than abstract. The specific information collected by students is probably learnt together with some aspects of this assimilative context. Students then solve the problem, which seems to embody many of the characteristics of 'oscillation' - it is a conversation between the theoretical and concrete information, and a relating of what it known to what needs to be known.

There seem, then, to be reasonable theoretical grounds as well as some empirical evidence to support the notion that elaborated learning may be occurring throughout in problem-based learning. Indeed there is no reason, psychologically, why it should not occur from the very beginning of an undergraduate medical curriculum. In the Southampton programme it need not occur only at the end of Year Three. On the contrary, there is strong support for suggesting that it is very likely to be seen in circumstances where the three conditions necessary for its occurrence are found.

Much of the evidence for suggesting that elaborated learning is likely to be occurring in the problem-based school comes from the inventory survey. However, earlier it was noted that this particular inventory may not be entirely satisfactory for use in medical education. Does this not invalidate the argument?

Partly, as noted in Chapter 6, there is other research from problem-based schools which supports the inventory findings, particularly in terms of students' high motivation. More particularly, the earlier criticism of the inventory related to its failure to correlate in the predicted way with students' examination grades at the end of Year Three. As already suggested, probably this is because the inventory lacks items specifically identifying important characteristics of elaborated learning such as 'things coming together'. The absence of these items means that the inventory cannot satisfactorily discriminate between adequate and elaborated learners, and could not then correlate with the Intermediate Part II examination scores which do.

Taken as a whole, the inventory scores of problem-based students are very significantly different from those at the other two schools, except at the end of Year Three when Southampton students' scores seem more like them. All of this seems to suggest that the learning occurring throughout in the problem-based school is likely to be elaborated, though further research is needed to investigate this more fully, but what should its nature be?

A survey using a standardised questionnaire or inventory such as the one used here seems ideal for this kind of comparative research. It can be used with relative ease in a number of different locations. At the start of this project there were good grounds for believing that the Entwistle inventory would be an ideal instrument to use here. However, as noted above, the dimensions it provides of students' approaches to studying do not correlate with examination performances in Year Three, though they do in Years One and Two. Could it be that the inventory is more suitable for use in higher education but not in medical education?

This might indeed be the case. Quite probably, medical education is different from education more generally.

Certainly, the present study suggests that it requires not just a deep knowledge but both breadth and depth. Correlations in Year One may reflect a depth of knowledge there, but the lack of correlation in Year Three may suggest that elaborated learning is not being detected at that time; a finding which could not have been anticipated at the outset.

It would seem reasonable to suggest, then, that a new inventory should now be devised, similar to Entwistle's and developed through the same methods but using medical students as the population from which the data are obtained. Moreover, in the light of the earlier discussions, this should include students not just in conventional schools but also from schools where elaboration might be expected to be found, such as in Southampton's third year and in a problem-based curriculum. In particular, it is likely that new inventory items obtained in this way will reflect notions of 'things coming together' as well as intrinsic motivation and enjoyment which were so characteristic of Southampton's elaborated learners.

It might be sensible to begin this redevelopment of the inventory by extending further the interview survey, talking with students at both conventional and problem-based schools, in order to detect and identify the indicators of elaborated learning. What these students describe could then form the basis for a pilot inventory survey, taking into consideration students' examination performances and their success in tests of 'far transfer'. Then, these data could be statistically analysed using factorial techniques, producing a new inventory specifically devised for surveying medical students' approaches to studying.

Elaborated learning and clinical thinking

So far, this discussion has suggested that medical students learn in a particular way because certain conditions are prevailing at the time. It has also shown that the kind of learning that occurs has certain consequences in terms of the learners' ability to retrieve and use their knowledge in settings for which it is needed. Clearly, this raises important questions concerning the nature of educational programmes, such as whether particular curricular arrangements generate certain kinds of learning, and an attempt will be made in the next chapter to provide some answers. However, before doing this it would seem necessary first to see whether one or more of the kinds of learning identified here are likely to be appropriate for effective clinical thinking.

Perhaps it is rather easier to begin by saying what kind of learning seems most inappropriate. As has been argued above, the cognitive structure of the restricted learners is chaotically organised, resulting in poor retention and unreliable retrieval: their knowledge is neither deep nor broad. This is likely to have serious implications for diagnosing and treating patients. As Gale (1980) has noted, diagnostic errors are largely due to memory failure. Indeed, it was suggested in Chapter 3 that problem solving may actually be inhibited if the learner acquires a mass of irrelevant information (Anderson, 1980). Worse perhaps, restricted learners also develop low levels of motivation and often show increased cynicism. As noted in Chapter 5, it seems likely that students acquiring these attitudes in their early learning may then apply them later, and this may have a deleterious affect on subsequent patient care (Gottheil et al., 1969; Edwards and Zimet, 1976).

This is particularly worrying since so many restricted learners manage to pass important examinations whilst at medical school. Indeed, many of them ultimately qualify as doctors. In this study it was clear that about a third of Southampton students at the end of Year Three were restricted learners. Although this figure may reduce somewhat by the end of the course, it has been estimated that possibly as many as a fifth of Southampton graduates are still learning in this way (Mountford, 1985). Indeed, the figure may be even higher in conventional schools where students do not have the same opportunities for elaborated learning as are found in Southampton. It should be a matter of some concern to the medical profession that a substantial number of doctors have learnt in a restricted way.

Is, then, the knowledge acquired by adequate or elaborated learners appropriate for effective clinical thinking? To answer that question it might be useful to look again at the cognition involved when doctors diagnose and treat patients.

When doctors obtain information from patients in order to arrive at a diagnosis their thinking is by no means random or haphazard. Doctors do not collect all the information there is to obtain; rather, their attention is directed towards gathering new information in the light of the information they receive. In short, doctors process information whilst diagnosing. Indeed, there seem to be close parallels between clinical thinking and normal thought processes such as those described in Chapter 3. In most cases this will quickly lead doctors to perceiving the patient's problems through some kind of pattern recognition or prototype matching (Bordage & Zacks, 1984). In such cases they will know that certain patterns suggest a particular diagnosis and treatment. The knowledge doctors use which enables them to do this is acquired over a number of years, both formally through their education and informally through their own experience.

At first, pattern recognition appears to require a 'fitting in' approach since arriving at a perception involves making sense of incoming information in terms of what is already known. Does this mean, then, that doctors need adequate rather than elaborated learning? There are a number of reasons why this may not be the case.

First, a 'fitting in' of information may lead to an inaccurate, possibly wrong diagnosis. For example, chest pain may suggest cardiac disease, but a very similar symptom might indicate excessive gastric reflux and oesophagitis. If the doctor's learning has linked a particular symptom, that is a retrieval cue, with a particular diagnosis, or encoding cue, but not with some other, then a diagnostic error may occur. In such a case, the doctor's cognitive structure might be well established, that is deep, yet it may remain simple, that is with no interconnections. Such inappropriate learning is most likely to occur through an adequate approach but is highly unlikely through elaboration.

Second, a 'fitting in' of information may elicit the correct diagnosis, yet lead to an inadequate treatment. In the same example, chest pain may be due to cardiac disease but 'fitting in' the information may lead to too early a 'closure'. The clinician might not obtain additional information which is important in treating a particular case, such as the patient's smoking habits, occupation or living conditions. Again, a deep but non-elaborate cognitive structure might not lead to the retrieval of important and relevant information from different cognitive structures. Quite probably, in the case cited here most doctors would elicit more information but only because they have an elaborated memory store relating to that particular condition - chest pain would also suggest a need to ask certain additional questions. Again, an elaborated rather than an adequate learning seems needed for establishing the necessary cognitive structures to achieve this wide search of memory.

Third, in some circumstances a doctor may be unable to 'fit in' information from the patient. The pattern may not be recognisable because the case is novel to that doctor. Naturally, it is highly unlikely that all doctors will have been taught all possible diagnoses in their undergraduate courses, and certain conditions cannot be anticipated in advance, particularly ones which are rare or complex. Moreover, it is likely that such cases might be emergencies, requiring prompt but appropriate action. Now, many doctors, particularly those with more experience are able to cope with these kinds of situations, but only because they carry out a wide search of their memory store, and this is facilitated by the number of interconnections within their cognitive structures, that is the amount of elaboration. Thus, a particular symptom may not elicit the correct diagnosis, but the inaccurate diagnosis elicited may have some connection with other diagnoses, and so on until the correct diagnosis is retrieved.

It is also likely that doctors are able to diagnose complex cases because their knowledge of biophysical and psychosocial mechanisms helps them to account for their observations - hence the importance of so-called pre-clinical teaching. However, it also seems clear from the present study that much of this knowledge is not acquired by doctors in a form that can be retrieved during their clinical experience, so why is it that many doctors become able in time to carry out a wide search of their memory?

Quite possibly, many doctors establish the multiple interconnections that are needed with 'experience', possibly only after the completion of undergraduate medical education, when they have seen a number of cases which provide appropriate assimilative contexts to which they can relate specific information about treatment and the underlying basic mechanisms.

It is probable, then, that many medical students learn merely in an adequate manner, creating for themselves a deep or a broad knowledge but not both. This may severely limit the effectiveness of their clinical training, and possibly restrict their effectiveness as clinicians. Recent criticisms of medical practice (Kennedy, 1981; Wright & Treacher, 1982; Pendleton & Hasler, 1983) suggest that some doctors may just treat the diagnosis without seeing patients more broadly - they do not consider further the wider implications of the patient's conditions in a holistic way. Moreover, this kind of learning may also limit the effectiveness of postgraduate education, perhaps causing it to be more protracted than it need be

(Renschler, 1984) through pro-active inhibition - their (inappropriate) early learning making later learning more difficult.

Elaborated learning, then, does seem to create the kind of deep, rich knowledge doctors need for effective clinical thinking. It is to Southampton's credit that this can be seen occurring there. Moreover, problem-based learning seems likely to do the same, though by quite different means. However, it also seems clear that elaborated learning is by no means common, and that many medical graduates have not learnt in this way.

Summary and conclusions

A clear theme can be seen running through this discussion: the term 'learning' can mean both a cognitive process and also its product. Medical students learn in particular ways that determine the kind of knowledge they acquire. In this respect, the findings presented here support recent psychological theories of information processing.

More particularly, the study has shown that students enter medical school with an approach to studying which is versatile, with high achievement motivation and a desire to understand what they are learning, coupled with a low reproducing approach and few learning pathologies. However, both at the conventional school and in Southampton, after only a few months these approaches change dramatically.

From the data, three learning approaches emerge, described here as restricted, adequate and elaborated learning.

Restricted learning comprises a memorising or reproducing approach, which is akin to rote learning (Ausubel et al., 1978) and surface processing (Marton & Säljö, 1976a). Students' cognitive structures are chaotically organised, with no clear pathway leading to stored knowledge. Retrieval is poor, even in tests of retention. The inventory study suggests that a majority of Southampton students adopt this approach in the early years. A similar profile is seen in students in the conventional school, but not in the problem-based school.

Adequate learning also is seen in the early years in Southampton and appears to be more worthwhile than restricted learning. These students attempt to understand what they are learning, and their approach is like meaningful learning (Ausubel et al., 1978) and deep processing (Marton & Säljö, 1976a): students attempt to make sense of what they are learning by 'fitting it in' to what they already know. They perform rather better than restricted learners in tests of retention during the early years, but even they do no better in retrieving during their third year clinical attachments what they learnt early on.

Elaborated learning occurs in Southampton at the end of Year Three when students revise for an important examination of their theoretical knowledge. Probably also it occurs throughout and to a much greater extent in the problem-based school. Elaborated learners 'fit together' their knowledge into a deep rich cognitive network. They are the most successful students both in tests of retention, apparently displacing the adequate learners, and also in retrieving knowledge later in a clinical setting. Elaboration, which can be accounted for by Mayer's work (1979a,b), is facilitated by students first having some general, concrete experience prior to receiving specific information and occurs through a process of 'oscillation' in which students relate together cognitive structures in what Pask calls "a conversation" (1976a).

Medical students' learning approaches do not seem so much to be the result of their preferred learning style, nor their previous educational experience. Neither are they 'learning strategies' implying some conscious decision to act in a particular way. Rather, they are a response by students to the learning situations in which they find themselves.

Elaborated learning seems appropriate as a basis for effective clinical thinking. Not only is it found when clinical thinking occurs, but it embodies psychological mechanisms which appear to be operating when doctors diagnose and treat patients. Adequate learning - a depth of knowledge alone - is insufficient for medical practice. Doctors need a deep rich knowledge for effective clinical thinking not just in situations requiring pattern recognition but also in novel cases. Restricted learning seems quite inappropriate, and concern was expressed at the possibility that a considerable number of medical graduates have learnt in this way.

In the next chapter the educational conditions under which these kinds of learning occur will be discussed further in an attempt to identify in what ways a curriculum may be generating particular learning approaches.

CHAPTER 12

DISCUSSION 2: CURRICULUM CONSTRAINTS ON MEDICAL STUDENT LEARNING

Introduction

In the previous chapter, three types of learning which emerged in the present study were described and their likely psychological explanation discussed. In particular it was argued that only elaborated learning forms the kind of retrievable knowledge store which doctors need to think effectively in a clinical setting. In the course of that discussion there was a strong implication that certain learning approaches occurred in association with particular curricular conditions, and in this chapter an attempt will be made to describe more clearly the nature of that association, in particular seeing whether there is a causal relationship. In short, the questions will be asked: do certain curricular conditions promote the kinds of learning which medical students adopt, and are particular conditions needed for elaborated learning to occur? In order to answer these questions it might be useful to reconsider in turn the three curricula, discussing them in relation to each other to see what kinds of learning are to be found there and why they occur.

1. Southampton

Southampton's curriculum was described in detail in Chapter 7. Most of the theoretical teaching occurs in the first two years. Year One largely comprises scientific disciplines, such as Anatomy, Biochemistry, Physiology and Pathology, whilst in Year Two much of the content is taught by bringing together contributing disciplines into systems courses. In addition, from the start of the curriculum, students see patients through courses such as Man, Medicine & Society and Early Medical Contact as well as some of the behavioural sciences, and clinical illustration is used wherever possible. In Year Three students attend clinical attachments and the year ends with an important examination of theoretical knowledge - the

Intermediate Part II.

In some ways, then, this curriculum appears ideal. It provides a discipline basis for the systems courses and allows students an early glimpse of the longer term relevance of the teaching. The first few years provide a theoretical foundation for the clinical work and the Part II examination comes at a time when students are able to link together the information they have been learning. It was for these reasons that the curriculum was planned in this way (see Appendix 2) with its blurring of the traditional distinction between the pre-clinical and clinical phases, by planning the first three years as a single entity and by holding the Intermediate Part II examination after rather than before students' first clinical experiences.

However, this study has shown that during these early years many Southampton students learn largely in a restricted manner, in contrast to their approaches on entry, with predictable consequences for long term retrieval. Many students feel overloaded, lose their motivation, do not relate their knowledge and find difficulty in seeing the relevance of what they are studying. Why is this? To answer this question it might be useful to reconsider these four issues - load, motivation, relating and relevance - now that the psychological principles underpinning medical student learning have been established.

Many medical students, not just in Southampton, feel heavily loaded. They find the amount of information being taught is large and the time available for learning it short. Moreover, they feel heavily pressurised to study for and pass important examinations which, if failed, could lead to the termination of their course. So in what ways might load be influencing student learning?

Dahlgren (1978) found that, generally, heavily loaded courses were associated with a reproducing orientation by students.

Ramsden (1979) felt that there was a causal link between the two. Does a heavy load, then, directly cause restricted learning? This can hardly be the case. Southampton's students at the end of Year Three felt heavily pressurised by the Intermediate Part II examination, yet some found revising almost an enjoyable experience. In itself, then, load may not directly create restricted learning. What seems more likely is that students who are in a position to handle information satisfactorily do not feel loaded, even though they may work hard and be under pressure. The interviews and the questionnaire showed that Southampton students most able to cope are the ones who are relating information together. They, as it were, reduce the amount of information they need to handle by forming cognitive networks, unlike students who commit everything to memory and find this an enormous and daunting task. More significantly, students who cope best are those who relate theoretical information to clinical experiences. Their 'assimilative contexts' and their 'oscillation' enable them to handle information effectively. Information load is only problematic when the curriculum does not provide appropriate means for students to handle it satisfactorily.

The motivation of medical students also seems to suffer in the early years, not just in Southampton's programme but elsewhere, as the review in Chapter 5 showed. Perhaps this is surprising since there is such demand on medical school places - students might justifiably feel honoured to have gained entry. Moreover, the career for which medical students are preparing has high status and security as well as offering substantial financial rewards. Why then does their motivation dramatically fall? Some writers suggest that motivation is a more or less stable characteristic of an individual (Beard & Senior, 1980), which is not greatly influenced by educational experiences (Entwistle & Ramsden, 1983). This study has shown this not to be the case. The motivation of medical students changes markedly, apparently in association with features of the curriculum, but what may be causing this to happen?

From the inventory survey it was clear that Southampton students' achievement motivation score was substantially lower in Year One than on entry, and then lower again in each of the next two years, only increasing somewhat towards the end of Year Three (Tables 10.2 and 10.3). The interviews had suggested that, for many students, every year was different, each requiring as it were a 'new beginning'. Motivation, then, might be associated negatively with novelty - 'new beginnings' may create a kind of 'dissonance' (Festinger, 1957). However, a 'new beginning' view of motivation does not establish any causal relationship. Why should novelty cause lower motivation? Interestingly, some Southampton students at the end of Year Three showed an increased achievement motivation score. How might this, too, be explained?

It may be that some students see more clearly than others the nature of the tasks they are expected to perform. So, too, some situations may indicate more clearly than others what students need to do in order to cope. Certainly, some Southampton students described their experience whilst revising at the end of Year Three as 'seeing everything more clearly'. It was argued in Chapter 11 that students' perceptions are an important factor in the learning that occurs.

Thus, motivation generally may be enhanced and new beginnings in particular relieved by students clearly seeing what they need to do in order to cope. If they cannot, then motivation drops. If they can, it is maintained and even improved. Perhaps, then, it is not very valuable to consider motivation as a primary cause of learning. It is a response to the situation in which learners find themselves which is aided by the clarity of the task being set. Because this may then influence how students organise their study time, it may affect student learning, but apparently as a secondary cause of it.

The relating of information appears rare for most medical students. From the interviews it was clear that many saw courses largely as being separate from one another. Indeed, Man, Medicine and Society - arguably the most horizontally and vertically integrated course in Year One with its various contributing disciplines as well as some patient contact - did not seem greatly to influence the relating of information of many students. In the second year, more students appeared to experience more relating by 'fitting in' what they were studying, and a number reported much preferring this approach. Nevertheless, many did not link courses together, indeed they tended to focus most of their attention on the course they were studying currently. During Year Three, students had a number of opportunities to relate their clinical experiences to work carried out in Years One and Two, yet few did so. Most only followed up cases in a clinical textbook. Again, even this relating was a 'fitting in'. It was only during their revision at the end of Year Three that some students, the ones showing elaborated learning, began to relate knowledge together. This then raises two questions: how might this apparent failure of most students to relate knowledge during the early years in Southampton be accounted for in curricular terms, and what features of the curriculum facilitate a relating together at the end of Year Three?

The work of Bernstein (1971) may be relevant here in answering these questions. He distinguishes between curricula that have what he calls either an integrated or a collection code. On his analysis (ibid.), Southampton's first year has a collection code, with strong 'classification' (separate disciplines) and strong 'framing' (formal teaching). Year Two systems courses show rather weaker classification but still with strong framing. Year Three clinical attachments have a variety of both classification and framing: some are weak in both and others strong. Much of the first three years, then, is of a collection code type, though aspects of Year Three clinical attachments may have an integrated code depending on the arrangements made, and even there most students saw attachments as separated from other attachments and also from the theoretical teaching of Years One and Two. Armstrong notes that most of undergraduate medical education "constitutes a collection type curriculum" (1977). However, the revision period at the end of Year Three in Southampton has weak classification, especially for the elaborated learners, and weak framing (no formal teaching at all).

The Bernstein analysis seems to be of value in understanding the phenomenon of 'relating'. It seems that the extent to which students experience a relating of knowledge is associated with particular parts of the course. In Year One, many students do not relate knowledge at all and this part of the course clearly has a collection code. In Years Two and Three there was more of a 'fitting in' type of relating, and the course at those times has weaker classification but generally strong framing. However, the 'fitting together' type of relating which characterised elaborated learning occurred at the end of Year Three when there is weak classification and framing.

The Southampton curriculum planners deliberately chose to make the first year largely a discipline basis for the remainder of the course. This does not seem to have succeeded. Certainly it does not provide the sort of experiences that students need to develop a retrievable knowledge for later use. Moreover, the systems courses in Year Two only generate a 'fitting in' type of knowledge, even though these courses are multi-disciplinary. Probably this is because the framing (the way the information is presented) remains strong (formal teaching) though the classification is weaker. However, a 'fitting together' type of relating is most likely to occur when there is weak classification <u>and</u> weak framing (at the end of Year Three when revising).

In Chapter 6 it was noted that one alternative to the conventional curriculum pattern is horizontal integration but that the limited evidence available did not greatly support this arrangement. The findings from Southampton support that notion. Horizontal integration in the form of systems courses does not seem to provide a basis for 'fitting together'. However, the curriculum conditions under which 'fitting together' does occur seem to reflect the second alternative, vertical integration: students revise their theoretical work after their clinical experiences in Year Three. Horizontal integration without considerable vertical integration does not provide the kind of learning that seems needed in medical education.

A curriculum might be described as being 'integrated' (Harden et al., 1978), and some might say this of Southampton's early years, but integration is probably best seen not from the planners' or teachers' point of view but the students': do the curriculum experiences students receive facilitate the fitting together of information? If they do, and relating does occur, then a curriculum could be said to be integrated.

The final issue, relevance, has been problematic to medical education for decades, as described in Chapter 5. Understandably, then, Southampton's curriculum planners introduced courses such as the Behavioural Sciences as well as Early Medical Contact in Year One and clinical illustration throughout. However, the interview survey showed that many students found difficulty in seeing the relevance of what they were studying, particularly in the first year. In Year Two, a number recognised a greater relevance in the systems courses, but some questioned the importance of the Behavioural Sciences. In Year Three, some students even questioned just how relevant had been the first two years: the questionnaire survey showed that forty per cent of students felt that the first two years did not form a good basis for Year Three, and, surprisingly, nearly twenty per cent actually believed them to be irrelevant to it.

The relevance of courses presents something of a paradox: whilst it is reasonable to assume that medical curriculum planners do not set out to devise a course which is anything other than relevant, some students find that the courses they are studying lack relevance. It seems that, in principle, a course may be relevant, but in practice it may not: the course may be relevant to planners, but not necessarily to the students.

On this analysis it seems that the student's perception of relevance is likely to be determined by the context in which the learning occurs. Interestingly and surprisingly, some Southampton students - about a quarter of those interviewed - said they felt that even Early Medical Contact - seeing patients in Year One - was not relevant. How could this be? Quite probably they were saying "this may be relevant to being a doctor but it is not relevant to being a medical student". Why is this?

It appears that the term relevance has two meanings. One refers to what might be called 'motivational relevance'. Students seem to be helped to maintain their motivation if they are shown the wider purposes of, and applications for, what they are being taught. In a very real sense Early Medical Contact does this. However, the second form of relevance is a 'cognitive' one. As has been clearly shown in the previous chapter, for elaborated learning to occur medical students need to have available at the start of any learning sequence a relevant advance organiser or assimilative context, that is something which is concrete, general and more inclusive than the specific information subsequently presented. Early Medical Contact does not provide this kind of 'cognitive relevance'. It does not make students' immediate task any easier, nor, more particularly, any clearer.

During the early years in Southampton, students are presented with considerable amounts of information in the absence of much appreciation of the long term purposes for which it has been taught. Under these circumstances they are unlikely to be in a position to see its relevance. Indeed, as they begin to adopt a restricted learning approach, students become even less likely to see information as relevant since their learning processes keep it isolated. It is not that the early courses lack clinical relevance, it is merely that students fail to recognise the illustrations and examples that are given, and do not form links between them and the theoretical information being taught. At the end of Year Three, only elaborated learners see much relevance in what they are doing, but this is because they now have had considerable 'first-hand' clinical experience to which they are able to relate the specific information they are revising. Moreover, as argued in Chapter 11, probably even they only 'stumble across' it. Relevance is a personal phenomenon, but it can be facilitated or hindered by the curriculum arrangement. Motivational relevance would seem useful and possibly necessary in a medical curriculum, but cognitive relevance is essential for elaborated learning to occur.

Southampton's curriculum, then, presents a mixed picture of experiences, some which seem educationally desirable, such as the timing of the Intermediate Part II examination that facilitates elaboration, but many others that merely contribute to either restricted or adequate learning. Before further discussing the links between curriculum and learning, and in order to gain a clear understanding of possible mechanisms, it would seem useful to consider the conventional curriculum and problem-based learning in the light of the points that have emerged above.

2. Conventional curriculum

In discussing the conventional curriculum it must be acknowledged that less evidence is available than for Southampton's curriculum. There are no interview or questionnaire data to draw upon, though there are some inventory data from the comparative survey. Nevertheless, considerable evidence has amassed from studies elsewhere, described in Chapter 5, to indicate the kinds of problems facing students in a conventional undergraduate medical course.

The conventional curriculum arrangement has a clear division between pre-clinical and clinical phases. The early years are largely formally taught on a discipline basis, though with some clinical illustration. On passing an examination of theoretical knowledge at the end of Year Two - the Second M.B. - students enter clinical attachments in Year Three. On the Bernstein analysis (1971) the curriculum clearly represents a collection and not an integrated code.

Given the apparent differences on paper between this arrangement and the Southampton programme, it is perhaps surprising that the inventory data are so similar at the two schools. In fact, many of the problems facing Southampton students in the early years parallel those reported in other studies in conventional medical schools. The same issues - load, motivation, and relevance - seem to arise, probably for the same reasons as discussed above. However, one unforeseen finding in the comparative inventory survey was that in Years One and Two conventional students had a somewhat different approach to studying than Southampton students (see Table 10.5), and these differences seem to favour the conventional school. What are they?

In Year One, conventional students have a very significantly lower reproducing orientation and learning pathologies score, and a greater achievement motivation and prediction of success score than Southampton students. In Year Two, in addition to these, conventional students' meaning scores and versatility are significantly greater than Southampton students. Only in Year Three, that is when both sets of students are in clinical attachments, do Southampton students' scores begin to match those of conventional students, ultimately their comprehension learning score being significantly greater. These results seem to suggest more restricted learning in Southampton in the early years than in the conventional school, but why might this be? Are there features of the conventional curriculum which may be less damaging educationally than some of Southampton's? One can only speculate at an answer to these questions, drawing on the available evidence, whilst noting that further research, probably of an ideographic nature, is needed in the conventional school to clarify students' learning approaches there.

It is reasonable to suggest that in a conventional school students may be more able than Southampton students to continue studying as before, probably more of them adopting an adequate learning approach as a consequence, because the discipline based curriculum arrangement is not unlike their school education. If, as was suggested earlier, adjustment to learning is influenced by 'new beginnings', probably Southampton students experience more 'dissonance' than conventional students. There is also the possibility that, since the planners make no claims that their curriculum is integrated, students in the conventional school may see their task more clearly than Southampton students as one of needing to make sense of what they are learning - more of them may adopt an adequate approach. There may be a danger in Southampton that some students feel that integration has been achieved for them by their teachers, yet this study emphasises that integration needs to occur within each learner's cognitive system. Moreover, it may be that a potentially integrated course such as Southampton's requires a considerable amount of effort to co-ordinate, particularly in the systems courses which draw on contributing disciplines, to administer it satisfactorily. Indeed, this effort may focus teachers' attention on day to day timetabling matters, possibly distracting them from more educational considerations such as whether students are in any position to handle the information they are being taught, what students see as the tasks being set and whether they can be helped to learn in the required manner. In short, the conventional curriculum may be rather easier to run than a horizontally integrated curriculum such as Southampton's, and as a consequence students and staff there may be less distracted by administrative matters. Some evidence to support this notion comes from the discussion in Chapter 6 of the experience of Case Western Reserve Medical

School in North America, where it was found that the organisational problems of systems courses apparently proved not just intolerable and insuperable but also possibly counter-productive (Williams, 1980). More research seems needed to identify the organisational problems within conventional curricula compared with a programme such as Southampton's, and at the effects of administrative complexity on staff activity and student learning.

It is probable that the learning of conventional students is likely to be either restricted or adequate. As argued in Chapter 11, no elaborated learning seems possible because students appear not to have available at the time they are learning the theoretical information any appropriate assimilative contexts, nor does the curriculum provide opportunities to oscillate. Indeed, because the Second M.B. examination comes prior to rather than, as in Southampton, after the students' first clinical attachments, conventional students must acquire their pre-clinical knowledge before they experience very much clinical medicine. Thus, in a conventional school, there is little likelihood of elaborative learning occurring. Indeed it may never occur there, certainly not during the undergraduate course - students' basic science and social science knowledge is not tested by the final examination so they may never 'revisit' their notes following some clinical experience. Nor may it occur later if postgraduate courses focus attention on specialist skills and knowledge without emphasising the contribution to clinical practice of pre-clinical knowledge. Some doctors' knowledge may never be more than adequate as a result of the conventional curriculum arrangement.

Support for this notion that elaboration is unlikely to occur in a conventional curriculum comes from the comparative inventory survey. Students there did not show the same shifts as a result of studying for the Second M.B., that is between Years Two and Three, as seen in Southampton students during their preparation for the Intermediate Part II examination.

Thus, the higher achievement motivation and comprehension learning in Southampton are unlikely to be the result of students experiencing clinical medicine, but of some elaboration occurring during the revision process.

One implication of this for conventional medical schools concerns the timing of their Second M.B. examination. If the examination were to be held after rather than before the first clinical attachments students would be more likely to acquire their theoretical knowledge in an elaborated manner, as in Southampton. Having said this, students' learning generally in Southampton is far from ideal and any change to the conventional curriculum needs to take into account that a mere shift of the Second M.B. examination would not substantially alter the learning of many students.

It is probable that conventional students learn in a less than ideal way as a direct consequence of the traditional pre-clinical/clinical division of the undergraduate medical curriculum. Even though this was most severely criticised in 1957 by the General Medical Council in their recommendations, seeing it as the root-cause of medical education's difficulties, it remains widespread and apparently highly resistant to change: most medical schools have a pre-clinical/clinical division of the curriculum. During the pre-clinical phase students are taught the knowledge they will need to know when they enter the clinical part of the curriculum yet, as evidence from this study and elsewhere has demonstrated, many are not able to retrieve much of it later when they find themselves in a clinical setting. Their knowledge of basic theory is not carried forward. It must be said that the pre-clinical arrangement has failed in its objective of preparing students for the clinical phase of the curriculum, but why is this?

Quite probably the reason is this: the pre-clinical phase reflects the view that students need to learn basic theory first, certainly before they enter clinical attachments.

However, this confuses two quite different notions of the term 'basic'. In Chapters 5 and 11 it was argued that much of the theory being taught to medical students during the early years of an undergraduate course is basic to medicine in the sense that it underpins medical practice and helps to understand medical conditions, but the term 'basic' has been taken also to mean 'coming first'. Although the first sense of the term 'basic' seems undeniable, the present study has shown that basic information cannot be learnt before, and isolated from, an understanding of its likely application. It can only be retrieved in a clinical setting if it is learnt in an elaborated manner, which requires it to be presented after, or in close proximity to, the prior establishment of an appropriate assimilative context to which it is relatable. The problem seems to be, then, not that the conventional medical curriculum teaches 'basic theory first', but rather that it does so without making clear to the students the purposes for which that information is needed. Where students have no clear perception of this, they cannot be expected to learn in an appropriate manner. Like in Southampton's early years, conventional students may have certain motivationally relevant experiences but not cognitively relevant ones.

Understandably, for this reason some writers recommend, half seriously, an inverted curriculum (Barrows & Tamblyn, 1980) with clinical experiences <u>preceding</u> the theoretical courses. As some Southampton students noted, it was only at the end of Year Three, that is after their first clinical attachments, that their theoretical notes began to make sense. Indeed, there is some support in the psychological literature that later teaching can be more didactic. Ausubel, for example, suggests that there is a strong case for having formal teaching at the end of a course rather than at the beginning (Ausubel et al., 1978) - apparently the reverse of much traditional practice.

However, an inverted curriculum would not necessarily resolve the basic theory first dilemma. It might provide motivational relevance, but students need to have a considerable amount of knowledge before they enter a clinical setting, otherwise they will be unable to make sense of much that they see there, nor take advantage of clinical experience which is a valuable and costly learning resource. How might a curriculum be so arranged as to limit the deleterious effects of the 'basic theory first' arrangement whilst preparing students for their clinical experiences? What seems needed is a different kind of 'basic': one that provides cognitive relevance. Prior to the presentation of the theoretical information, students need to be given appropriate assimilative contexts as described in the previous chapter. As has been repeatedly noted, these should be concrete and more general than the information presented subsequently and, in a medical course, could be 'clinical' in nature though, early on, need not involve patients in clinical settings.

Probably what is needed, then, is for the pre-clinical/ clinical arrangement to be retained but that any theoretical information should only be taught early on under conditions that facilitate elaborated learning. Similarly, clinical attachments should exist primarily for consolidating and applying pre-clinical knowledge, and only secondarily for learning about clinical management and therapeutics, important though such knowledge will be ultimately.

All of this raises a further question concerning the 'basic theory first' curriculum arrangement: Why is it so common? In Chapter 5 it was argued that in pre-Socratic times medical education was not theoretical but practical, and this was the basis for the much revered Hippocratic school. All of this changed with Plato who saw becoming knowledgeable as a theoretical, almost 'armchair' pursuit. In modern times, the basic theory first arrangement probably dates from the early part of the nineteenth century (Newman, 1957), reflecting in part the intellectual tidiness of Victorian thinking (ibid.). Indeed Flexner, in his reviews of medical education at the turn of this century (1910, 1912, 1925), argued that the teaching of theory before its practical application was an approach which obviously expedited students' learning. The present study has shown that the conventional basic theory first approach may indeed appear rational but that, through it, students' progress is anything but expedited. There may indeed be a difference between logic and psycho-logic (McLaughlin, 1963): an educational arrangement may seem obvious but not make learning any easier.

3. Problem-based learning

Just as with the conventional curriculum, less evidence has been presented here concerning problem-based learning compared with the Southampton programme. Nevertheless, again the comparative inventory survey data are available, as is evidence from studies elsewhere which were reported in Chapter 6.

In a typical problem-based school such as McMaster or Maastricht each learning sequence lasts about a week and begins with students being presented with one or more biomedical problems. Students in small groups then discuss what information seems needed to understand the problems, and information collection tasks are allocated. Information is sought from a number of sources, including books, journals, demonstrations, dissections, advisers and consultants, etc., and shared amongst the members of the group. Then, at the end of the learning sequence, group members use this information to attempt to solve the problems raised at the outset. On Bernstein's analysis (1971) this curriculum is integrated: it has weak classification and weak framing.

The inventory data showed that, compared with students in Southampton and the conventional school, the learning profile of problem-based students had high scores in achievement motivation, meaning, versatility and prediction of success with low scores in reproducing and learning pathologies. These results were accounted for in Chapter 11 in psychological terms. Much of the learning appears to be elaborated, with the problem acting as an assimilative context and problem solving being a form of oscillation. Research findings elsewhere gave similar results: problem-based students maintain their early motivation and positive attitudes without developing the same cynicism seen in conventional students (Rosenberg, 1973; Hamilton, 1976b; Gellhorn & Scheuer, 1978; Werner et al., 1978; West et al., 1982). Moreover outside medical education similar results were found by Ramsden (1983): sixth form students following a discovery-based course had an approach to studying profile like that found here in problem-based students whilst traditional course sixth formers had a profile like that found in Southampton and the conventional medical school.

In what ways, then, might the problem-based curriculum be enabling students to learn in this apparently desirable manner? By looking further at the curriculum's major features - the problem, information collection and problem solving - it might be possible to provide and answer.

As already noted, having a problem at the beginning of a learning sequence is likely to provide the learner with a suitable assimilative context. However, unlike early patient contact and clinical illustration, the problem seems to give both motivational and cognitive relevance, indicating the nature and scope of students' work for that week and recognising its long term purposes.

Problems are likely to do more than just orientate and motivate students, important though these may be. They can also set objectives for the learning and determine the content of the information learnt. In a conventional school, and even in the Southampton programme, objectives and content are dictated by the planners and teachers. In problem-based learning, although the broad areas of study may be decided in advance, each problem directs students' attention towards what to learn. Such an arrangement is valuable in medical education. When the curriculum content is teacher-centred, as in conventional schools, there is a danger that the information taught and learnt may not entirely reflect the most common let alone the changing health care needs of the society for which the students are being prepared. To do so, each of the teachers would need considerable clinical knowledge. Whilst this is not impossible and may well occur in many instances, it is unlikely that it will happen automatically or without considerable effort in a conventional curriculum. Indeed, with changes in personnel, this making clear to teachers the relevance of what is being taught would need to be an on-going concern. Moreover, much of the content of conventional schools may reflect historical precedence, as the General Medical Council noted in many of their more recent recommendations (1947; 1957; 1967). Indeed, in a more sinister way it may even indicate departmental or personal power and self-interest (Williams, 1980) which may be not just a serious constraint on development of the curriculum but extremely difficult to influence (ibid.). A problem-based curriculum arrangement, however, provides a different means for establishing and maintaining the content of courses, with the problems chosen directing what students learn.

The second phase of problem-based learning, information collection, is as important to the psychological process of elaboration as having had a relevant assimilative context established at the outset. In a typical school this occurs in small group seminars. Now, a number of quite legitimate claims have been made for the value of small group learning (Walton, 1973; Abercrombie, 1978). In medical education this would seem worthwhile since doctors must work often in small groups and, quite reasonably, might be expected to acquire skills of discussion and communication. Indeed, there is evidence that some doctors are not always effective communicators (Pendleton & Hasler, 1983). However, in problem-based learning, small group work may not be entirely satisfactory from an educational point of view.

It has been observed (Olson, 1984; McAuley, 1984) that some problem-based students 'prepare' in advance of a seminar rather than approaching them 'cold', and that, perhaps paradoxically, this may limit the effectiveness of the learning that then occurs. As already noted, when students discuss the problem they also identify and allocate information collection tasks. During this early phase of the learning sequence it is likely that any student who has prepared in some way for that discussion, for example by reading about the biochemistry of the problems for that week, may direct the group's attention towards particular areas, thus possibly ignoring other equally important ones. There may be what some psychologists call too early a 'closure' of the problem (Krech & Crutchfield, 1958). In addition, it is likely that 'prepared' students, appearing to their colleagues to know a lot about a particular area, may be given the task of finding out more of the same, possibly limiting their own learning. Just such an observation has been made by Haas and Shaffir (1982), who describe some problem-based students as developing a "cloak of competence" - covering up their inadequacies - which may be detrimental in its effects on subsequent learning.

There may be other reasons why allocating information collection tasks on a group basis may not be altogether desirable educationally. It might be that each student studies in depth one or only a few aspects of the problem, relying on others for the remainder. In this way, students may become quite knowledgeable about small areas, only acquiring other information as it were *'secondhand' from their* peers. Whilst this may be inevitable, it may have undesirable consequences in problem-based learning. In the previous chapter it was clearly shown that elaborated learning is only likely when students bring together information for themselves. Small group allocation of information collection may be fostering a deep knowledge - adequate learning - for some but not the deep rich one for all that is needed. Ironically, elaboration might be thought more likely to occur in the Southampton setting (where each student is revising for an important examination and has the opportunity of bringing things together) than in a typical problem-based arrangement with its division of labour in information collection. Whilst collaboration, possibly through organised small groups, might encourage a wide ranging collection of information, ultimately all learners need to establish their own cognitive networks.

The third important feature of problem-based learning is the act of problem solving itself which occurs at the end of the learning sequence, probably involving a psychological process of 'oscillation'. Typically, this too occurs in small groups, and the same criticism as above may be made: for elaborated learning to occur each student needs to 'oscillate'. This is not something that can be achieved by a group, though discussion within a group might facilitate its occurrence *within individuals*. However, quite probably not all students achieve this oscillation in problem-based schools, and this might account for the inventory finding that by no means do all students there show high levels of meaning and versatility even though the mean scores are significantly greater than in Southampton or at the conventional medical school.

Moreover, problem solving alone is not necessarily an ideal process for establishing elaborated learning. Certainly problem solving includes some kind of oscillation: as argued in Chapter 3, when we solve problems we draw upon stored information and in the process of it we further elaborate our cognitive structure. However, quite fundamentally elaborated learning involves linking together otherwise distinct cognitive structures through oscillation but, as Gale (1980) has noted, the structural properties of cognition are not clearly indicated in the case of problem-based learning. The question that needs to be asked is, does problem-based learning provide the most suitable basis for generating the kind of learning that is needed? It seems, from the available evidence, that the case for this has yet to be established by the proponents of problem-based learning.

In addition, it is unlikely that medical practice only, or even largely, entails problem solution. As suggested in both Chapters 5 and 11, much of clinical thinking can be described as pattern recognition. Even cases which are unusual, unknown or complex, and which require clinicians to widely search their memory store, do not represent 'problems' requiring 'solution', any more than scientific research is problem solving. Productive thinking (Wertheimer, 1945) of any kind may involve solving problems but as a cognitive function it is likely to include many other psychological processes (Gale, 1980; Gale & Marsden, 1983). To characterise clinical thinking as problem solving may be to distort not just its nature but also any educational provision which is intended to establish the kind of knowledge that is needed for it. What seems much more reasonable in the light of current thinking is to suggest that doctors need a store of deep rich knowledge to ensure that they can satisfactorily diagnose a patient's condition(s) and to prescribe some appropriate management. There is danger in confusing the term 'problem' with terms such as 'concern' or 'difficulty'.

Nevertheless, problem-based medical schools actively set out to facilitate appropriate learning approaches in their students. For example, at both McMaster and Maastricht the early part of the curriculum is devoted to an induction programme for students to learn how to work within a problem-based setting (Graat, 1983; McAuley, 1983). This is likely to minimise the effects of 'dissonance' and enable most students to study effectively, helping them to 'handle' the learning process.

Problem-based learning, then, seems to embody certain unique and educationally attractive features. In particular these are that students are given relevant assimilative contexts at the beginning of each learning sequence and opportunities for oscillation. However, other aspects of the programme appear problematic educationally, particularly the sole use of small group seminars for identifying information collection and problem solving. Moreover, whilst it is clear that students there maintain their motivation, it has not been established satisfactorily that their learning is any more effective than that of students in a conventional curriculum. There is some evidence that problem-based students learn as much as conventional students (Gellhorn & Scheuer, 1978; Werner et al., 1978; Duban et al., 1982; Woodward & Ferrier, 1983) but should they learn more? Indeed, do they develop a deep rich knowledge? Are they more able than conventional students to retrieve information in a clinical setting? Can problem-based students perform more effectively than conventional students subsequently under conditions of 'far transfer'? Is their postgraduate education facilitated by effective undergraduate learning?

Answers to these questions are not apparent yet in the literature, and clearly more research is needed. Naturally, it will not be easy to provide satisfactory evidence to answer them since, at the present time, there are few appropriate and acceptable means for detecting elaborated learning or for measuring performance. Moreover, the ultimate success of problem-based learning is likely to be determined by whether or not its educational and psychological basis can be satisfactorily established but this has yet to be achieved. In short, the kind of analysis presented here has not shown problem-based learning to be entirely appropriate educationally, attractive though it may at first seem.

Learning and curriculum

Having discussed the three curricula, and in the light of the conclusions from the previous chapter, it is now possible to say in what ways an undergraduate medical curriculum may generate particular kinds of learning. Three quite fundamental general principles seem to emerge:

1. Medical students' learning is constrained by the way a curriculum is arranged.

2. Students' perceptions of the demands being made of them crucially determine how, and therefore what, they learn.

3. A curriculum is well placed to influence these perceptions, enabling students to learn in an appropriate manner.

Having identified these principles it would seem valuable to consider them further to see whether or not any of the three curricula discussed above meet the demands set by them in generating the kind of learning that is needed in medical education.

First and perhaps most importantly, students' learning seems to be fundamentally constrained by the curriculum arrangement. In the early years of a conventional medical school and in Years One and Two of the Southampton programme, most students adopt a restricted approach as a result of the curricular experiences they receive. In a conventional medical school, with its basic theory first arrangement, students seem seriously disadvantaged because the curriculum does not provide appropriate assimilative contexts nor clearly articulated opportunities for oscillation. In other words, it is not so much what the curriculum does that causes the problems but rather what it does not do. The Southampton programme seems little better. Even Early Medical Contact does not provide students with the advance organisers they need to handle the information they are being taught at the time. They are not central enough to the curriculum arrangement, students seeing the other courses running concurrently as more important. Nor do the systems courses automatically and universally allow students to 'bring together' information being learned. Indeed, it might be argued that a horizontally integrated curriculum arrangement, which juxtaposes otherwise separate disciplines, is no satisfactory alternative to the conventional curriculum arrangement without there also being considerable vertical integration. Having said this, it must be stressed that the students' failure to learn in an elaborated way during the early years of the Southampton programme is no reflection on the teachers' undoubted efforts and sincerity, but is due, in large measure, to the curriculum arrangement.

However, the Southampton programme does provide the necessary conditions for elaborated learning at the end of Year Three, through the timing of an important examination of students' theoretical knowledge. At that point, students have an opportunity to learn in an elaborated way, but it is also true to note that if the Southampton programme did not incorporate such a feature it would almost certainly be indistinguishable from a conventional curriculum in its effects on student learning, and it might even be counter-productive educationally because of its administrative complexity.

Problem-based learning, on the other hand, has an undoubted advantage over the conventional curriculum and even the Southampton programme, because the curriculum arrangement embodies its educational philosophy: it acts as a vehicle for appropriate student learning. On the other hand, the educational philosophy of the conventional medical school, basic theory first, is not productive. Rather, the learning that occurs there generally is not retrievable and useable later. Students' knowledge acquired in this way is not a 'basis' for subsequent practice. Southampton's programme is based on a philosophy of treating the first three years as a single entity. However, this is not clearly enough articulated nor satisfactorily embodied in the curriculum arrangement. Students see the separate parts as being quite distinct. Of all the innovations for which the Southampton programme is well known (Editorial, 1976), perhaps the most educationally valuable and certainly its most unusual feature is the timing of the Intermediate Part II examination. Yet the significance of even this is not clearly understood by most students beforehand and only by some afterwards.

In short, to achieve the kind of learning that seems needed in medical education, it would appear necessary that the curriculum arrangement should embody certain appropriate features, some of which are to be seen in problem-based learning.

The second general principle of curriculum action follows from the first, and it builds on an important notion raised in the previous chapter. Even though the curriculum arrangement may constrain the learning of most students, it does not do so for all. Indeed, the ways in which students learn are greatly influenced by their perception of the demands they see being made of them. Most students in the early years of the Southampton programme, and probably in the conventional school, see their task as one of merely 'collecting' information. They are not absolutely certain why or for what purpose they are doing this, nor are they clear how the information is likely to be needed in the future. They must, as it were, 'take on trust' that they need to do so, but given the amount and complexity of this information this 'trust' becomes severely challenged. It is understandable that many students 'play the system' (Becker et al., 1961), which often means learning just enough to pass the next assessment or examination. Even at the end of Year Three in the Southampton programme, many students did not see their task as one of 'bringing together' the information they were revising, even though the conditions were present for them to do so. In the problem-based curriculum, however, probably most students see their task as one of solving biomedical problems, though it is also likely that some students do not, possibly resorting to a collection of information rather than an active processing of it.

The third principle follows from the second: does the curriculum help students to see clearly what they need to do in order to learn in an appropriate manner? In a problem-based school the curriculum gives students at the outset some experience of how to cope with such an arrangement - there is an induction programme. Even so, probably some students do not then learn effectively because some aspects of the curriculum arrangement, such as the small groups, may promote less effective approaches to studying. In the Southampton programme students receive little or no formal guidelines from the curriculum concerning how to study effectively. Indeed, the 'informal' guidance provided by the curriculum arrangement seems to direct their attention more towards collecting information than to fitting it together. Not even the clinical attachments in Year Three are clearly stated as being for students to understand the biomedical and psychosocial principles taught during the first two years, and many students see their tasks then merely as learning clinical medicine. Thus, it is most likely that in the Southampton programme and in the conventional school, students obtain their perceptions of the tasks being demanded of them not from some deliberate curriculum intervention but from their peers, and from informal contact with staff - the so-called "hidden curriculum" (Snyder, 1971) - which may be productive in the short term but often seems to be counter-productive in the longer term. Unless the curriculum clearly indicates to students the demands it is making of them, or what tasks might be performed in order to learn effectively, it is likely that by far the most powerful influence over how students actually learn is this covert and not always predictable force.

This, then, brings the discussion full circle: a curriculum arrangement is capable not only of establishing appropriate conditions for generating the kind of learning that is needed, but it can also directly influence students' perceptions of what they need to be doing in order to learn effectively. Thus, a curriculum is well placed to generate effective learning, though this rather general conclusion merits some qualification here: Undergraduate medical curricula must proceed in three phases. Students first need to be given appropriate assimilative contexts, then to have specific information made available, and third to have opportunities to relate together this information to form elaborated cognitive networks.

In the light of these conclusions, is there an ideal curriculum in medical education? Problem-based learning seems educationally to be the most attractive of the three considered here, but even this has some undesirable features which may direct students' learning towards unproductive approaches. In the next chapter an attempt will be made to provide an educationally more appropriate basis for planning and developing undergraduate medical education.

Summary and conclusions

In this chapter the three undergraduate medical curricula which provided empirical evidence for the study have been discussed in the light of the earlier findings concerning medical student learning. It was argued that the Southampton curriculum in its early years does not overcome the perennial problems of load, motivation, integration and relevance seen in conventional schools. However, towards the end of Year Three it provides a unique opportunity (not seen in other United Kingdom medical schools) for elaborated learning to occur through the timing of an important examination. Those students who do not learn in this way at that time do not seem to see their task as one of relating together the information they are revising.

The conventional curriculum in some ways seems educationally more desirable than the very early years of the Southampton programme, probably because it is less dissimilar from students' school experience. However, it has serious educational flaws centering on the 'basic theory first' arrangement which confuses two meanings of the term 'basic'. Conventional schools might improve their students' learning by rescheduling the Second M.B. examination to occur after rather than before the first clinical attachments, but even this would generate only a marginal improvement in learning.

The problem-based school appears ideal, not just because its curriculum arrangememt embodies the psychological principles underpinning elaborated learning, but also because students and staff are inducted into effective ways of coping with this novel programme. However, other features of the curriculum, notably students working to a large extent in samll groups, may be less successful educationally, possibly counter-productive, and generate inappropriate learning approaches.

Thus, an undergraduate medical curriculum is capable of generating elaborated learning if its arrangement is of a particular kind and if it enables students to perceive what they need to be doing in order to learn effectively. None of the three curricula reviewed here entirely meet these requirements.

The pre-clinical phase of the conventional curriculum does not promote the development of a retrievable, usable knowledge for students' subsequent clinical work. Southampton's curriculum is not sufficiently vertically integrated to provide students with the necessary motivationally and cognitively relevant experiences they need for elaborated learning. The problem-based approach has a number of attractive features but it does not encourage elaborated learning for all of its students, probably because it lacks a sound theoretical basis.

In the next chapter an attempt will be made to distil from this study a curriculum model on which to base future developments in medical education and possibly elsewhere.

CHAPTER 13

DISCUSSION 3:
CONTEXTUAL LEARNING:
A CURRICULUM MODEL FOR UNDERGRADUATE MEDICAL EDUCATION

Introduction

This study has shown that medical students learn in different ways which in Chapter 11 were accounted for in terms of current psychological theory. Then, in Chapter 12 it was argued that certain features of the curriculum which students experience seem to constrain the learning that occurs. More particularly it was argued that elaborated learning, the development of a deep rich knowledge needed for effective clinical thinking, can be seen occurring only under certain cirmstances, in particular in a problem-based curriculum and at a period towards the end of Year Three in the Southampton programme. However, overall, even these curricula do not appear ideal because they do not meet certain conditions discussed in Chapter 12.

In the previous chapter it was argued that to devise a curriculum to promote the kind of learning needed in medical education it is important to have an appropriate theoretical basis, or model, which reflects the conditions under which elaborated learning occurs. Given such a model, it might then be possible not just to plan more effective undergraduate medical courses, but to refine existing relatively successful curricula and to develop further curricula that seem at present to be unsatisfactory. In this chapter such a model is described and its relationship with other similar models discussed. Its uniqueness for medical education is claimed, and the chapter ends with a discussion of the problems and potentialities of adopting such a model.

The contextual learning model

The discussion in Chapters 11 and 12 clearly indicated three more or less distinct though interrelated phases which seem needed for elaborated learning to be generated: the establishment of an appropriate assimilative context, the presentation of specific information related to it and an oscillation between the two (see Figure 13.1 on page 240).

i) Establishing an assimilative context

The first and prior condition for elaborated learning is that students need to be placed by the curriculum in a position to be able not just to acquire a deep understanding of what they are learning by making sense of the information subsequently presented to them, but also to begin to link together that information into a rich knowledge network. It was argued that to do this students must have some kind of assimilative context. From this study, it appears that although the conventional curriculum and the early years of the Southampton programme do not do this, Southampton's clinical experiences in Year Three do provide such a context, and problem-based learning has this from the outset through medical or medically related case studies being presented at the start of each learning sequence.

In Chapters 11 and 12 it was argued that an appropriate assimilative context in medical education must have certain characteristics. First, it must be concrete. This means it should be 'real' or at least in a simulated form that can be readily identified by the students as being real. Second, it needs to be relevant, not just to what the learner will ultimately do, but also to the information which is subsequently presented. Third, it must be general and more inclusive than the information which follows. Not only must it be an illustration of that information but it must embody it and be capable of having that information 'attached' to it through what the student learns.

In medical education it seems very reasonable for medical case studies and health care situations to be used as assimilative contexts since these fulfil the above criteria. However, as argued in Chapter 12, the use of 'problems' may not be entirely satisfactory: construing medical practice as problem solution may distort its nature, and problem solving does not provide ideal conditions for elaborated learning.

In addition, 'motivationally relevant' experiences could be provided, showing students not just the range but also the the nature of medical practice. These could include something like Southampton's Early Medical Contact scheme, but possibly also attachments to community clinics, old people's homes, schools for handicapped children, etc.. Students might also be attached to hospital wards, though the clinical cases seen there and the health care occurring may be rather too complex for them to gain much insight during the early years.

All of these experiences, whether to aid learning in the long term or the short term, should be carefully chosen to match the students' level of development at any time. In the very early years these experiences need to be concrete - possibly involving video and film presentations of real (or simulated) patients or health care situations - with which students may readily identify. Later they could be less 'real', possibly being presented in some printed form, such as the paper and pencil problems used throughout in Maastricht and McMaster.

The types of problem, their groupings and their sequencing, also need some consideration. In Maastricht and McMaster, for example, problems are organised into topics such as emergencies, bodily systems and human development. This seems a reasonable arrangement, but it should not be taken as a pattern for every medical school. Each undergraduate programme should choose broad topic areas reflecting the health care needs of its own surroundings. Thus, a medical school in Central Africa might present topics such as gastroenteritis, malnutrition and some of the infectious diseases not now common in Western societies. A medical school in an industrialised society might choose topics such as common domestic emergencies, ischaemic heart disease and pulmonary conditions associated with heavy smoking. Of course, whichever topics are chosen, the basic underlying mechanisms students learn are likely to be the same in any setting: they are fundamental to human existence. Nevertheless, by having topics which reflect common conditions in a particular setting, students will be provided with assimilative contexts which bridge what they know from their own experience and what they need to know as medical students and doctors.

Finally, the choice of assimilative contexts would also need to be determined by the science and social science information that students need to know in order to practise effectively. Ironically, this is likely to reflect the contemporary content of a conventional medical school. The major, and highly significant, difference between contextual learning and a conventional curriculum is that the health care topics provide a suitable 'basis' for students to learn the theory they are taught. Clearly, though, this means that 'control' of the content would be influenced more by clinical than pre-clinical teachers, and there is likely to be a need for considerable discussion between both groups in choosing suitable topics.

ii) Presentation of specific information

The second condition for elaborated learning, following closely on from the first, concerns making available to students the information which needs to be learnt. In this study quite distinct modes of information presentation occurring within medical education have been described. In the conventional curriculum and in Southampton's medical school there is a considerable amount of lecturing, especially early on, but also some tutorial work and also self study, whilst in the problem-based school information is obtained throughout by students themselves.

It is not possible to say which, if any, of these alternatives is the most suitable in facilitating elaborated learning. It is tempting to argue that formal teaching contributes towards excessive load and lack of relevance. Certainly, it has been shown here that restricted learning occurs in association with formal teaching, and that student-centred learning appears to be associated with a more elaborated approach. However, this does not mean that formal teaching, in itself, inevitably leads to restricted learning, nor that elaboration inevitably occurs only through a small group or student-centred approach. Indeed, it may be that if the curriculum is so arranged that specific information is only presented <u>after</u> students have experienced an appropriate assimilative context, then the way in which that information is presented may be of secondary importance. Having said this, it is also true that students will require sufficient time in which to assimilate information, and that a full timetable, whether of lectures or any other formal activity, may place a limit on the number of opportunities for doing so. Nevertheless, where curricula need to work within specified resources, as most do, there may be insufficient time for students to gather for themselves all the information that is required, and some form of pre-selection of content may be inevitable.

There would appear to be a need, then, for curriculum planners not just to decide what information should be made available to students at a particular point in the curriculum, which they would do when choosing topics and cases as assimilative contexts, but to discuss the relative strengths and weaknesses of the various presentation methods that might be used. The choice is wide, including texts and journals, purpose-prepared printed sheets, demonstrations, prosected specimens as in Anatomy displays, etc.. In addition there might also be some lecture presentation of certain information such as difficult concepts and principles. The contextual learning model does not, like a typical problem-based curriculum, exclude the possibility of some lecturing. This is far from the case: as Miller (1978) has noted, it is the lecture system not the lecture method that is at fault in medical education. However, in the light of the possible dangers of the teaching becoming overprescribed and the timetable crowded, any information presentation (and lectures in particular) might be kept to a minimum, perhaps by some legislative control. For example, it might need to be said that no topic would have more than a certain percentage of its allocated time devoted to lecture presentation.

This approach to information presentation, then, suggests departures from the conventional arrangement. Staff would be less concerned with giving information but more with making it available as well as helping students to acquire and use it. It is unlikely that this shift of role will occur automatically. Established problem-based schools, such as McMaster and Maastricht, provide support for their staff (McAuley, 1983; Graat, 1983) through induction schemes in the various teaching functions needed. In addition, the students may need to adopt new approaches to information collection, such as self-study, effective reading and note taking, for which their previous education may or may not have prepared them. As with staff, this might require a 'shift' which is not likely to occur automatically. Some form of induction to it, and continuing support for any students in difficulty, may be needed. Many medical schools already have a tutorial system and it would seem valuable to incorporate this actively into the educational programme. In short, the curriculum must be so arranged as to enable students not just to see clearly that information collection is an important learning function but also to indicate the sources of that information and ways of obtaining it.

iii) Oscillation

The third condition needed for elaborated learning to be generated should occur at the same time as, or immediately following, the other two. The curriculum should provide students with opportunities to relate the assimilative context and the specific information that has been made available, that is to 'oscillate'. In the conventional curriculum this probably does not occur naturally, and is only seen in Southampton's medical school at the end of Year Three when students revise. In problem-based learning it probably occurs throughout when students solve biomedical problems. However, as already noted, problem solving may not be ideal for elaborated learning, and oscillation is likely to occur through other means. This study does not provide evidence which supports problem-based learning as a curriculum model for ensuring oscillation, nor indeed as being the only alternative pattern likely to do so. However, it does seem that certain conditions are necessary for oscillation to occur: students must have available an appropriate assimilative context as well as related specific information. If these are not present oscillation is unlikely, though the mere juxtaposition of the two does not necessarily ensure that oscillation will occur. Not all students in Southampton achieved elaborated learning whilst revising at the end of Year Three, and it is quite likely that in a problem-based curriculum not all students there do so either.

It seems, then, that the means for encouraging oscillation need further consideration. Problem solving may be one of these, but, as argued in Chapter 12, not necessarily in small groups. The important principle is that each of the students should oscillate for themselves, relating general experiences and specific information, since it is their own cognitive structures that need to develop in an elaborated manner. Oscillation might occur also through writing notes of the cases being studied, emphasising the theoretical underpinnings, and in case presentation. In addition, project work could promote oscillation. So, too, might examinations, which provide valuable and unique opportunities for students to 'bring things together', though their nature and timing still need careful consideration. In addition, devices such as patient management problems (Harden, 1983) would seem valuable, and use might be made of microcomputers (Clayden, 1985) to facilitate oscillation.

Another important principle to emerge from this study is that oscillation needs to be a continuous feature of the curriculum. It is insufficient merely for it to occur late in the educational programme as it does towards the end of Year Three in Southampton. Rather, students need to build up their cognitive structure in an elaborated way from the start, as probably they do in problem-based learning.

It is likely that oscillation will not occur automatically, though it might be facilitated by having available the necessary prior conditions and appropriate opportunities. Quite probably a curriculum needs to promote this in some active way, and again some form of induction programme for students may be useful, possibly similar to those in McMaster and Maastricht.

Important, too, is the role of the teacher as facilitator and mediator of learning, and this might also represent something of a change from current practice. Staff may need to develop skills of counselling and advising, to help students to relate together both the information they are acquiring and the experiences they are receiving. Clearly, some teachers may do this already. For example, teaching rounds, taking tutorials and marking essays might all involve teaching of this kind. However, contextual learning suggests a shift of emphasis away from lecturing,which many staff at present may see as their most important function. Staff working in a medical school with a curriculum based on contextual learning probably would need to see 'teaching' rather differently, and there might be a need for some kind of development programme to help them do this.

An evaluation of the contextual learning model

The curriculum model outlined above emphasises that the kind of learning needed for effective clinical practice is only established if it occurs by a process of oscillation within a relevant context - hence the name contextual learning, but how appropriate is it? Certainly, it draws some strength from the evidence of empirical studies, and also from the theoretical explanations currently being provided by psychological research.

The empirical evidence appears convincing if circumstantial. This study has noted that elaborated learning occurs only under certain curricular conditions, not just in a problem-based medical school but also at a particular point in the Southampton programme. It is the similarities between the curriculum features of these two quite different situations that suggest the model's form, and, for this reason, the model may be generalisable, possibly reflecting fundamental principles linking curriculum and learning.

Theoretical support for the model comes from two psychological sources which were discussed in Chapter 11. First, it reflects Mayer's notions of 'elaboration to schema' and 'far transfer' (1979a,b). Moreover, this is complemented by the work of Grotelueschen (1979) on prior concrete experiences facilitating subsequent theory learning. Secondly, it embodies Pask's notion (1976a) of versatile learning being generated by a 'conversation', and hence the concept here of oscillation.

The model represents, then, a synthesis of empirical and theoretical evidence. Indeed, it is based on a concept that is by no means new. More than sixty years ago, Whitehead (1922) argued that education generally needed to proceed through three phases: first a stage of romance not unlike the establishing of an assimilative context; then a stage of precision, similar to acquiring specific information; and finally a stage similar to the process of oscillation. Moreover, Whitehead suggested that these stages form a "cyclic process" and that education "should consist in a continual repetition of such cycles" (ibid.).

Interestingly, a very similar approach is seen in some recent developments in the school teaching of modern languages, mathematics and science, sometimes called discovery learning (Bruner, 1961), where the learning of unfamiliar material is facilitated by prior concrete, general and relevant experiences. It is interesting, too, and possibly highly significant for this study in questioning the effectiveness of problem-based learning, that discovery learning in schools has not been altogether and universally successful. Partly this has been because not all teachers have satisfactorily implemented the schemes but also because discovery alone may be insufficient: learners need to go beyond the information given (Bruner, 1966).

As well as seeing the contextual learning model embodied in a number of curriculum development projects in schools, it may also underpin some recent trends in professional education. For example in nursing, teacher education, and certain areas of engineering, some curricula arrangements provide students with a cycle of alternating practical and theoretical experiences. Naturally, one cannot be certain that this inevitably generates elaborated learning, and further research seems needed to find out whether these curricula embody the model's principles. Nevertheless, it is interesting that this approach is so common and widespread, which seems to suggest that some general principles may underlie it. There would appear to be value in seeing medical education as an example of professional education more widely, and by noting the extent of developments elsewhere.

Perhaps the closest parallel with the contextual learning model is the preparing of new entrants not just for medicine and other professions but for a wide range of trades and occupations through an apprenticeship, which it was noted in Chapter 5 was responsible for the transmission of medical practice from ancient times and through the Middle Ages, and which, at its best, seems to be a useful, possibly highly appropriate, educational approach (Ellis, 1963). In its simplest form, apprenticeship comprises a master and an apprentice: the latter experiences a full spectrum of practical work, whilst the former explains its theoretical basis. The task becomes central to the learning that occurs, and it, rather than the master, dictates what needs to be known. For example, the skill of the stone-mason extends far beyond mere manual dexterity, extending to an understanding of the occurrence of stone, its characteristics, properties and major features. Naturally, some professional people might deride such a means of education as being no more than technical training, yet the apprentice acquires an undoubtedly deep and rich knowledge, though quite probably this is not often declared. In a sense, the contextual learning model, is a stylised, regularised and formalised system of apprenticeship.

The contextual learning model, then, is based on concepts that are far from novel: its foundations can be seen in widely differing educational situations. However, hitherto it has never been proposed in this form as a basis for undergraduate medical curricula. Even though it can be seen operating, in part, in problem-based learning and in aspects of the Southampton programme, it was not employed as such in planning them. Perhaps now that the model has been articulated here it might make a number of contributions to medical education.

1. It could be used to explain the apparent successes and weaknesses of problem-based learning. Evidence presented in Chapter 6 suggested that a problem-based approach has received general approval but the educational and psychological reasons given - notably that students learn best through solving problems - remain unconvincing. If problem-based learning is successful, probably this is because students are learning in an elaborated manner, and this occurs because of certain features of the curriculum. The contextual learning model helps to understand this success. However, the problem-based arrangement is not entirely successful, particularly in its use of small groups for information collection and problem

solving. These aspects of the curriculum cannot be accounted for by the contextual learning model and could, on the basis of it, justifiably be abandoned whilst retaining those features which do fit the model.

2. Similarly, although the model does not appear to underpin the early years of the Southampton programme, it does account for the successes and failures of the curriculum arrangement. The early planners felt it important to treat the first three years as a single entity (Acheson, 1974), with students' clinical experiences in Year Three determining the nature of the content of the early courses, and by holding an examination of students' basic knowledge after rather than before students' clinical attachments. The contextual learning model not only vindicates but supports those decisions. The educational weaknesses of the early years are not, then, due to any inadequacy of the planners' decisions. Rather, they are due to the way the curriculum was implemented which did not reflect the planners' general principles. The contextual learning model now shows the psychological and educational strength of these principles. Had it been available at that time it might have provided a sounder basis for their implementation.

3. The model also accounts for good teaching practice in medical education. For example, a 'teaching round' may be educationally successful when it reflects the model, that is if it has an appropriate assimilative context (seeing a patient), relevant information (recalling underlying mechanisms) and opportunities for oscillation (arriving at a diagnosis and management). Similarly, some audio-visual and micro-computer teaching programmes may be effective if they feature the model's principles. If not, they may well be no more effective than conventional teaching or a textbook.

4. The model seems to support the recent recommendations of the General Medical Council. In 1957 they suggested that the pre-clinical/clinical division of the undergraduate medical

curriculum might contribute to many of medical education's problems, and in 1967 recommended the integration of courses as well as early contact with patients. However, they did not suggest how these aims might be achieved. The contextual learning model rationalises these recommendations. It emphasises that medical students learn best under certain conditions which are embodied in the model: conditions which seem to have been at the heart of the recommendations. In short, the model gives empirical and theoretical justification for some of the curricular changes which the GMC have been attempting to achieve.

5. The model might also prove useful in postgraduate medical education, yet, in a sense, it may not need to be applied there. If medical graduates have acquired a deep rich knowledge through their undergraduate learning, and if any theoretical teaching in postgraduate courses is related to doctors' clinical experiences, then a contextual learning approach might not be needed because the learners would already have acquired adequate assimilative contexts to incorporate new information. However, these assumptions are unlikely to be met at present in much postgraduate medical education. It is more likely that many recently qualified doctors will not possess the necessary deep rich basic knowledge on which to build because of the educational conditions under which they acquired it - the conventional curriculum. Nor may they see postgraduate teaching as requiring them to 'fit together' new information, probably only to 'fit it in', or worse, merely to collect it to pass some examination. For the present, then, postgraduate medical education might profit from adopting the contextual learning model for many of its programmes, basing its teaching on the learners' concrete experiences and by encouraging a 'bringing together'.

6. A medical curriculum based on the contextual learning model would be readily adaptable, capable of accommodating new knowledge, current research findings and even new subject

areas. Because the information-collection phase is directly related to the prior establishing of appropriate assimilative contexts, and because the sources of information can be maintained in an up-to-date form, then the information students acquire can keep abreast of current developments. In this respect the contextual learning model 'controls' a curriculum's content far more effectively than the conventional curriculum ever would, since it is based on common cases. Similarly, it could accommodate new health care practices as well as reflect any changes in the patterns of health and disease in the community. Moreover, by its general-to-specific nature, it is 'holistic' - the assimilative context provides a broader, more inclusive framework for learning than the conventional specific-to-general approach - and this is more likely than the traditional curriculum to create a depth and breadth of knowledge for treating patients as 'whole people'.

7. The model could be used to help students with learning difficulties. At present, whether they identify themselves as having problems or are found to be in trouble through, say, their examination results, students receive little guidance in how to learn. Use might be made of the inventory or some other purpose-designed questionnaire to detect students with inappropriate approaches to studying. Then, these students might be counselled by focusing their attention on the model's three phases, asking such questions as: does the student recognise and use the clinical illustration currently provided in the theory courses? Does the student merely collect information for later use? Does a student 'oscillate', fitting together specific information and its general context? In this way, students may come to see studying in such a way that they learn in an elaborated manner.

So far, this discussion has suggested that the contextual learning model might usefully be applied in medical and other health care educational fields, and it reflects, in this way, the major focus of the research which gave rise to it. It has been argued, too, that it might be of value in professional education more generally. However, it could also prove useful elsewhere in higher education, though this notion is highly speculative at this stage because the project has not provided evidence in support of it. By far the most common curriculum arrangement in higher education is the so-called single honours degree course with variants such as combined honours, modular components, unit courses, etc.. In the main, these courses do not appear to reflect the contextual learning model. On the contrary, they seem to be based on quite the reverse: students add further detailed knowledge to what they learnt in their previous education. How appropriate is this approach? Is medical education a special case of higher education, requiring its own unique curriculum arrangement which does not generalise to single honours courses? Would the contextual learning model be inappropriate elsewhere in higher education?

Most university degrees require some form of specified prior study and even pre-requisite entry qualifications. With some exceptions, such as courses in the social sciences and those for professional qualifications, most degree work requires the study of a subject which began at school. Pre-requisite knowledge is indeed likely to facilitate subsequent learning, but it may do so by the student 'fitting in' what is being learnt to what is already known. This form of learning has been described here as 'adequate', and it is arguably less effective than elaborated learning: pre-requisites might provide a basis for a 'deep' knowledge but not necessarily 'depth' and 'breadth'. Indeed, some students may 'succeed' in single honours courses, as do a number of medical students, largely because of their high level of prior knowledge. This might even mask educational inadequacies in the courses themselves. Some degree courses, then, may be too 'narrow'. Some science graduates may be less literate than they should, and some arts students not numerate enough. However, by adopting a contextual learning model in single honours courses, not only might breadth and depth be encouraged but courses might also be able to accommodate students from different backgrounds who otherwise might not have gained a place. As Bruner (1960) perhaps optimistically notes:

> ...any subject can be taught effectively in some intellectually honest form to any (one) at any stage of development.

This evaluation of the contextual learning model, then, shows it to have a number of similarities to other educational models and potential applications in a variety of educational settings, representing professional and non-professional courses both in tertiary education and elsewhere. Ultimately its value will depend upon its utility as a basis for planning new courses, as well as in accounting for and explaining the educational strengths and weaknesses of existing ones. The model has its attractions, but what are its limitations?

One limitation may be an intrinsic one: it has emerged through a study of a somewhat specialised form of education, drawing largely on psychological theory in support of it. Clearly, when further empirical and theoretical evidence becomes available there may be a need to re-evaluate the contextual learning model, asking such questions as: are there special circumstances in the present study which have led to the proposal of an inappropriate model? Is medical education uniquely distinct from other forms of teaching and learning? Is the model only appropriate to undergraduate medical courses, or to aspects of them, or to certain settings?

A more practical limitation of the model is in the likelihood of it being used. Will it be accepted and adopted? If adopted, would it be satisfactorily implemented? These are important questions, and the remainder of this chapter will be devoted to seeking some answers.

There are some indications that changes to the current pattern of medical education may be unavoidable. Arguably, there is now in the United Kingdom something of an oversupply of doctors, possibly resulting from an over-optimistic expansion of medical school places in the 1960s but also due to *recent changes in the financial provision for health care.* Some qualified doctors now find difficulty in obtaining certain posts, and there is intense competition for the more attractive and lucrative specialties. In addition, society itself has begun to demand more involvement in health care provision, arguing that not only doctors but patients too should control medical practice (Kennedy, 1981; Wright & Treacher, 1982; Faulder, 1985). One immediate consequence of these pressures may be for medical students to demand greater relevance in their undergraduate courses. A more indirect effect might be that school leavers begin to question the attractiveness of medicine as a career. At present medicine is a popular choice and there is a considerable excess of applicants for the number of medical student places available. However, if the attractions become less obvious, so demand may be lessened. It is under just such conditions elsewhere in the tertiary sector of education that curriculum change has occurred (Becher & Kogan, 1980).

In addition, there has been considerable pressure for educational change from medicine's professional body, the General Medical Council. In their most recent recommendations (1980) the Council continue to exhort medical schools to experiment with their curriculum and to innovate. Elsewhere in the world, too, innovative medical curricula such as problem-based learning have attracted considerable attention (ASME, 1983). Indeed, the World Health Organisation now see a need for developing what are called 'community based' educational programmes (Katz & Fülöp, 1978; Fülöp, 1983; Guilbert, 1984) in which the health care needs of the society for which the students are being trained would determine the content of courses. All of these initiatives seem consistent with the notion of contextual learning being proposed here. Indeed, the model rationalises these alternatives and suggests a common basis for them.

Implementing the model

Whilst the contextual learning model appears to have certain attractions, educationists should not believe that even apparently appropriate schemes will automatically be adopted (Weiss, 1984), but it also seems insufficient merely to propose a scheme and to leave its implementation to others. As Entwistle and Wilson (1977) have noted:

> In educational research it is safer to... conclude with suggestions for further research. In this way controversial areas of policy are avoided. But if research is to be useful, possible implications for action must be pointed out by those closest to the data, even though their value judgements may intrude.

What, then, might be some of the implications of adopting the contextual learning model?

The recent history of curriculum development suggests that implementing innovation is highly problematic. In schools, for example, attractive schemes have not been taken up by teachers (Becher & Maclure, 1978), or have been adopted without being fully implemented once the implications of doing so have become clearer (Gross et al., 1971). More often curricula just drift (Hoyle, 1969, 1970). In higher education, too, innovations seem less the result of "careful deliberations of committees" or of a "systematically-researched need" (Becher et al., 1975) but have arisen through the initiative of individuals or the efforts of a group of enthusiasts, often resulting from a visit, a conference or a chance meeting (ibid.). Indeed, in medical education deliberate change has, on occasion, met with considerable resistance, as in Case Western Reserve Medical School (Williams, 1980). It is perhaps significant to note that innovations such as Southampton's curriculum and problem-based learning have occurred at newly established medical schools, and not through the development of existing ones. All of this seems to present a somewhat dismal picture for educational development, but there are some indications as to what characterises successful development. For example, following an extensive review of higher education, particularly in the United Kingdom (Kogan & Kogan, 1983), and drawing upon the experience of the Nuffield Group for Research into Higher

Education (Becher et al., 1975, 1976), it has been argued (Becher & Kogan, 1980) that:

> Innovations which manage...to challenge certain accepted ideas while reinforcing others have a fair chance of success, provided...also...that their merits are reasonably visible and that they do not appear seriously to undermine the existing patterns of freedom and control.

In looking at how the contextual learning model meets these criteria it might be appropriate first to see in what ways it challenges some ideas whilst reinforcing others. Fundamentally the model criticises the 'basic theory first' approach of not just the conventional curriculum but also the early years of Southampton's programme: information taught in a setting where its likely applications are not made abundantly clear will be learnt in a way that often renders it irretrievable in circumstances for which it is needed. This finding seriously questions the very structure of most curricula in undergraduate medical education. However, the contextual learning model does not suggest that the pre-clinical arrangement should be abandoned altogether nor replaced by 'an inverted curriculum' (Barrows & Tamblyn, 1980) but that a different kind of 'basis' is needed, one which is cognitively and motivationally relevant. Thus, important aspects of the conventional curriculum can be retained within the spirit of the contextual learning model. Indeed, as already noted, its theory content is likely to reflect what is already taught. Moreover, rather than the model denying the importance of pre-clinical knowledge, it emphasises its crucial role in subsequent clinical practice, suggesting that students need to establish a clear and retrievable theoretical knowledge.

By emphasising the importance of establishing an appropriate assimilative context, however, the model could seem threatening to pre-clinical teachers, whose understanding of the applications of the information they teach might be rather limited. However, the model also suggests that appropriate contexts would be determined by an analysis of current and common health care needs, probably with clinicians advising pre-clinicians which cases and situations to employ.

In addition, the model supports the important function of clinical attachments as being a time in which students begin to *consolidate and apply the knowledge gained during the* pre-clinical phase. As this study has shown, this may represent something of a shift of emphasis for many students from seeing attachments as a time for beginning to learn about clinical medicine. Probably, too, clinical staff's views will need to change, and they may feel inadequate in their own pre-clinical knowledge. However, the model suggests that students could work largely alone or with other students, relying on staff for providing the clinical illustration and for guidance in their clinical thinking.

In *their second set of criteria, Becher and Kogan suggest a* need for any novel scheme to have visible merits and not seriously to question existing patterns of freedom and control.

The potential merits of the contextual learning model seem clear from the present study and from research elsewhere in terms of its effects on student learning. More evidence might be obtained, possibly through further comparative studies, as suggested in Chapter 11, and through visits to, or exchanges between, staff of medical schools with different curricula. It is possible that through a greater knowledge and understanding of the effectiveness of alternatives such as problem-based learning staff and students may come to recognise the attractions of the model.

Once the scheme has been adopted, its merits would quickly become apparent. The inventory survey showed huge differences between the approaches to studying of Southampton and problem-based students. It is highly likely that, by adopting a contextual learning model, students' entry approaches would be maintained, and this could be detected by using the inventory. Probably, too, the 'coming together' which so characterises elaborated learning would lead to a greater sense of intrinsic motivation. Monitoring would almost certainly show that students learning in this way would feel highly satisfied by their efforts. As studies elsewhere have shown, students are extremely motivated by a vertically integrated curriculum.

What, though, would be the merits of the scheme for staff? Clearly, this needs further investigation, perhaps by looking at possible changes in patterns of work as a result of adopting the model. Of particular interest would be any implications concerning the amount of time spent planning and running such an arrangement, especially if research output is affected. At present there is little evidence available. One recent study provides findings of an equivocal nature. At the Karolinska Medical Institute in Sweden, Biochemistry teaching has become problem-based (Mårtenson et al., 1985). Although students' subsequent recall is far greater than under the previous arrangement, the work-load on staff was found to have increased by 20%. Naturally, this might be because the scheme is new, and the load might decrease once the innovation becomes established. It might also represent the effects of running an innovative scheme in conjunction with conventional teaching. Clearly more research of this nature is needed.

Even less clear at present is the effect of such a change on the current patterns of freedom and control of the people involved and, before any development is seriously considered, further research is needed, not just in problem-based but also in conventional medical schools, to establish some sort of 'base line'. Given this lack of evidence one can only speculate here. The discussion earlier of the model's major features showed that control of curriculum content would no longer reside solely with individual teachers but be embodied in the assimilative contexts chosen to introduce any learning sequence. Some staff might not approve of this shift. Possibly the problem might be alleviated by as many as possible of the teachers being involved in deciding which cases to use. Similarly, the scheme would mean that students were no longer the somewhat passive recipients of information but active participants in the learning process. Whilst this may seem educationally worthwhile and even desirable, it is unlikely to occur unless the people concerned adopt new approaches. Clearly, more research is needed into the problems people have experienced in schools with these kinds of approaches.

Cost is another important aspect of freedom and control, not least because it may influence how staff view an innovation. Might such a scheme involve fewer staff, and possibly therefore redundancies? Answering such questions is always important, and no more so than when funding is being reduced, though it has been argued that innovation at a time of recession is by no means undesirable (Becher et al., 1976; Editorial, 1984). Again, little evidence on comparative costs is available. As noted in Chapter 6, some findings suggest that problem-based learning is, indeed, extremely cost-effective. The student/staff ratio in Maastricht (11.3 to 1) is the same as for other Dutch medical schools (and it is worth noting that United Kingdom medical schools are more favourably placed in this respect, with a ratio of about 9 to 1.) yet more students there qualify on time than at other Dutch schools, and the wastage rate is less (Stalenhoef, 1984). Problem-based learning seems to cost no more than a conventional arrangement, and it is likely that the contextual learning model will not be more expensive to fund.

To a certain extent, then, the Becher and Kogan criteria could be met, though more research is needed, but for the contextual learning to become adopted there remains a need for some kind of initiative to be taken: how might the scheme become implemented?

Within the past decade, educationists have come to realise that what Havelock (1970, 1971) called "research, development and diffusion" and Schon (1971) refers to as the "centre-periphery" model of innovation, are not altogether appropriate conceptions for deliberate curriculum change. Other considerations are needed. In particular, it was not found possible to develop an innovation away from where it was to be implemented. Thus, Macdonald and Walker (1976) describe the whole process of innovation as requiring "negotiation", and Hewton (1982) speaks of the need for "diplomacy". In short, it seems inevitable that imposed innovation is likely to fail. Rather, for an innovation to become adopted and accepted, considerably more attention than at present needs to be given to the people most likely to be involved with it - students and staff, including teachers, co-ordinators, planners and administrators - whose assumptions, attitudes, values and expectations are likely to be highly influential and must be taken into account.

Of course, the success of any innovation may, in part, also depend on the 'climate' in which it is being proposed. Quite probably, the time must be ripe for it, and this may dictate the nature of successful innovation. For example, Southampton's curriculum and problem-based learning emerged in the 1960s, which was a time not just of economic expansion but also of considerable devolution of responsiblity in education and elsewhere. Perhaps understandably, innovations that occurred then were 'bottom up' (Editorial, 1984), needing closely to involve the people concerned. Currently there is recession and a greater sense of central control in education (Kogan & Kogan, 1983). Could it be that 'top down' (Editorial, 1984) innovation, or imposed change, is more likely to succeed now than twenty years ago? Clearly the present study can go no further in answering this important question. Moreover, it may be academic to medical education, which, because its courses need to be accredited, must in part have a curriculum imposed on it. Nevertheless, as this study has shown, medical students' learning is influenced not just by the curriculum plans but, more particularly, their perceptions of what actually occurs. Quite probably, then, medical curricula are fashioned as a consequence of both 'top down' and 'bottom up' forces.

In the United Kingdom, by far the greatest outside influence on curricula in medical schools is through the General Medical Council which moderates and accredits courses. Although recent recommendations have encouraged innovation, nowhere do the GMC suggest how this might be accomplished. It is perhaps significant that there is no problem-based school in the United Kingdom, even though up to twenty are to be found worldwide. Indeed, in this respect there appears to be some equivocation by the General Medical Council. Whereas in 1957 they argued that the pre-clinical/clinical division was responsible for medical education's problems and should be abandoned, in 1980 the term 'pre-clinical' is reintroduced to describe the early years of the undergraduate programme.

The General Medical Council's educational committee might consider further not just the contextual learning model but other vertically integrated alternatives to the conventional curriculum arrangement. Since no new medical schools are likely to be established in the United Kingdom for the foreseeable future, and any change must therefore occur within existing ones, the General Medical Council might encourage development along the lines described here in one or two schools, giving them "experimental protection" (Becher et al., 1976) for an agreed time period, and the necessary financial support, but which schools might this involve?

Innovation might reasonably be encouraged in schools where the educational 'climate' seems favourable and where a scheme such as the contextual learning model can, at least in principle, be incorporated relatively easily into the existing curriculum structure. As an illustration, Southampton's medical school would seem ideally placed for this kind of development. The early planners saw a need to blur the traditional distinction between pre-clinical and clinical phases, to base the early science and social science teaching on what the students would experience subsequently in their clinical attachments, and they introduced Early Medical Contact as well as clinical illustration throughout, arranging much of the teaching into bodily systems rather than distinct disciplines, and holding an important examination of students' basic knowledge after, rather than before, exposure to much clinical medicine. The introduction of the contextual learning model into this curriculum would reinforce a number of its existing features. Probably, the model could be accommodated by first looking at the present content of courses, identifying whether or not health care topics might be introduced as assimilative contexts for what is already being taught, and by providing students with opportunities for 'oscillation' within the existing courses. This almost certainly would need a substantial reduction in the time currently devoted to the lecture programme, but the information otherwise 'taught' could be made available in other forms, drawing upon the current non-lecture teaching of Anatomy and Pathology.

At a national level, then, the General Medical Council might be in a position to initiate innovation in line with the contextual learning model, though perhaps not universally throughout the United Kingdom at first but more particularly in specified medical schools. However, as this study has shown quite clearly, this would not necessarily mean that even these schools would take up the notion nor, if they did, implement it fully. How might this be facilitated at the local level? Indeed, in what ways might people within schools come to adopt the model without (or in anticipation of) the General Medical Council taking a more global initiative?

Development might be encouraged within existing medical schools by using the contextual learning model not so much as a basis for planning a curriculum, at least not initially, but rather as an evaluation tool. As already suggested, the model's major features provide a set of criteria or explanatory frameworks (Stenhouse, 1975) for evaluating existing practice. Evaluation might begin by identifying those courses which most closely resemble the contextual learning model. Once a course has been identified its arrangement could be clarified and refined in line with the model. Then it might be described, reported and discussed, initially amongst the people most closely associated with it and then more widely within the medical school and possibly beyond. Following this, further courses, not necessarily embodying the model, might be observed and described, leading to discussions with the people responsible for them.

Such a 'bottom up' strategy for development might lead to the adoption of the model more widely within a medical school as a basis for its courses. Moreover, it is probable that the evaluation approach would be taken up because the kind of person responsible for adopting and using the model in this way would be what Hudson (1971) calls "a curious species of middleman": probably they would already hold posts in the medical school, yet be conversant with and sympathetic to educational ideas, possibly even being educationists employed by the school on a full-time or a consultancy basis specifically for the purpose of evaluation. Above all, such a person would not, and probably should not, be a 'change agent' in the sense of spear-heading overt development, but rather should act as a catalyst, an 'outsider' becoming an 'insider' (Coles, 1977b; Hewton, 1982), helping the people concerned to see more clearly for themselves the educational strengths and weaknesses of what they are doing at present and using the model as a basis for doing so.

Such an approach to curriculum development, then, is enquiry based (Cronbach, 1963; Stenhouse, 1975). It rests on initiating small-scale research projects within an institution, and involving closely with each project the people most concerned with, and involved in, the courses being evaluated. This differs markedly from development which imposes change, and may therefore have some chance of succeeding. Indeed, by first describing current practice in concrete terms, then finding ways of accounting for it theoretically and finally discussing alternatives, even curriculum research and development may reflect the three major features of the contextual learning model.

Summary

In this chapter a contextual learning model primarily for use in undergraduate medical education has been described. It has three phases: establishing an appropriate assimilative context, making available related information, and providing opportunities for oscillation.

The model was then evaluated in terms of its empirical and theoretical basis, and its similarity to other educational models was noted. This led to a consideration of its likely applications in medical, health care and other forms of professional education, and there was some speculation concerning its relevance for higher education generally.

Limitations of the model were noted, particularly focusing on problems associated with its adoption. Suggestions were made concerning the initiation of such developments at both the national and local levels. Finally, use of the model was recommended as a means for evaluating and developing a curriculum through an enquiry based approach initiated by an 'outsider' becoming and 'insider'.

Phase	Event	Type of experience	Time scale
One	Establishment of an appropriate assimilative context	General, inclusive, personal, vivid and concrete	Prior to phases two and three
Two	Presentation of specific information related to the assimilative context	Any form of presentation determined by the constraints of time and resource	Closely following phase one
Three	Oscillation between specific information and its general context	Students relate information and experience, Teachers act as facilitators/mediators	During, or immediately following phase two

Figure 13.1 The Contextual Learning Model of Medical Education: events, experiences and time scales

CHAPTER 14

A SUMMARY OF FINDINGS AND GENERAL CONCLUSIONS

Introduction

At the outset (Chapter 1), four questions were raised: (i) In what ways do medical students learn under different curricular conditions? (ii) How can we account for these differences? (iii) What do these findings say about the relationships between a curriculum and the learning it generates, particularly in medical education? (iv) Is it possible to derive out of this a model which might provide a basis for devising more appropriate curricula?

In this study a number of specific findings have been made. Whilst these have been noted at the close of each chapter it would seem useful to consolidate and summarise them here. Following this, certain general conclusions are presented which are less concerned with medical education but more with wider issues in education and psychology.

Summary of specific findings

1. The recent literature on learning was reviewed (Chapter 3). This indicated a preference now by psychologists for an information processing model, suggesting that what we learn is largely determined by how we learn it, and that the way in which we learn is highly dependent on the learning circumstances in which we find ourselves.

2. Research into higher education (Chapter 4) generally supports the psychological theories, also suggesting that the context of learning is important, possibly more so than certain prerequisites such as intelligence, learner's style or level of development.

3. The literature on medical education (Chapter 5) shows that doctors need a deep rich knowledge in order to think

effectively in clinical situations, and this seems to parallel recent psychological explanations of cognition.

4. It was noted (Chapter 5) that the conventional curriculum pattern, with its clear distinction between pre-clinical and clinical phases, seems in practice to be problematic, facing a number of dilemmas which it appears not yet to have resolved satisfactorily.

5. A number of alternative curriculum patterns were reviewed (Chapter 6), notably horizontally and vertically integrated arrangements. The latter appeared more successful, with the problem-based learning alternative being the most common and clearest example.

6. Southampton's curriculum was then described (Chapter 7). This attempts both horizontal and vertical integration, with a blurring not just of the traditional disciplinary boundaries but also the distinction between the pre-clinical and clinical years.

7. Early monitoring of this curriculum from a number of different sources (Chapter 7) suggested that the students' experience did not entirely match the expectations of the planners. However, the evidence from these studies seemed unconvincing, partly because it only presented data on students' opinions and not their approaches to study, but also because it failed to establish mediating mechanisms to account for the findings.

8. A purpose-designed study of the first three years of Southampton's undergraduate medical curriculum was undertaken using a three phase approach - interviews, followed by a questionnaire, then an inventory survey which also gathered comparative data from two additional medical schools, one conventional, the other problem-based. This methodology is consistent with current thinking (Chapter 2).

9. The interview findings (Chapter 8) indicated three kinds of learning which occur in medical education: restricted, adequate and elaborated.

10. The 'restricted' approach was seen in many students, particularly during the first two years or so of Southampton's curriculum. This was characterised by students 'lowering their sights' and focusing on the immediate demands being made of them. These students' motivation seemed severely questioned and some became increasingly cynical. Many did not perform well in assessments, and found that they quickly forgot much of what they were taught. Typically, they learnt through a process of memorising.

11. Students adopting an 'adequate' learning approach coped rather better than the restricted students, some gaining high examination grades, particularly in the first two years in Southampton. Learning in this way required a 'fitting in' of the information being taught, with students 'attaching' it to what they already knew. It was characterised by an attempt to understand and make sense of what was being learnt. However, even these students found difficulty in retrieving in a clinical setting much of what they had learnt during the early years.

12. A third approach, 'elaborated learning', seemed much more successful, but only occurred towards the end of Year Three whilst students revised for an important examination. These students 'fitted together' information, found their work enjoyable though pressurised, and realised that they could carry forward and use their knowledge when subsequently they found themselves working with patients.

13. On the basis of the interview survey, a questionnaire was devised, and its findings (Chapter 9) supported what students had said. In particular, it added strength to the notion of learning being 'things coming together' which was associated with subsequent success, not just in examinations

but also in remembering later on what had been learnt.

14. An inventory survey (Chapter 10) showed that Southampton students' approaches to studying on entry were apparently highly desirable, with high scores in motivation, meaning, and versatility, with low scores in reproducing and learning pathologies. However, by the end of Year One, students had adopted significantly poorer approaches to studying. These remained consistent for much of the first three years, though, towards the end of Year Three, there was some increase in motivation, comprehension learning and versatility, with a lowering of reproducing, supporting the notion that emerged in the interview study that elaborated learners experienced a 'qualitative shift' in their approach to studying.

15. A comparative inventory study (Chapter 10) provided information from two additional medical schools, one conventional, the other problem-based. Very similar results were found in all three schools concerning students' approaches to study on entry. Subsequently, the pattern in the conventional school mirrored that found in Southampton but students at the problem-based school retained during the first three years the approaches to studying they entered with.

16. In accounting for these findings, psychological explanations were employed (Chapter 11). Restricted learning was equated with a 'surface' approach, whilst it was argued that adequate learning is a 'deep' approach. Elaborated learning, however, reflects what Mayer describes as elaboration to schema (1979a).

17. Elaborated learning is by no means common in medical education. It occurs for some students at the end of Year Three in Southampton. However, it seems rare in a conventional school but is likely to be much more usual in problem-based learning.

18. Only elaborated learning seems to provide the deep rich

cognitive interconnections needed for effective clinical thinking, i.e. information learnt only in this way can be retrieved and used in settings that are unlike those in which the information was acquired. This kind of learning seems most likely to occur under a 'general-to-specific' form of sequencing. Students first need some kind of general assimilative context, then relevant specific information. However, it also seems that students need to relate specific information and its general context, or 'oscillate' between them. This reflects what Pask (1976a) calls "conversation learning".

19. The findings were discussed in curricular terms (Chapter 12). The three curricula which feature in this study were reviewed in turn to see under what conditions particular learning occurred. It was suggested that three features were involved: the way the curriculum was arranged, the perceptions students have of the demands being made of them, and whether or not the curriculum itself facilitated the kind of learning that seems needed.

20. It was argued (Chapter 12) that the conventional curriculum only created either restricted or adequate learning because large amounts of information were presented to students prior to and without making clear the context for which this information was needed ultimately. This inappropriate curricular arrangement was called the 'basic theory first' approach.

21. The basic theory first approach is at fault because it confuses two meanings of the term 'basic': while certain knowledge embodied in the sciences and social sciences might be considered basic to medicine in the sense that it underpins medical practice and is important for doctors to know, this knowledge cannot be acquired early on in a curriculum as a basis for subsequent clinical practice without certain other curricular conditions being met (Chapter 12).

22. A 'basic theory first' arrangement is seen in the first years of the Southampton undergraduate programme, but not at the end of Year Three when students revise for an important examination of theoretical knowledge. At that time students have had considerable clinical experience, and some students then learn in an elaborated manner because they are able to relate the theoretical information they are revising with the more general clinical experiences they have then had.

23. In a problem-based medical school it is quite likely that the conditions needed for elaborated learning are present from the outset: the problem provides an appropriate assimilative context, related information is then acquired by students, which is then linked to that context through problem solving which is a form of 'oscillation'.

24. Other features of the problem-based curriculum, such as exclusive use of small group methods and peer group assessment may not be educationally valuable, indeed they may be counter-productive.

25. Out of this discussion a contextual learning model was derived (Chapter 13), with three features reflecting the curricular circumstances pertaining when elaborated learning occurs both in Southampton and in the problem-based school: an assimilative context, relevant information and opportunities for oscillation.

26. This model appears to have considerable merit in its empirical and theoretical backing, gaining support too from its similarity to other apparently successful educational models (Chapter 13).

27. Contextual learning seems to have a number of applications in medical, health care and other forms of professional education (Chapter 13). It may be of value in higher education more generally, though this finding is speculative at the present time.

28. One limitation of the model is that further empirical and theoretical work may invalidate it (Chapter 13).

29. By far the most serious limitation of the model is the likelihood of it not being adopted. Prior conditions are discussed (Chapter 13) and a strategy for implemention described. Southampton's medical school seems ideal for further development using it.

30. Overall, the study shows that where students are expected to learn a large amount of novel, complex information from a variety of disciplines for subsequent retrieval and use under conditions that are quite different from those under which it is acquired (as seems the case in undergraduate medical education) then a general-to-specific form of curriculum sequence is needed, with students first being given appropriate assimilative contexts, then related information and opportunities for oscillating, so as to develop a deep rich knowledge reflecting multiple interconnections in their cognitive structure (Chapters 3, 5, 11, 12, 13).

31. *In medical education, elaborated learning is most likely* to be generated in a curriculum which is vertically integrated. A horizontally integrated curriculum that does not also have substantial vertical integration from the outset is no more likely to generate elaborated learning than a conventionally arranged curriculum (Chapters 5, 6, 11 and 12).

General Conclusions

This summary of findings relates chiefly to undergraduate medical education, which was the basis for the research. However, the study also suggests two further conclusions that may generalise more widely and possibly resolve some of the problems which education faces which limit the effectiveness of applying curriculum theory to curriculum practice. First it is suggested that the study confirms and clarifies certain notions *of curriculum and learning. The second looks at the current* status of curriculum research and development in the light of the study.

i) Curriculum and Learning

In general, the findings support the notion outlined in Chapter 2 that a curriculum is a complex phenomenon which comprises many events, activities, ideas and assumptions. In addition, the detailed observations of Southampton's curriculum and the added evidence from the comparative studies indicate that there is likely to be a difference between what a curriculum is intended to be and what actually takes place. Indeed, there appear to be areas of mismatch: one between the intentions of the planners and the curriculum's activities, the other between these two and the experiences of the students. A model which characterises the curriculum in this way is shown in Figure 14.1. This comprises three more or less overlapping circles. The first might be termed 'the curriculum on paper'. This is not just what is written about it in documents, prospectuses, committee minutes, course descriptions, examination papers, etc., but also what people say about it; why it is being run, its purposes, aims, goals, etc., including the intentions of the people involved. 'The curriculum on paper' might also include the materials being used in a course, textbooks, student work-sheets, lecture handouts, and audio-visual aids.

The second circle in the diagram might be called 'the curriculum in action' and seems in practice to differ from 'the curriculum on paper' - hence the lack of perfect overlap of the two circles. It consists of timetabled events, lectures, seminars, tutorials, practicals, visits, ward rounds, etc., but it also is indicated by the perceptions of the staff and why they are teaching in the way they do. 'The curriculum in action', then, is a representation of how the intentions, reflected in the first circle, appear in practice. Clearly, mismatches occur. Area (a) represents intentions which never become actions - perhaps because of too little time, not enough accommodation, a member of staff off sick, etc. Area (b) is those aspects of the course which appear in action, but which were never intended, such as the spontaneous anecdote in a lecture, or more seriously a misunderstanding by a teacher of the philosophy that lies behind a course. Area (c) represents those aspects of the course which were intended and which appear in action.

The third circle represents what might be called 'the curriculum students experience'. It is what students do, how they study, the tasks they see being set, the learning that occurs and its outcomes. Again there may be an incomplete overlap between this circle and the other two. Area (d) represents aspects of the course which students experience but which were never intended - for example if they were to come to see Biochemistry as being all about chemical pathways that need to be memorised. Area (e) represents untaught intentions which students nevertheless experience, perhaps through informal contact with a member of staff. This might be, for example, a clearer understanding of what Pharmacology is all about, or even what is coming up in the next examination. Area (f) represents intentions which have become actions and which are experienced - hopefully a larger area than represented here! Area (g) is enigmatic, yet crucial. It is those aspects of the course which were never intended and never became the course in action, yet it is part of the course students experience. This might be highly desirable - corporate learning, independence, integration. It might also be rather more sinister - knowing how to play the system, exam. question spotting, etc. It is the area sometimes referred to as the "hidden curriculum" (Snyder, 1971) and, as the present study suggests, is highly influential, an example being the 'preparing' by problem-based students and its deleterious, possibly counter-productive effects in an otherwise apparently successful curriculum.

Such a view of curriculum appears consistent with the present study and seems to extend current thinking: no longer does it seem appropriate to see a curriculum simply as a design or set of plans with desired outcomes (Johnson, 1967), but rather as a dynamic entity which fundamentally involves greater consideration than at present of the people working within it and the activities that occur. This view somewhat questions whether it is possible to say anything at all worthwhile about the 'curriculum on paper'. Its intentions may not become operationalised, indeed others, possibly less appropriate, may emerge in practice. Similarly, the 'curriculum in action' may not reflect what students actually do, and the 'curriculum students experience' may not greatly reflect the planners' intentions nor the curriculum's actions. In other words, to say that an institution has a particular curriculum may mean very little without also looking at what happens and the effects of this on what people do as a consequence. Probably it is more valuable to consider a curriculum to be the sum total of all the intended and unintended, planned and unplanned, overt and covert activities that occur within an organised educational context.

Turning, now, to the concept of learning, in Chapter 3 psychological theories were described which suggested that it could usefully be thought of as comprising the processing of information. However, educational evidence presented in Chapter 4 indicated that this might be an oversimplistic characterisation of a complex process. It was noted, for example, that, in theory, advance organisers deliberately introduced to facilitate learning should be effective but then, in practice, this was found not always to be the case. Advance organisers are only facilitative if the information to be learnt is abstract, complex and unfamiliar to the learner, and if the test of learning is its 'far transfer'. The present study supports this view and extends it further, suggesting that, certainly in medicine and possibly elsewhere in education, a special kind of learning, termed elaboration, is needed which entails developing a richly interconnected cognitive structure.

The ability to use and retrieve information in situations which are somewhat different from those in which it was acquired may, indeed, be commonplace in human cognition, possibly being the basis of higher order mental activities such as problem solving, and it seems likely that neither depth nor breadth alone are sufficient but that a deep and rich knowledge is needed. This seems to suggest a model of learning as shown in Figure 14.2, comprising two dimensions, increasing depth and increasing breadth, shown here for the purposes of the diagram as being orthogonally related. The four 'cells' indicate different kinds of learning. Restricted learning ('r') is characterised by a lack of breadth and a lack of depth. Breadth ('b') and depth ('d') indicate the positions of the furthest point of their respective dimensions, and either might characterise what has been called here adequate learning. Elaborated learning ('e'), however, is a point of extension of both the breadth and the depth dimensions.

This analysis of learning appears more closely to resemble that of Pask and of Entwistle than that of Ausubel and of Marton. Meaningful (deep) learning, alone, seems insufficient: the learner needs to be versatile, utilising both operation learning (depth) and comprehension learning (breadth). Learning occurs when the two (breadth and depth) are related through what Pask calls "conversational techniques" (1976a) but which is called here "oscillation". Entwistle (1981) emphasises the importance of interaction between the two types of information, suggesting that the sequencing of comprehension and operation learning is not relevant. The present study, however, indicates that, certainly in medical education, elaborated learning is likely to occur when specific information is acquired after an appropriate assimilative context - some relevant general experience - has been established and to which it may be related. For certain educational purposes, both the sequencing as well as the nature of the pedagogic situation may need to be considered.

All this suggests broad areas of agreement between educational and psychological research into learning. Both emphasise the importance of the context in which the learning takes place, one important aspect of which is what the learner already knows. They also point out that learning is an active rather than a passive process: what the learner actually does is likely to determine the effectiveness of what is learnt. Moreover, they show just how complex higher-order cognition is. Indeed, the relationship between approaches to studying, learning processes and learning outcomes is both dynamic and interactive, possibly only being predictable in particular and known learning circumstances.

Educationists seem content with an application of their relatively imprecise findings whilst psychologists seek universal principles of learning. There seems to be a need for more research of a collaborative nature in both areas, possibly focusing on how students learn in known, real-life settings, by transposing these findings to the laboratory and then applying them back in educational situations. In this way, cognitive psychologists may gain greater insight into theoretical processes, and educationists may be able to apply the findings to the benefit of both students and teachers.

These, then, are the two concepts central to this study, but what are the links between them? It has been shown here that certain curriculum arrangements generate particular kinds of learning, generally in predictable ways. Earlier, it was suggested that there is a 'chain of causality' between curriculum and learning (Entwistle & Ramsden, 1983). In part this study supports that notion and extends it further by indicating that the links in that chain are at least as shown in Figure 14.3. The curriculum on paper - the planners' intentions - influences the curriculum in action - what actually occurs - which forms a basis for the curriculum students learn. This, then, influences students' perceptions of the task they see being demanded of them, which determines learning processes, and, as a consequence, learning outcomes. However, from the evidence of the present study and more particularly from the discussion and general conclusions, this 'chain of causality' notion seems an oversimplification of a complex phenomenon. Merely because there is a set of curriculum plans does not ensure that appropriate activities will occur, nor that students' experiences will reflect either the activities or the intentions. Indeed, students' perceptions of the demands being made of them may be influenced more by factors outside the immediate educational setting, possibly reflecting their own learning approaches and even prior learning outcomes. Learning is a response by learners, possibly unconsciously, to the settings in which they find themselves.

Thus, the relationship between on the one hand 'curriculum intentions' and on the other 'learning outcomes' is a complex one that is difficult to characterise. For this reason, in Diagram 14.3 the links themselves have been shown as dotted lines. Probably, though, the diagram should be in the form of a network or web. Thus, each aspect would need to be linked in some way with each other part, though to do so in a diagram would make it so complex as to be virtually worthless.

It seems reasonable, then, to conclude on the basis of this study that there is a clear relationship between a curriculum and the learning it generates, and that the link between the two can be identified in known contexts, but that this forms 'a consequential network' rather than a 'chain of causality', where the nature of the links and the direction of their influence cannot be determined in advance of observing what occurs within any particular setting. Clearly, more research is needed, possibly looking at learning within particular curricula with this notion in mind.

ii) Curriculum research and development

Although the project appears to have occurred in three relatively distinct, though closely interrelated phases (interviews, a questionnaire and an inventory survey) it was by no means intended at the outset that it would take this course. Its progress 'unfolded', further enquiries being undertaken on the basis of the results obtained. At the start of such a project the researcher may be in no position to predict the direction it takes. Any methodology which ties the curriculum researcher to a particular course of action would seem to be suspect. Rather, it should be flexible, responsive, and adaptable.

The study began 'broad' with an interview survey, and then narrowed its focus. As argued in Chapter 2, this was deliberate, largely because it was felt that it might provide access to important issues which would not otherwise have been identified. This seems to have been the case. For example, the *'qualitative learning shift', seen to be occurring at the* end of Year Three and which forms a pivotal point in the argument, is unlikely to have been identified by any other methodology than an interview survey. The questionnaire was only able to confirm its occurrence and then to ask questions about it, but only because the interviews had first identified its existence. A project such as this first needs to identify issues before pursuing them in depth, and probably this is best achieved by carrying out an interview survey initially.

The style of the research, then, was to move from collecting qualitative data to a more quantitative approach. This, to some extent, limits the influence of researcher bias on the results: data from quantitative approaches probably are less open to bias than qualitative ones. Naturally this may not entirely eliminate the effects of bias, but the reverse - carrying out the interviews <u>after</u> the inventory survey and with a knowledge of the results - might more justifiably have attracted such a criticism. A project such as this needs to proceed from a qualitative to a quantitative approach to avoid a knowledge of the results unduly affecting subsequent data collection.

So the project utilised both qualitative and quantitative methods. Whilst it is tempting to believe that the latter provide more exact and precise data than the former, it would be quite wrong to suggest that the questionnaire or inventory findings confirm, let alone 'prove' the interview data, merely because they are quantitative. Rather, one set of data supports (or questions) another. In a project such as this the utility of all the data is the same, though their validity still needs to be established. Indeed, qualitative and quantitative approaches carry their own strengths and weaknesses: an interview is admittedly to some extent impressionistic but it takes a broad view and can identify issues, whilst an inventory takes a rather narrow view but can be used very widely, for example in a comparative study. Researchers need to be aware of the particular contribution of different methodologies, and adopt those that appear most useful in particular circumstances.

In this respect, the research presented here is not unlike the approach adopted by a clinician when attempting to understand a patient's condition. In Chapter 2, the present approach was termed a 'clinical method'. What seems to be important for clinical and educational researchers is that in order to carry out both qualitative and quantitative research they need to acquire particular expertise. For example, interviews require certain inter-personal skills whilst questionnaires and inventories often need to employ computation and statistics. This range may be difficult to find in a single researcher (or even clinician). It has been suggested that qualitative and quantitative research methods are philosophically different and may pull the researcher in quite opposite directions (Entwistle & Ramsden, 1983). Both the clinician and the educational researcher need a range of expertise or they must have access to others with specialist skills. Collaboration seems essential.

The study also suggests that a valuable way of observing the effectiveness of a curriculum is by researching students' approaches to studying. Indeed, it even provides a basis for evaluation: the contextual learning model gives a set of criteria for judging a curriculum's worth. It does so by clarifying the relationship between a curriculum and the learning: curricular experiences are perceived by the student, who adopts ways of studying which affect the kind of learning that occurs, hence particular cognitive processes and certain learning outcomes. Thus, 'approaches to studying' hold, as it were, the middle ground. In this respect, observations of students' approaches to studying are not unlike the taking of a blood sample by a clinician. Both are, in a sense, 'proxy' ways of understanding deeper underlying and not immediately observable internal functioning. Using a blood sample, clinicians have a clearer understanding of the body's biochemical condition. Then, from an understanding of bodily functioning together with a knowledge of normal patterns, a doctor is in a position to say whether any particular result indicates a pathological state.

The same may well be true of a student's approaches to studying: by seeing how a student studies in certain circumstances and by knowing the mechanisms involved, the educational researcher will be in a position to say what kinds of learning outcomes are likely and which curricular experiences may be influential. Indeed, on this basis, support and guidance can be given to both the student and the curriculum planner.

However, just as with clinical findings, data from one observation of a student's approach to studying may need to be interpreted with caution. A blood sample taken from a patient just after a heavy meal may indicate a high level of blood sugar, but this does not suggest to the clinician that the patient is inevitably diabetic. Instead, both he and the educational researcher need to see any information in its broader context, taking into account other similar information as well as evidence from other sources to support the initial observations.

In Chapter 1 it was noted that such an approach has led to considerable advances in health care in recent decades, probably for two reasons. First, the research has been methodologically eclectic, obtaining evidence from a variety of different, though appropriate sources, some quantitative others qualitative. Second, through this research medical scientists have gained a greater understanding of the underlying mechanisms, and can now be predictive. Probably any organised research effort shows progress through generalising, allowing interpretation of the data largely through an ability to account for them in theoretical terms. Educational research may have had a limited impact on curriculum planning so far because it lacked suitable and convincing theoretical explanations. It is hoped that the contextual learning model described in this study may, in part, bridge that gap, at least for medical education.

At the end of Chapter 13 the discussion turned to the development of a curriculum, and it was acknowledged that this raises other considerations concerning the adoption and implementation of any proposals. It was argued that the findings seem rational and the model is based on sound empirical and theoretical observations. However, development of any curriculum on the basis of the model would not be automatic nor could it be ensured.

It was suggested that an enquiry based approach might be of value. This notion gains some support from recent thinking about curriculum innovation (Macdonald & Walker, 1976; Becher & Kogan, 1980; Hewton, 1982), acknowledging that curriculum development in general and innovation in particular reflects a complex web of interaction (Waring, 1979) which fundamentally concerns the people involved and especially their assumptions, attitudes, values and expectations.

Such an approach at first seems not to parallel the clinical method nor the pharmacological model of research, both of which are essentially interventionist. Yet, paradoxically, even though doctors may be able to diagnose a patient's problem, and prescribe some drug therapy, in reality their efforts are sometimes thwarted. Patients must first see themselves as being ill, and even then the cure is not ensured merely because a drug is prescribed. Whether or not patients comply with a particular régime of treatment may depend on their perceptions, beliefs and even values (Helman, 1984). Indeed, if the clinical management requires patients to change their habits and lifestyle there may be even greater limits to a doctor's effectiveness.

A curriculum, too, is complex and dynamic. What occurs is an amalgam of people's views, and development of it is unlikely to succeed if it is 'interventionist'. Educationists and their research findings are constrained by their surroundings. Perhaps education and health care are not so dissimilar, and the parallels between the two would seem worth exploring further.

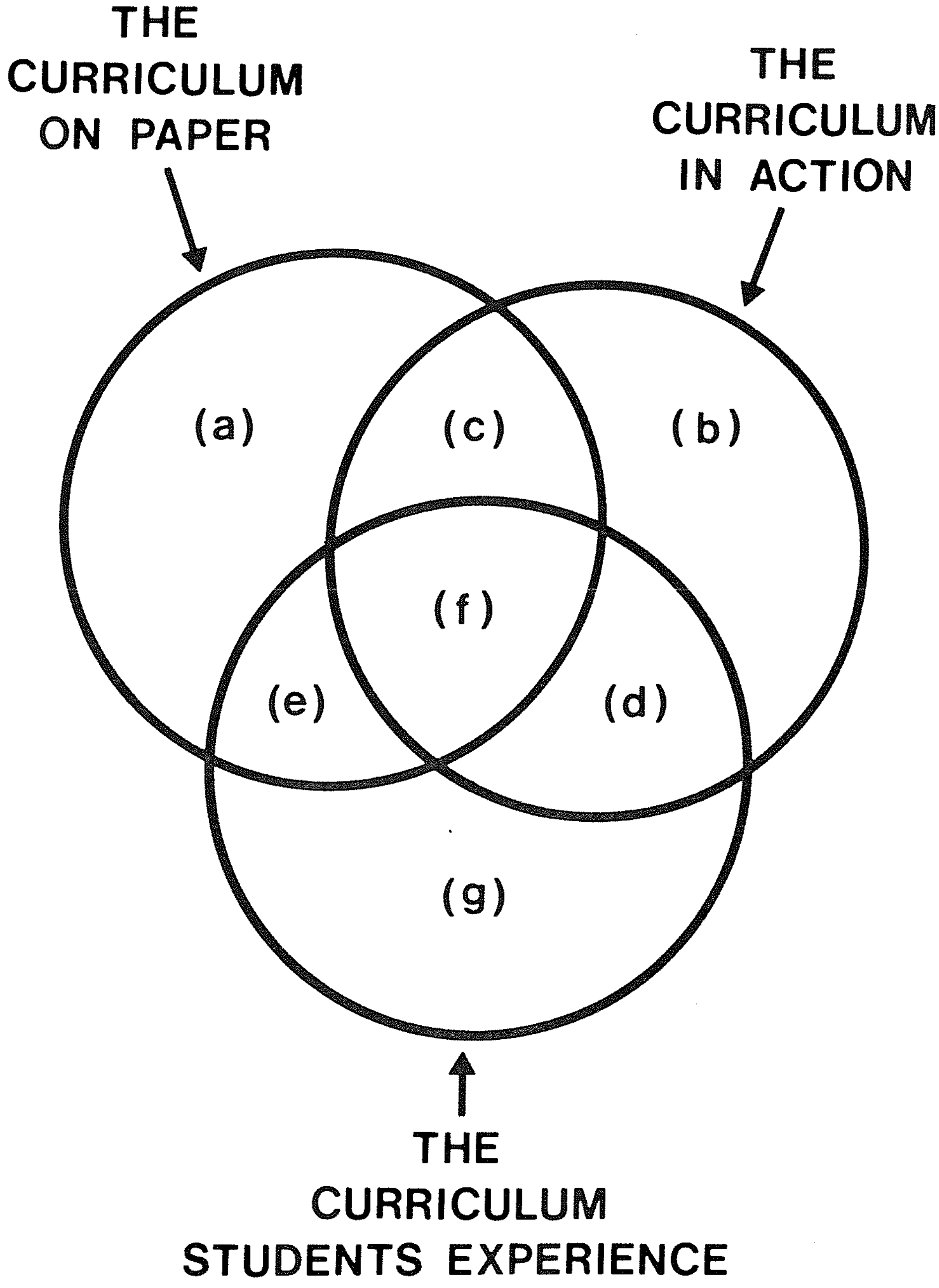
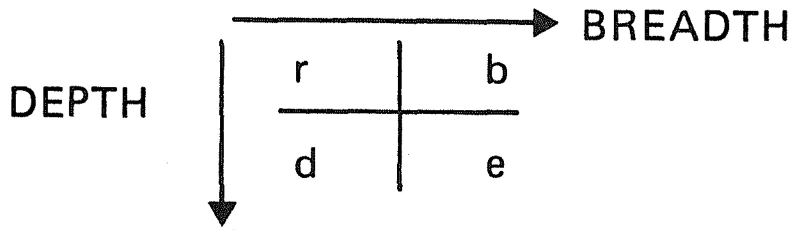


Figure 14·1 A Descriptive Curriculum Model



<u>Key</u>

r = restricted learning
d = deep learning } adequate
b = broad learning } learning
e = elaborated learning

Figure 14.2 Medical Student Learning

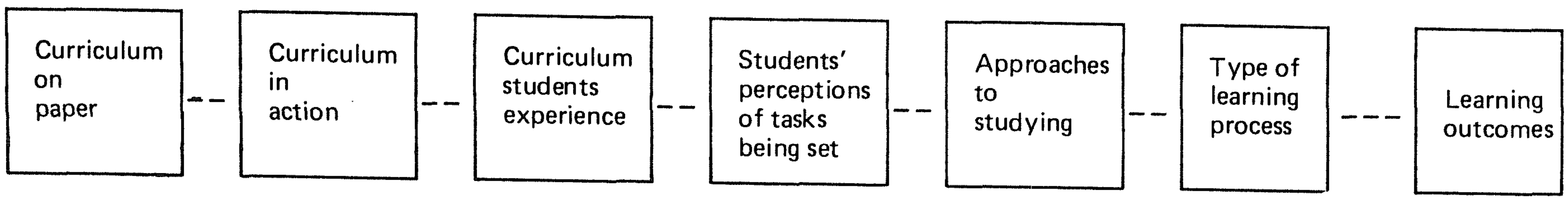


Figure 14.3 Chain of causality/consequential network from curriculum to learning

A P P E N D I C E S

APPENDIX 1

PARADIGM SHIFTS IN EDUCATIONAL AND CURRICULAR RESEARCH

Introduction

In Chapter 2 of this report arguments are presented for the methodological approach being adopted here. Central to this is the need for a 'mixed' approach. Partly this is the result of a dramatic shift in methodological paradigm (Kuhn, 1970) for educational and curricular research during the 1960's and early 1970's which saw a change from predominantly psychometric to essentially anthropological methods. This appendix briefly summarises what are believed here to be the major landmarks and is included as an elaboration to the arguments in Chapter 2 which, to a certain extent, draw on the evidence now presented.

The emergence of scientific enquiry

Perhaps the most significant contribution to the advance of knowledge came with the emergence of scientific thinking. Whereas the ancient Egyptians and early Greeks were inveterate observers, recorders and collectors of information, it was not until the time of Plato, about 500 years BC, that natural occurrences were studied in any rational way. Prior to that, science was not so much a way of understanding the world but one of applying what one knew to everyday situations (Farrington, 1961). The Greek word techne was used to describe what we now call technology. Plato, however, believed that science was a way of thinking. It was a rational thought process that could legitimately be carried out as an intellectual pursuit. Indeed he saw society itself divided into those who might engage in science and those who would need to support them - masters and slaves. And science, for Plato was a reflection of social division. Given this freedom, Greek science flourished (ibid.), yet it remained limited not so much by technological advance nor by wealth nor by communication systems but rather by philosophical beliefs. Perhaps the best recognised example concerns astronomy. Early man had observed the heavens, incorporating apparent movement of stars and planets into mythology. The ancient Egyptians recorded these observations yet saw no need to establish explanatory models. The Greeks, however, largely using the Egyptian's recorded sightings, constructed theoretical, mathematical and even mechanical explanations of what was observed. However, generally these models were geocentric and this suited Greek philosophical and religious beliefs. Indeed it was not until much later, at the time of Gallileo, that such models were seriously challenged and, even then, not without serious misgivings.

Following the Dark Ages, scientific impetus was re-established which in the West was particularly influenced by rational positivism, reductionism and the need for systematic experimentation. Simply described, experimental science comprises the observation of two similar situations, one of which becomes the subject of some particular manipulation whilst the other acts as a control. Any subsequent differences may then be said to be due to the influence of that manipulation. Such a model for data collection is capable of being elaborated but essentially it remains unaltered to the present day. Fundamental to it are a number of requirements. First, the two groups of objects being studied need to be closely matched. Second, before collecting data begins, any variables liable to exert some influence over the outcome need to have been identified and controlled, save those that may vary in response to the manipulation. Particularly important is any possible influence the researcher may have over the outcomes of the research. Third, large numbers of observations may need to be used to eliminate error and variability. Fourth, the most accurate means available of observing and recording need to be employed and fifth the methods of data analysis need to be declared.

On this basis experimental science expanded, establishing a reputation as being objective and valid: the observations recorded were a true representation of the phenomena being observed, or so it was believed. Certainly it is true that the past 200 years have seen a dramatic increase in both scientific effort and knowledge together with remarkable technological achievements, not least in medicine.

Until the 1960's, this experimental tradition had been the major methodological influence on educational research:

> Students - rather like plant crops - are given pre-tests (seedlings are weighed or measured) and then submitted to different experiences (treatment conditions). Subsequently, after a period of time, their attainment, growth or yield is measured to indicate the relative efficiency of the methods (fertilisers) used. (Parlett & Hamilton, 1972.)

Partly this was because the spectacular advances and the attendant prestige occurring within scientific disciplines was coveted by educationists but partly it was in order to minimise the influence of the researcher on the research itself. Not least influential, too, was the assumption that education was concerned with learning outcomes:

> Evaluation is essentially the process of determining to what extent the educational objectives are actually being realised by the programme of curriculum and instruction ...Educational objectives are essentially changes in human beings...and evaluation is the process for determining the degree to which these changes in behaviour are actually taking place. (Tyler, 1949)

> Evaluation is concerned with securing evidence on the attainment of specific objectives of instruction. (Bloom, 1970)

However, doubt came to be expressed about the appropriateness of the experimental approach. It became felt that it had provided "a long and sterile tradition" (Becher & Kogan, 1980). This shift partly reflects the difficulties faced when undertaking experimental studies within an educational setting:

> ...particularly if we are dealing with classrooms...perhaps reality cannot be brought to conform to this specification, except in exceptionally favourable circumstances. (Stenhouse, 1975)

But partly it was due to believing that experimentation was not necessarily appropriate within an educational setting:

> In part the difficulties stem from the enormous complexity of the interaction *between teaching methods and learning*... different students being affected in different ways at different times in their academic careers by the courses and teaching, and other variables which may

> influence their studying. Much research has been carried out into teaching and learning activities in an attempt to compare the relative effectiveness of teaching methods...The most common finding is one of no significant difference...The content and context of learning have been neglected. (Ramsden, 1980)

Partly, too, the shift away from experimentation came because researchers felt it trivialised important issues which it could not examine - the accurate measurement of the barely relevant as opposed to the less accurate measurement of the most highly relevant (Simpson, 1976). One observer of classroom practice noted:

> Objective test results...were found to provide neither an unambiguous nor comprehensive result. Rather, they tended to direct attention away from the more dynamic and idiosyncratic aspects of the programme towards those aspects which were more easily measured. (Hamilton, 1976a)

But the experimental approach when applied to education also came to be criticised because it failed to emphasise the role of mechanisms in explaining outcomes:

> A definition of evaluation based solely on measuring the achievement of pre-specified objectives is unlikely to give us evidence about a wide enough range of factors for us to see <u>why</u> something is happening - though <u>this</u> is usually what we wish to know. (Cooper, 1976)

Thus edcuational researchers shifted away from the experimental tradition largely because they saw education as being different in certain crucial respects from phenomena in the physical world.

> Almost all evaluation studies have resided within this traditional paradigm. More recently, a small number of empirical studies have been conceived outside the agricultural/botany framework, and relate instead to social anthropology, psychiatry and participant observation research in sociology. Such research can be thought of as representing a second and contrasting paradigm with a fundamentally different research style and methodology and from that of main-stream educational research. (Parlett & Hamilton, 1972)

Curriculum investigation, then, adopted a sociological or naturalistic (Guba & Lincoln, 1981) approach. One of the studies which contributed towards this shift was carried out in a North American medical school:

> In one sense, our study had no design. That is, we had no well-worked-out set of

> hypotheses to be tested, no data-gathering instruments purposely designed to secure information relevant to these hypotheses, no set of analytic procedures specified in advance. In so far as the term *design* implies these features of elaborate prior planning, our study had none. (Becker, et al., 1961)

This emerging tradition of educational research became known as illuminative evaluation:

> It takes account of the wider context in which educational innovations function. Its primary concern is with description and interpretation rather than measurement and prediction. It aims...to study the innovatory project: how it operates; how it is influenced by the various...situations in which it is applied; what those directly concerned regard as its advantages and disadvantages; and how students' intellectual tasks and academic experience are most affected. It aims to discover and document what it is like to be participating in the scheme, whether as teacher or pupil; and, in addition, to discern and discuss the innovation's most significant features, recurring concomitants and critical processes. (Parlett & Hamilton, 1972)

But such an approach does not merely adopt a sociological methodology. Indeed, Parlett and Hamilton suggest that illuminative evaluation needs to be "both adaptable and eclectic" such that "the choice of research tactics follow not from research doctrine, but from decisions in each case as to the best available techniques: the problem defines the methods used, not vice versa" (ibid.). In much the same way Stake refers to the notion of "responsive evaluation" which:

> ...orients more directly to programme activities than to programme intents... responds to audience requirements for information, and the different value perspectives present are referred to in reporting the success of the programme. (Stake, 1974)

Illuminative evaluation begins with a familiarisation with the educational situation being studied. Its approach fundamentally differs from experimental science and the resultant data are different too:

> ...the outcome of learning is commonly described in quantitative terms...(but) we have found distinctive qualitative differences...a description of what students learn is preferable to the description of how much they learn. (Marton & Säljö, 1976a)

Thus by the mid-1970's a general and marked shift occurred in educational research towards observational and descriptive approaches: collecting qualitative rather than quantitative data. It was:

> ...a trend away from the examination of predetermined issues often undertaken in an inflexible way, to a more open approach sensitive to the emergence of unexpected outcomes. (Fleetwood-Walker et al., 1983)

However, not all educationists welcomed the change:

> Although I am entirely sympathetic to the criticism of the old style, product testing evaluation with which the new wave evaluators start, I have some reserves about their position as it emerges. (Stenhouse, 1975)

This view is echoed by others who recognise dangers in the new approach:

> By adopting a stance of cultural pluralism and recognising the validity of different groupings and viewpoints, evaluation...moved into new territory. It relinquished the security of objective, universally agreed criteria and struck out into poorly chartered waters...infested with shoals of conflicting values and beliefs. (Hamilton, 1976a)

Thus, illuminative evaluation faced a dilemma. Although its proponents argued in favour of "seeking general principles... spotting patterns of cause and effect...and placing individual findings within a broader explanatory context" (Parlett & Hamilton, 1972), in practice descriptive studies often failed to go much beyond their own findings: the people adopting the approach rarely attempt to generalise to a wider context. Indeed, as argued in Chapter 2, now there is something of a shift back to a more quantitative style of curriculum research, but with illumination in mind. It is this mixed methodology approach that is being adopted in the present study.

APPENDIX 2

A BRIEF HISTORY OF THE DEVELOPMENT OF SOUTHAMPTON'S UNDERGRADUATE MEDICAL CURRICULUM (1967 - 1971)

Introduction

The working party which submitted a proposal to the Royal Commission (Report, 1968) also devised a curriculum proposal comprising:

> A basic medical science course leading to a Part I at the end of the third year. This course would study particularly aspects of Cell Biology, Physiology, Biochemistry...a one year course in Anatomy, and a course of Pathology. In addition, students could select alternative courses covering Psychology, Sociology, Genetics, Microbiology, Medical Law, etc., as supporting ancillary subjects. Clinical examples would be integrated in the teaching from the earliest possible stage. (University of Southampton, 1967)

Discussions were held with the GMC and a symposium arranged in Southampton in April 1967 to which were invited outside discussants as well as the curriculum consultants who had advised the Working Party. Folowing this, the Working Party produced a document entitled Proposed Undergraduate Curriculum for the University of Southampton Medical School (ibid.). This gave "the broad outline of the undergraduate curriculum" and noted that "changes in detail and emphasis, particularly on the clinical side, may be made after the appointment of the Dean and after senior staff" (ibid.). For the purposes of the present study it is not proposed to examine this document in great detail - rather to note its contents and make general comments. For example, the proposal recommended that the first two years should be 'pre-clinical' but with "clinical illustrations and topic-type teaching being introduced where helpful throughout these years, as well as during the remainder of the course" (ibid.). Thus, whilst retaining the traditional pre-clinical/clinical division it notes the importance of clinical illustration in the first two years. Nevertheless, the content of the early years is largely traditional: for example the total timetabled time in the first two years is 1,260 hours of which only 40 hours (3%) are given over to "individual and social behaviour". No less than 720 hours are allotted to Physiology and Biochemistry including Pharmacology. In short, despite innovative rhetoric and worthy aims, the proposed undergraduate curriculum appears rather conventional. And it was this proposal that the first Dean 'found on his desk' when he took up his appointment in 1968.

The redevelopment of the initial proposal

During the first twelve months of the Foundation Dean's appointment there is no record of discussion concerning the curriculum. When the Interim Board of the Faculty of Medicine first met in the 1969-70 academic year the Dean proposed the establishment of a Curriculum Sub-committee (University of Southampton, 1969a). However, its size and constitution could not be agreed and it was resolved to hold a special meeting of the Interim Board to discuss the curriculum. This was held at the end of October (University of Southampton, 1969b). The Dean "expressed his appreciation of the hard work and imaginative thinking that had gone into the preparation of the document on the Proposed Undergraduate Curriculum and explained that the purpose of the meeting was not to formulate policy, but to enable those present, especially the new professors, to comment on the proposals for the curriculum". He went on to explain that the school was committed to providing "a basic medical education in accordance with the General Medical Council". In the following discussion Professor Millar, who had previously held a post at the University of Newcastle, circulated a statement of the objectives for that medical school and explained that it "had introduced integration in the pre-clinical course so that the same topic was dealt with simultaneously by two or more departments". Professor Howell, foundation Professor of Medicine, supported this. Professor Fraser, appointed to the Chair of Surgery, "expressed the hope that students would be introduced to patients during the pre-clinical years", and Dr. Bulmer, later to take up the Chair of Human Morphology, also emphasised "the need for integration between clinical and pre-clinical teaching". Professors Smith and Trasler, representing Sociology and Psychology, hoped that teaching in their disciplines "would complement the teaching in other subjects during the pre-clinical years and would broaden the concept of undergraduate training and medical practice".

In summing up the discussion, the Vice-Chancellor said that it was "clearly agreed that planning the curriculum must be a joint exercise; that firm decisions must be made concerning the ground to be covered during each course; and that strife regarding semantics and sovereignty must be avoided" (ibid.).

When the Interim Board of the Faculty of Medicine met next (University of Southampton, 1969c), the Dean again proposed that a "small sub-committee of the Board, called the Co-ordinating Sub-committee on the Curriculum, should be set up". When this held its first meeting (University of Southampton, 1969d) the Dean submitted for discussion the following objectives for the new curriculum:

> The first fundamental requirement of the undergraduate curriculum is that the student should develop a knowledge and understanding of the sciences upon which medicine depends and of the scientific method. The second requirement is that he should be given a comprehensive understanding of man in health and sickness and of his physical and social environment. The third requirement...is the development of clinical judgement and practice through history-taking and physical and mental examination, so that the qualified doctor can enter with confidence on the pre-registration year... Throughout the period of undergraduate study he must be encouraged to develop the confidence, interest and ability to continue to educate himself throughout his professional life. (ibid.).

It is perhaps worth noting that these objectives are taken, almost verbatim, from the General Medical Council's 1967 Recommendations (see GMC, 1967, paras. 16, 20, 21 and 22).

At the next meeting (University of Southampton, 1970a) it was agreed that integration "should include participation by Anatomists and Physiologists, etc. in clinical teaching as well as the reverse" and "Professor Howell proposed that the first three years of the curriculum should be planned as a single *exercise, in order to facilitate integration".* This was a considerable departure both from the original Proposal and also from the conventional arrangement with its pre-clinical phase. A rather different pattern was emerging in Southampton not just with greater clinical illustration early on but by seeing the teaching of Years One and Two as clearly relating to the first clinical experiences in Year Three. This idea subsequently became incorporated into the curriculum and became known as "blurring the distinction between pre-clinical and clinical phases" (Acheson, 1976) and was reinforced by the placing of the major theory examination (called the Intermediate Part II but being roughly the equivalent of the Second M.B. elsewhere) at the end of Year Three rather than as in the traditional curriculum at the end of Year Two (University of Southampton, 1970d).

Thus the plans for the early part of the curriculum were greatly influenced by the clinical professors. They were further enhanced by the establishment of working parties, one to look at Community Medicine and Social Science and the other "to decide on what procedures should be followed in discussing the remaining part of the first three years" (University of Southampton, 1970b). Both working parties were chaired by a clinical professor. The second of these reported first (University of Southampton, 1970c) and suggested that an alternative to teaching the basic sciences as separate disciplines would be systems courses, as in Case Western Reserve (Howell, 1976). The approach was felt to be justified because the student "needs integrated models in his everyday clinical practice" (ibid.).

The other working party failed to make a similar proposal but recommended that the Social Sciences be taught as separate disciplines. However, it also proposed a scheme whereby students in their first year would meet patients and this was to develop into what is now known as Early Medical Contact or EMC (Elstein & Forbes, 1976).

The acceptability of the final plans

Towards the end of 1970 the Interim Board of the Faculty of Medicine brought together these proposals and, at a weekend conference (University of Southampton, 1970e), finalised the curriculum plan. This was then presented for discussion at two meetings, one to a group of clinical teachers, the other to those likely to be teaching in the early part of the course. Particular emphasis was placed at these meetings on the way in which the curriculum would 'overlap' the pre-clinical and clinical teaching:

> Professor Howell explained that the objective of third year teaching on the wards would be to continue training, under supervision, in clinical techniques and procedures but with the emphasis moving from the concept in systems courses of disease as an illustration of a disordered mechanism to symptoms and illnesses and their management. ...Professor Fraser confirmed that there would be a similar approach to surgery attachments. (FM 43)

The clinicians were generally receptive to the plans (FM 43) but the other meeting (FM 40) was rather less harmonious. One issue concerned the sequence of the systems courses:

> It was felt that Human Reproduction was too complex to teach at such an early stage, when students could not fully understand the endocrinology which was involved. It was suggested that this system could be more profitably taught later in the course, when it would correlate earlier teaching and demonstrate relevant scientific concepts more clearly... It was thought... that there would be a danger of encouraging students to accept in a superficial way concepts that they did not understand at that stage and which they might never find time to study and comprehend more fully. (FM 40)

Another issue concerned the amount of time that was devoted to the behavioural sciences in comparison with the basic sciences:

> It was suggested that there was an undue emphasis on social science and community medicine at the expense of scientific training. But the clinical staff present spoke of their own consciousness of a lack of training in the social sciences in previous courses and the importance of including teaching in this field. (ibid.)

Another point at issue appeared to be the inter-relationship between the scientific teaching and the clinical aspects of the course:

> The need to demonstrate the relevance of scientific teaching was stressed and

> Professor Fraser explained that the intention was not to teach clinical medicine at an early stage, but merely to use disease as an illustration of the normal function... Professor Howell expressed the hope that demonstrating the relevance of the basic sciences to medicine would encourage students to undertake further study on their own. He emphasised that the intention was to teach the basic mechanisms of disease, which were usually omitted in traditional courses, and that he felt there were great advantages in the proposed curriculum, although there were inevitable risks also. The need to bear in mind the needs of the eventual graduates was stressed by clinical staff present and the point was made that traditional pre-clinical courses had frequently proved unattractive to medical students anxious to begin their clinical training. (ibid.)

A clear theme appears to run throughout these objections. From the comments made it appears that some people were concerned that the curriculum would not provide students with a sufficient knowledge of basic science prior to entry into the clinical phase. As seen in Chapter 5, medical education has faced the same problems for over a hundred years. In fact the curriculum planners had discussed the problem and decided that, although much of the science teaching would occur in systems courses, there was a need for introductory courses in Year One.

Indeed, it is perhaps worth noting that although the original intention was to integrate the sciences, only just over a quarter of the timetabled time in the first two years is allocated to systems courses. A similar observation may be made in relation to the Social Sciences. Objections were raised at their relative imbalance compared with science courses. In fact only just over ten per cent of time in the first two years is devoted to them. So, too, with clinical exposure. In the first two years, only about two per cent of time is given over to Early Medical Contact, and six per cent to an Introductory Course to Clinical Medicine. It would seem, then, that the fears expressed by the basic scientists, real though they were to them, were based on a number of misconceptions, and these were not allayed by the meeting. This, then, was the climate in which the curriculum was taught to the first students when they entered the Medical School in 1971.

APPENDIX 3

EXAMPLES OF INTERVIEW NOTES

Data from interviews with students are presented in Chapter 8. In this appendix examples are given of notes taken during four of these interviews, chosen to represent contrasting reports by different students of the same experiences.

Student 1

1st December, 1982.

I don't feel at all prepared for being a doctor. You don't learn it 'til you start to apply it. I can see it coming. That's the trouble. You remember it for exams and you can't remember it now. It all seems a waste of time. Perhaps its a problem with students. Or is it the pressure of knowing you've got to use the knowledge as part of your job. But you can get by just by learning things for exams and then forgetting them.

Year One

I spent a year in a bank but felt I wasn't going to get a career out of this, so did work as a school laboratory technician for three years. I had at the back of my mind wanting to be a doctor so worked at my A-Levels trying to get in and so I did. In the first year I lived in Hall and didn't meet very many young medical students until the second year. My girlfriend was in London so I was travelling between here and there at weekends. It wasn't 'til the second year I moved in with a few other medical students that I really got to meet them and know them. I suppose you get into a routine at medical school quite early, but didn't really feel settled 'til the second year.

Anatomy stood out as the important one and it loomed large, especially from the start, because more pressure was put on this and it builds up. Now you can look back and you could see that then, at the beginning, it was easier and it built up to head and neck which is really difficult. But Biochemistry was horrible too. Again at the end it all mounted up and you have got to learn it all. It all seems formidable. Unlike Anatomy where you learnt it as you were going along. In Biochemistry you write it down, you understand it for the lecture, store it away and learn it all later. You have got the bits and the pieces but it doesn't seem to mean anything. Pathology was relevant and good and they were nice staff and it was interesting the way they put it over and there wasn't too much - the basic concepts infection and regeneration - rather than throwing you in at the deep end with complicated tumors and everything like that.

For Anatomy I went to the lectures, I was that sort of person and tried to get something from it. Then you go up to the dissection room - and I spent all of my spare time up there. It was absolutely ridiculous. Wednesday afternoons when we were supposed to have time off. All the timetabled time, but this bore no relationship to what I was actually doing. I suppose I doubled that time. Sometimes I thought that Anatomy was the only thing I was doing that week. I would read the boards, sometimes I'd copy it down, especially at the beginning. Everybody seemed to be doing that and I was part of a group at one time, but I opted out because I thought it was pointless just copying it all down. It was all in the books anyway. Then I'd use the basic book, Snell, that I'd try to read beforehand, and go in and look at the boards and take the book in as well and see which one had the most in it and I would jot some notes into the margin of Snell so now my textbook is covered with notes. Then I'd try to relate all this to what was in the dissection, using the pictures in Snell and take the textbook over to the dissection. In the end I'd use Snell much more than the boards. It was much easier. It was there with you and you could look from the dissection to the textbook and not to have to keep going back to the boards. This reading about it first before I went up came later on in the Course, perhaps between Christmas and Easter. Certainly that alleviated the problem. Early on in the week I'd try to get the overall picture, but later I'd go into detail and try to relate the other systems together. Now I was trying to understand it all, and I was happier about it now. Earlier on I was just going everywhere. I felt better about doing the work. Earlier on I was just trying to do everything and remember it but later on I would just try and lay back and take it all in. All along I got C's for the assessments and doing it this way didn't alter my grade, I just felt I was more able to cope.

Biochemistry - The trouble is you can write it down easily. They put up good notes on the blackboards, but I don't think I ever had an understanding of it like I had of Anatomy. I never came to terms with it, so I learnt it by rote for the exam. Calculations I found difficult and I got D's for that part. It really is a most horrible feeling that you have to learn things by rote. For A-Levels, my organic was interesting but here it's rather boring.

Man, Medicine and Society - I don't think that got off the ground for me. It was partly being swamped by the other subjects and partly the lecturers. You felt that if you had an opinion different from his, then he took it personally. Early Medical Contact was good. It was a change of pace. One minute you were trying to learn and being bogged down by the elbow joint and the next minute you were talking to somebody. And you could tell yourself "if only I can get through this, then it'll be alright".

Primaries

I was worried abut them. I was part of a mature group and they worry more. Assessments do get you worked up and you see them out of proportion. In the second year I relaxed more about them and I still passed. Overall I got a C.

Second Year

The Nervous Systems Course - oh god that was horrible! It really is a lot to do, that system, in such a little time. I still haven't got much grasp of it. I have got no 3-D model of it, unlike Anatomy. We didn't touch any brains. They would show them to you but you didn't rummage around with them. Something like the nucleus of a brain stem I've not much idea about it. They tell you about it and you can learn it by rote, but that doesn't help you at all. I've no idea of what the effects of a lesion at a certain level would be, and that is important.

Cardiovascular and Respiratory I enjoyed. Its more physics, more biophysics really. These are quite interesting. You can learn just a few rules and apply them and work things out. There is not so much learning off by heart. Then, curiously, the pathology becomes more of a bind. You've got to learn things rotely. You don't see the people with the disease, its just names of things and sex, age and incidence.

Gastro-intestinal - I didn't think was very good. There were no basic principles. It is all enzymes and motility and so on and you have just got to get through it. Musculo-skeletal I quite enjoyed and Endocrine is incredibly important. I realised it then. Its a unifying thing. For example, thyroid dips its fingers into different parts of the body and different systems. But there is not enough time for it. For the assessment I just learnt it off by heart.

Sociology, etc. It didn't really get off the ground for me and that is a shame because they are very important. But either they are seen as very important parts of the curriculum, or you get rid of them. At the moment it is a waste of time and effort. Psychology is very interesting and it is vital really, but there is not the investment of time. There is no time to get over to the basic principles. They just skate over things. Essays were just a matter of getting them out of the way.

The Introductory Course for Clinical Medicine was alright. It was pretty good. Nice. You were very naive but the pressure was off and you could make a fool of yourself and nobody worried about it. Nutrition didn't get off the ground for me. It was just a matter of learning the notes and a lot of it was repeated in third year, but of course you didn't realise that at the time. Pharmacology was a bit boring really. You get a nice folder given to you, but it is so easy to sit there and not listen. Maybe we depend too much on the folders. But Pharmacology was just rote learning too.

THIRD YEAR

Very variable - it depends on your firm. I started on Medicine. You start back after the holidays and the Introductory Course seems a long way away. Perhaps it shouldn't be at the end of the second year. You've forgotten it now because you have switched off from that for a few weeks. It's very varied. On some firms you get quite a lot of teaching, but I think we got the short straw. They have so few staff on that firm and you are left to yourself. On other firms people get teaching all the time, but we hardly got any.

We had one hour a week and that was all. It is a pittance. Two of us would go around the wards and clerk as many patients as we could. One of my friends on another firm only clerked about eight patients in ten weeks. I should think I clerked 80, but I didn't get much out of them because I never went over them with anybody.

I didn't do any "bringing forward". It's the peculiar things that stand out. You might be asked the causes of something and you'd give the most peculiar ones. A good example is heart failure. You'd say thyrotoxicosis, which of course is, it would be better if you had said a mycoardial infarct, its much more common. Most of the information had got lost. Then of course the clinicians would sigh and you'd feel silly. Some of the questions you didn't really grasp what they wanted. Then somebody would give an absolutely obvious answer and you'd feel a twit because you knew that all the time. One of the troubles is that they'd ask you one question and you could answer it but the second question would be more difficult and the third question nobody would be able to answer it. It's not that the questions became harder, but they were using up your knowledge store. Everybody knew something that they could answer for the first question, a few knew something for the second and nobody for the third. And whether you could answer or not depends on where you stand in the line.

I didn't look things up so much for the teaching, but after the clerking and then I'd use Davidson or Muir, not second year books or notes. They didn't seem important, except just for exams.

PART II's PREPARATION

The quantity was a shock and I realised I'd not got enough time, I left it too late to do it properly. They all seemed so disjointed. They seemed to make a fair amount of sense at the time, but there was no continuity, they didn't form a whole pattern. In respiration it was alright because I got some general principles and those had helped me to see the whole picture. But its rather difficult to make sense of other subjects as a whole.

Some things made sense then. You'd seen a patient and this would help a lot. Endocrine started to make some sense now. The experience of Part II's was horrible. It was partly panic and partly having to do all that again. There was such a large quantity. You'd go through it all once then you'd go back to it again and realise you'd forgotten it all again. If my notes were appalling I'd just give them up and use a book. I'd also use past papers. That helped a lot.

It really helped doing Part II's having the third year in between. If you haven't done the 3rd year its just a matter of rote learning it and then you know you are going to forget it. If you had third year you've seen people and conditions and you learn things and it starts to make sense. You've seen Mrs. so and so and you think "ah yes, she did have all that".

It's so important to see people. I can even remember the names of a patient. It's in a different context. The first two years are the same in a sense. You are learning the same things in the same way and you know you are going to forget it all, its a real shame. When you get to the third year you learn things as you go along by looking up in Davidson, but you never really go and understand it 'til its part of the exam, and then you do everything for that. Things that were separate and that had been separated quite artificially, now you see overlaps. For example, endocrine goes with every system. Now when you are preparing for the exams you've got all these different areas and they all come together and that was a good thing about it. It was a daunting task, but the only time when you got it all together. It was then that you were able to do the interconnections. It helps you to understand things. It reduces the amount you have got to learn off by heart and I find that sort of thing more enjoyable for me to do, otherwise just learning the different bits is just daunting and there is no point in learning it, just the bits, it's a waste of time, it'll all go away. I often feel after all these years and all the time spent on it what have you got to show for it? So you've passed exams and you have got through, but what do I know. In just a couple of years time I'm going to be a doctor and I don't really think that I know anything.

STUDENT 2 16th November, 1982.

I always see the first year separate from the rest. It's very theory based and unconnected with clinical medicine.

YEAR ONE

I didn't have any Biology and this was a problem in the first term. They assume that you have it, but a third of the class doesn't. I really had problems with the terms they used, because I hadn't learnt them before. We saw some lecturers about this and they arranged some tutorials for us and that was quite good, but it was a bit of a shock. At school you're led really by the hand, but here you are plunged straight into it. It's really new.

The Physiology was OK, they took you from basics. It was almost too simple. If they hadn't taught us that then we'd have been a bit lost in the second year. I think I've caught up now, probably had by the end of the first time.

Anatomy - I failed this part of the examination. I never really got started. I was always behind. I didn't know what was expected of us. Possibly this was because I didn't have Biology. I did the work each week and did the classes and Saturday mornings, but I just don't know - I just didn't get on with it. I put in the hours. I am a slogger, I have to do twice as much work as anybody else. This was especially true at the end doing the revision with all the other subjects. I realised I'd not learnt it each week. There should be a system for learning it as you go along. They have these assessments but you don't get any feedback from them. The lectures didn't teach you very much. I found it was very hard to get to know what they were getting at. You'd know that it was the arm, but if you hadn't read it before, which ideally you should do, you haven't really got much clue what it was all about, and its hard to teach a 3-D subject like this in the lecture theatre, you really need to learn in small groups. But there are reams and reams of stuff on the boards. All I can remember coming out was the words, no clarification, just the words. But I went along to the lectures. I felt I ought to. If you don't go to these lectures, there is no anatomy teaching. I took notes, of course, but I never used them. Then you'd have the odd tutorial - very odd! When they happened they were very good. It's good to be in small groups. All I can remember about Anatomy is the dissection room. Sometimes we'd have a video tape or tutorial beforehand and then it's up to you. You could ask the demonstrators but only in the afternoon you were alloted. You just had to go round, read reams of facts and it sometimes took half a week or even a whole week to just go around properly before you realised you had a problem that you needed to ask somebody about.

I'd look at the boards and dissections and mix the two to fit the relevant bits. I'd go back and look at the boards again if I found it difficult, then I'd write down what was on the board. That way you'd know what they wanted us to know. I used to work in a group photocopying it and this was quite good. You copied it out the way you read it. Most of the work in Anatomy I did in the dissection room and a bit in the library. I'd work in the day using a textbook, usually Snell, or "Essential Anatomy" - though I didn't find that very good because there weren't enough pictures for me. I lived in the hall and it was very difficult to concentrate there. It was very depressing in the third term which didn't help me very much. I was trying to get a grasp of it rather than reams of parrot fashion facts. I was trying to visualise it and to understand it rather than to do it all parrot fashion. But perhaps that's the wrong way as the assessments seem to want the facts. They'd ask you these short answer questions with no time to think about it, just to reel it all off. It makes you into a parrot learner, rather than an understander. For A-Levels I'd try to understand everything. I like to think things through, rather than to give a set answer to a question. I like to stand back from things. During the week they would try to encourage us to understand things, but for the assessment they expected you to have learnt a thousand facts.

I enjoyed the rest of the courses - Pathology and Biochemistry. I found some of the Immunology difficult: I couldn't understand it at all. I had to go back to first principles and teach myself from scratch. You couldn't learn that parrot fashion and I wanted to understand what was going on. Biochemistry is more parrot fashion, learning different pathways. It didn't seem too bad at the time.

PRIMARIES

I panicked. I realised my Anatomy was not recoverable. I just hadn't kept up with it or learnt enough of it during the year. I realised that I'd have to sit down and learn it all again. I concentrated on Pathology and Biochemistry and didn't do any work for Anatomy. I'd wished it away. It was a predetermined failure for my resit I just started the first day of the summer holidays and worked three or four hours a day every day. I was frightened of not getting it done, it really was gruelling. I worked every day. It was as though I hadn't done it before and I came to it fresh. I wasn't having to do the other subjects I worked through it just as in the year, learning it parrot fashion I suppose. I'd learn a section, close the book and write it out 'til I'd got it. Sometimes I'd read a section, precis it and shut the book and try to write it out again.

SECOND YEAR

A lot of relief to be in the second year. But I feel its a bit bad to start with Neurology. It's a difficult one. Perhaps it's alright if you'd spent the whole of the summer on holiday, but I had not. But my overall impression of the second year is that I enjoyed it. It's interesting. It's not just facts, but it's applied to something. It's nice to concentrate on a system and leave it behind you. I enjoyed the projects, doing them, not so much for the subjects, but planning, writing and doing some work on your own.

Other Systems Courses - Respiratory was quite difficult because the concepts were difficult to grasp - things like ventilation and perfusions. All the rest were quite reasonable. For the first few systems courses it was a 9 to 5 sort of day. I'd go to the lectures, make sure I'd got the notes and do a bit in the evening, but not much, perhaps one or two evenings, I'd spend an hour or so. Then the week before the assessment you'd sit down and just learn it. I'd read it through time and time again. Sometimes I'd write it down when I'd read it. I suppose it was just swotting for the assessment. But I try not to learn something until I've understood it.

The Behavioural Sciences made a pleasant change but I can't remember much about them. I think they are a waste of time. Really it's more so in the second year. In the first year I thought perhaps it must be good if they've decided to put it in the curriculum. The projects were good, but I feel that I've only studied one thing in the course and I don't really know much about the rest of the subjects, for example, what Psychology is all about. It doesn't give you any idea about the whole lot.

Early Medical Contact - I enjoyed that. The whole of the first year is so detached from what you thought had to do with being a doctor. It's so nice. You don't learn much but it brings you more in touch with what you are going to be doing in a few years time.

The Introductory Course in Clinical Medicine was good - very well done and very worthwhile. It's in small groups which is good and it was good teaching. It didn't worry you that you'd be grilled on this or that, you were just there to learn, for example, how to carry out an examination of a patient and it did help you when you approach patients. I suppose it stops you worrying all summer about the fact you are going to be seeing patients soon.

THIRD YEAR

I enjoyed it. It's a pity that they are dominated at the end by the Part II's and all the work that you have to do for them.

Medicine I enjoyed, but it did last during my revision for Intermediate Part II's, but because of that it's very relevant to what you are revising. I felt I could integrate the two. And the teaching was good. They knew that you were revising and they tried to integrate it as well. I found it all came together well. If I'd done something like Psychiatry last, I probably wouldn't have gone in.

Second year work does come up a lot in your clinical work and I suppose some of the first year work as well, though of course you are repeating that in second year. The Pathology does to some extent come in, disease processes and all that. But answering questions, I suppose overall it was on the tip of my tongue or it did ring a bell rather than being able to give the answer or never having heard of it before. If I did hear about something, I would perhaps try to look it up in a textbook. If I did I would do it that day, if I didn't then I wouldn't do it at all. But most of the time I wouldn't avidly read it up.

REVISION

I suppose some people say they are going to start at Christmas - The keenies that is - and they tell everyone so. So between then and Easter I thought "well I'll start tomorrow, or I'll start today", but of course I never did. I started at Easter at home. I sorted all my files out, and got myself organised. I carried on doing this throughout my Medicine attachment. It was absolutely phenomenal, the amount I found I had to get through. I relised that if I was going to get through it I'd never remember it all by the end. Revising for these wasn't as bad as for Primaries, but was quite hard work, but quite enjoyable. It was applying what you'd seen, what you'd been given on the wards. You'd seen a disease and you'd have some teaching on a patient, the physiology and pathology related to that patient. It made it all a lot easier to grasp. It was easier now to sit down and read it. It was more interesting now, having seen the patients, rather than learning the facts straight from a textbook when you'd not seen it applied to anybody. I was surprised at the sheer volume. Some things I noticed how bad my notes were in some areas. They didn't fully explain things. I'd realised I'd gone through a systems course, learnt it for the assessment, but hadn't realised I hadn't understood it until now.

When you're revising it's very good to concentrate on the whole lot and look at the whole lot as one. In ten weeks you have to cover everything. It's hard work but it's good. You can see overlaps and you can think - "oh yes! I've just done that in Pharmacology. It comes together quite well".

When you apply your knowledge, it's not so much that it makes you understand it more, it's rather more it gives you an incentive to want to understand. It encourages you to say things like "I don't understand that", and to speak up for yourself. It drives home to you that one day you will be a doctor and you'll have to understand it and you can't bluff your way through it any more.

ELECTIVE

In Kenya - working half the time in a mission hospital and half the time in a general hospital in Niarobi. I left two days after the examination results, which was a bit worrying. The Elective was excellent, lots of responsibility, making decisions, which I'm not very good at usually, even if it's only whether to buy a pair of trousers or not. But it really teaches you to do that. We were given as much responsibility as the fifth years, giving anaesthetics, prescribing drugs. It was all worrying at first, but it was an excellent experience. Part II's work didn't really come in as much as I'd expected. Perhaps you are relaxing and just trying to forget what you've just learnt.

STUDENT 3 4th November, 1982.

General Impressions - I'm pleased it's over. I'd done a (science) degree and that was infinitely preferable to this place. It was smaller, more of a campus and you got know people. It was easier to take part in things than at Bolderwood. Boldrewood doesn't help. Medicine is a training for a job, so all the time you are thinking about how it is going to be and what is going to be useful. That's the trouble. Doing a (science) degree you really didn't have that sort of way of thinking about it you just thought "well I'll get a degree, then think about what to do". It was more of a game and a more enjoyable one. This is a different game and not so enjoyable.

YEAR 1

I wanted to do medicine since I was 16. But I picked the wrong O'levels and had to do maths in the sixth form which I found difficult and ended up doing (a science). I thought I would do the degree and then perhaps go into medical research, or perhaps see if I still wanted to do Medicine. I did, so I wrote to all the medical schools who I thought would let me in.

I came here but I didn't have a grant and that absorbed me most really. In fact the problems that I had were not course related ones. I had to live in the hall as I had no time to find a room and there were a lot of school leavers and I was away from the established friends I'd got and I'd got no money. It was a problem meeting people like myself and that wasn't easy. Then I did hear that I'd get a grant and I moved out of hall, but that was worse really because the house I moved into had a lot of weird people and it was difficult living in a community like them. But I pressed on. It had been such a struggle to get in and it involved the whole family, so I did carry on. All this really affected me during the first year.

The work - well you can criticise the course, but you have to accept it. I suppose I did the bear minimum. It didn't seem to be relevant. Especially the Anatomy course. I was amazed by the Anatomy. You know that medics have to learn a lot, but all of this... In the end you just have to learn it and it's all forgotten. You just do it. It's something you've got to go through. I went to lectures. Looking back, I'd be more selective, but I tend to go to them. You can't ever be sure 'til afterwards, when you've got an overview. Then it's too late. In Anatomy I'd look at the boards and the bodies. I suspected it was a waste of time and in retrospect it was, but I was scared really and when you are caught up you don't experiment with ten different ways of learning. You pick up bits and bobs and I don't feel that I've picked up any less than any others. I'd go to the lecture, writing it down, hoping there would be some keys to tell me what was going on. I'd go up, wizz round the boards and perhaps do four at once. I'd go back at lunchtime. I really persevered. I didn't read Snell much, not then. I realised towards the exam that I'd have to learn Snell parrot fashion. I did a bit of histology and no embryology.

Biochemistry was good, but it was all familiar. I had no difficulty with it. But I didn't go to practicals. I knew they were all a waste of time.

Pathology I stopped going to the practicals. They were a waste of energy. You could have been told it all in half the time. It seemed they were trying different methods of teaching us, which I admired, but thought it was a bit over contrived. The lectures were quite good, but you could do with more linking between the ideas that they were putting forward. Physiology, I don't remember much about it. I went, but you twigged by that time that if you are not having to have an exam on it, you don't really bother too much with some things.

Man, Medicine and Society was a terrible disappointment. You expect things to be more controversial and relevant, but it's no good if the teaching is done by people who don't want to hear dissent. These people were the pillars of the medical school. They could have allowed for more discussion, but you see you begin to realise that marks are everything. I'd seen this when I came here for an interview, all those marks up on the wall and it put me off a bit but I had no choice, I had to come here. The trouble is, doing medicine doesn't give people an opportunity to express. There is no time and there's no encouragement.

Early Medical Contact - the GP part was valuable. You could talk and argue you could see a patient. The labour ward was shocking. It is for most people. I felt very sorry for the patients.

PRIMARIES

I slogged. I was so exhausted by that time, living in this house. I couldn't sleep, with people playing music all over the place. I should have moved, but I didn't have the energy to. It was hard. I couldn't really go away because I hadn't got any money. I just sat in front of my books. I knew that nothing was really going in. I never make a timetable because I never keep to it. I don't think anybody does. I just tried to learn Snell. I read over again thinking, "if it sounds reasonable, it'll go in". But I knew it wasn't really working. I just didn't think it would be relevant. From past experience you know what you learn for an exam you'll forget. It's not like being at school where you had a basis or something and you built on it and you gradually built up your knowledge and understanding. I thought it was highly unlikely that people retained it, nor would they have to use this knowledge. I suppose they are caught in a trap in the first year of the medical school; they are doing what every other medical school does, but I feel they are wasting people's energies. Why don't they do anything that is relevant to medicine?

SECOND YEAR

I'd got some money and I moved out into another house. It all seemed a bit better. It's more sensible to have systems courses. Of course there are no links between systems and if there were it would be good. Neurology was incredibly bad. Totally lacking any depth. You just couldn't get the knowledge to pass the assessment to pass the course. Cardiovascular was alright, but looking at my notes again for Part II's some things weren't clear how they were related. In a course like that there is more to it than meets the eye at first glance. Respiratory was the same. You could read a book and have lots of questions to ask, but then you'd realise there was no point in doing that. You'd say, "if you can handle the stuff, you can learn for the assessment and that's all you need to do". Gastro-intestinal I enjoyed that one. Pharmacology, well you've just got to learn it; learn it to pass the assessment that is, after all you are not applying it at the time.

Sociology and Psychology were valuable, but the Sociology Lectures were very poor. I went to one and didn't go to any more - that is unusual for me. But I realised I wasn't going to get anything out of it. The projects were alright, but you were only doing a couple of them. Perhaps doing a short essay would have been better, so that you could move onto other important issues.

The Introductory Course to Clinical Medicine was alright really when it happened. The information of it was good. People are not used to hospitals and you really need to relax more about it. The more relaxed you can be the better.

THIRD YEAR

It's hard to generalise, especially now, with hindsight I realised I am just glad I got through it. I didn't like what I saw about hospital medicine and how they treat patients in hospital. But it's a means to an end, I'll endure it and do what I have to do to get through. Medicine was OK but you can put in a lot of time, but you don't automatically get a lot out. It all seemed to be about wearing the right clothes, standing properly, laughing at the jokes and not caring about people. It's sickening; to get a good job, you've got to get on with the right people.

The first year was not relevant at all. The first patient I clerked I was so scared she would die before I got the history and then when I was presenting the case I was asked for a diagnosis. I hadn't expected to come up with that. I suppose I slowly realised that you are supposed to be thinking, adding the information together. Yes, sometimes you were given a choice between two answers and really you would toss a coin and say one of them. But what you are taught is to bluff it, to appear confident and give some sort of answer. Confidence is everything. Even if you are wrong, and in any case in clinical medicine they are not concerned with the second year fine detail of facts. You are taught all that by strict physiologists, all pushing their own fields.

Part II's

I went through my notes. I realised there was a lot I couldn't remember. I did leave it all 'til it was far too late. Quite a bit of it I was learning for the first time. When I looked at it, I knew what it all meant. I always revise in the same way. I don't feel I have the time to do it differently. I just go through the notes. Part II's were big, they loomed. I thought I might fail them. But it is difficult to work out where you will be in the pass/fail spectrum. You know that quite a lot of people who do a lot more work won't do any better necessarily than you.

ELECTIVE

In India I didn't really like what I saw and language was a problem. I don't think I learnt very much. I suppose I got used to work in clinics doing dates and size and so on.

STUDENT 4 15th November, 1982.

It was good. I was pleased with it. Little things left something to be desired, but overall it was good. They did give you the impression that it was way out and very different, but it's not all that different.

FIRST YEAR

It was a bit overpowering. In fact it was very overpowering. I just didn't know how hard to work. I failed the first assessment, even though I thought I was heading for a B. I was in the top half always at school, now I'm in the middle, or at least in the lower half and that's a bit of a shock to the system. At school I took notes, then wrote them up at home later. I did this for the first half of the term here, then gave up because I realised there was no way I was going to get it all done, so in the lecture, I'd write out my notes for best and perhaps afterwards use books.

For Anatomy usually I'd go in for the allocated time, plus Saturday mornings occasionally. I'd look at the boards but find it hard to cope. At first I read on my own and then went home and read Snell. Then I'd take notes from the boards and later I'd go round with somebody else and talk it through together. We'd take notes from different boards, get them photocopied and swap them, but I never found a particular satisfactory method. I was trying to remember it but that is difficult when you are standing up and looking over someone else's shoulder and you are talking about what you did last night. I wasn't really able to keep up. Some weeks I'd leave a board or two or more. Head and neck was extremely hard going. I'm afraid I just let it slip. I felt guilty, but wouldn't go back because the next week was coming. In Biochemistry I couldnt cope with the numbers which is silly because I was quite good at Maths at school. I came out of the problem solving exam convinced I'd failed it. But the acid-base balance stuff, no matter how often I went over and over it, I would still flounder, even if I thought I knew it at the time. I mugged it up a week or so before the exam. Pathology I found a little hard going. I didn't go to it much. I wasn't that enthusiastic about it. The handouts were good. Physiology was quite good and not too hard.

Man, Medicine and Society was interesting but a bit waffly, nothing to get your teeth into. We had seminars which made you do something yourself, and it was good to talk about it all.

Early Medical Contact - What there was was really good. Very enjoyable and I enjoyed talking about the patient afterwards. The labour ward was a good experience as well, but there is not as much of it as you'd been led to believe.

PRIMARIES

It was big and I got in a state about it. I just wasn't sure how well I'd do. It's two weeks after everybody else's exams and that is hard. But I have a friend who's a medic and we worked together and it was good. But we did tend to panic each other. I passed with a C which I was very happy about. I was scared I'd failed.

SECOND YEAR

This was an improvement. I was quite impressed with the systems course teaching. They did that very well. Mixing up the material with the clinical aspects and getting clinicians in, but they started with the Nervous System, which is a difficult one. Cardiovascular and Gastro-intestinal were quite good. I could get to grips with them. I'd go to most of the lectures and read through my notes at home. I'd use the pathology boards in the library and perhaps dip into a textbook. I spent the last week cramming it up in the evenings. I'd go over and over the lecture topics and the notes that I'd made from the pathology boards and talk it over with others in the house, giving each other quizzes, which was quite helpful. We'd ask each other broad questions, like "what could you tell me about disease of the pancreas?" The assessments went quite well.

Pharmacology was a good course. They gave us a wad of notes at the beginning and that was good. The lectures were quite useful, but some were a bit dry, depending how I felt. Sometimes I wouldn't go to them. The clinicals were quite good but I didn't go to all of them.

Biochemistry Nutrition - I never really got into. When revising in the third year I found a lot of my notes were very inadequate.

Sociology, etc. - The Projects were good. You were doing something yourself. The lectures were a bit of a bore, especially when other things were more pressing, like the systems courses, and I tended not to go. Sociology was very, very waffly. It was just common sense. The projects were good. I got a lot of information out of it and the visits were good too. I find it good for me to read something up, think about it and write an essay. We hadn't written an essay for a long time.

The Introductory Course to Clinical Medicine was jolly nerve-wracking. I was petrified. But it's a really good idea. You went there not knowing much about what it was going to be like on a ward, never having been in a hospital myself, so it was quite informative.

THIRD YEAR

It was totally different. And the attachments differed too.

Bringing forward was very difficult. I had to go back and look things up. I had to dig Snell out once and reread my lecture notes. Very hard to recall what you had learnt, but when someone said something, you realised you once knew it, or you once new something about it. Then I'd go home and read it up and it would be fresh in my mind. I realised how important it is to go over things again and again, because a few weeks later I feel I won't be able to recall it. What I feel I should have done is gone through a book just before the start of an assessment, but I never got that good.

REVISION

There were no surprises. I was a bit disillusioned that my lecture notes weren't as good as I'd hoped they'd be and not as comprehensive. So I had to go out and use textbooks.

With patients I'd clerked, I'd never forget them, I'd read it up and then it would be engrained in my memory - that helped a lot. I tried to get into the habit of that, see a patient, and then read it up afterwards. That way it goes in much more easily than just reading a textbook on its own.

Part II's were big and I panicked a lot. I felt reasonably on top of it, unlike in the first year. In the second term of the third year I sat down and worked out what I needed to do. What really helped me was our situation. There were four others in the house and they were doing other courses in the University, so their exams were earlier and they were revising much earlier, and that helped me start early. I got a C, I think. Isn't it incredible, I've forgotten. Something as important as Part II's.

APPENDIX 4

A CHRONOLOGICAL ANALYSIS OF THE INVENTORY DATA

This appendix presents the full chronological analysis which is summarised in Chapter 8. Each set of comments from students is headed here by a sequential number code (1.0.0; 1.1.0; 1.1.1; etc.). Supplementary data are given in Appendix 5 using the same code, and reference is made to them by the comment "see appendix".

1.0.0. YEAR ONE

Most of the timetable for year one is devoted to three science courses - Anatomy and Biochemistry (for three terms) and Pathology (which commences half-way through term 1). The remainder is spent on four other courses; two are scientific - Physiology and Human Reproduction - and two are behavioural science - Man, Medicine and Society and Psychology. Students also attend Early Medical Contact from about the middle of Term 1 in which they meet patients.

1.1.0. Anatomy

The Anatomy Course extends over all three terms of the first year and its content:-

> ...covers the normal structure of the human body at the gross, light microscope and ultra-structural levels...The relationship of structure to function is emphasised at all levels and different aspects of the course are closely related. (Prospectus, 1983)

Two hundred and fifty four curriculum hours are devoted to the teaching of Anatomy of which 165 are allotted to gross Anatomy. This is considerably less than in other medical schools and presented something of a challange to the Anatomists (Bulmer et al, 1982). An early planning decision had been that students would not dissect and this was consistent with current thinking (GMC, 1967). In Southampton use is made of prosected specimens as demonstration material - predissected parts of the human body - together with information on display boards containing legends and diagrams referring to the specimens. Each demonstration relates to a particular aspect of gross Anatomy such as the cardiovascular system or one of the limbs, and often would be changed weekly. Students have time allocated for attendance at the Anatomy demonstration room. Since it was felt that not all students would be able to see, handle and examine demonstrations at one time, the class was divided into two groups. A week's work would normally commence on the Tuesday morning with a lecture which outlined aspects of the demonstrations - the Anatomy staff felt that it was not possible to formally teach Anatomy in the available time and used the lecture time to outline topics thought to be difficult to conceptualise. Students would then be expected to visit the demonstration room on two half days of the week to read the boards and look at the dissections. Students had a handout on the week's work which included notes and a series of questions to test themselves on their understanding. A textbook (Snell) is recommended; most students buy a personal copy. Facsimile copies of the demonstration boards have been available in the library since 1980. In addition, students are assessed periodically on aspects of the Anatomy Course.

1.1.1 Lectures

A few students found the lectures to be of some value:

> "In Anatomy I went to the lectures which were a grounding for all you were going to do and not in too much detail. They helped you understand what was coming next."
>
> (See Appendix)

1.1.2

However the majority did not see lectures this way:

> "I'd go to the lectures but with some of the Anatomy ones I'd come out more confused than when I went in. There would be so many facts by the end of the lecture that it was difficult to sort it all out... I took notes but never consulted them later."
>
> (See Appendix)

1.1.3

A number of students reflected that the notes they took were never used again:

> "I certainly didn't get any decent notes from them."
>
> (See Appendix)

1.1.4.

Some students noted differences between the teaching styles of the lecturers suggesting that some helped with difficult anatomical concepts.

> "Those lectures really did make Anatomy easier: easier than books or the boards. They gave you guidelines, the important bits and ways of remembering it."
>
> (See Appendix)

1.1.5

Some students felt that it helped to know quite a lot <u>before</u> going into the lecture:

> "To understand the lectures you need to have done some work first. You need to have done something yourself."
>
> (See Appendix)

1.1.6. <u>The Dissection Room</u>

Most students perceived Anatomy as requiring them to spend a considerable amount of time in the dissection room looking at the boards and the specimens. The Room is open most of the time for private study and many students made use of the room on a number of different occasions:

> "After the lecture I'd go to the dissection room a number of times, perhaps three or four, spending an hour or two and perhaps another couple of hours on Saturday mornings."
>
> (See Appendix)

1.1.7.

For a number of students this was not a pleasant occasion for studying:

> "It takes up so much of your time - much more than the timetabled time because (i) you can't get through it in the time available and (ii) it's the emphasis placed on 'hard work' by the Anatomy Department staff. You are told you won't pass the exam if you don't work hard. The pressure starts almost at once. And not just from the staff but the students in years above you. They tell you you've got to get down to your Anatomy right away."
>
> (See Appendix)

1.1.8.

But for a few students:

> "The boards were almost a social occasion ... if you didn't want to work then it was alright, you would meet people. It was more fun in some ways."

1.1.9.

In the early weeks, indeed for most of the first term, nearly all of the students saw their task in the dissection room as being one of copying down everything from the boards. Needless-to-say this became an enormous task but a number of students found ways around it:

> "I was in a syndicate of four people or so and we'd each take a board and write it down in quite some detail, then photocopy it and give a copy to the rest of the

group, then read it up later."

1.1.10

As time went on students realised that merely copying information from the boards was insufficient:

> "For the first half of the year, I copied everything from the boards but not towards the end. It took too long and seemed to be a waste of time."
>
> (See Appendix)

1.1.11.

A number of students realised that the textbook was as valuable as the information on the boards:

> "(In the dissection room) I'd go around the boards and make a few notes at first but later-on used Snell more. I did think I may miss out because the exams are on the lecture notes, but in the end I revised from Snell."
>
> (See Appendix)

1.1.12.

A few students felt the dissections were more important sources of information:

> "I suppose most of the time was spent reading the boards, but the most important part was the specimens, because you couldn't get those in any other place."
>
> (See Appendix)

1.1.13

A few students would just "go to the boards, read it and then go to the bodies and then onto the next board and so on". But rather more students would go backwards and forwards between boards and specimens:

> "I'd go to the dissection room and perhaps start where there was a space, not in any particular order at all. I'd look at the board, then the dissection and then back to the board and another dissection. I was trying to understand what it said on the board and to see it in the dissection and to get it clear in my mind."
>
> (See Appendix)

1.1.14.

Some students would check the dissections not just with the board but with their textbook:

> "In Anatomy I'd look at the boards first and then look at the dissections. Perhaps spend one and a half hours on this and then

I'd go away and look at it in Snell. I'd just keep reading Snell until I thought that I knew it and then I'd go back to the dissection room and relate what I'd read in the book to the dissections."

(See Appendix)

1.1.15.

A small number of students worked the other way round and this seemed to help them to cope:

> "I'd try to make a mental picture of say an arm or a leg relating the different bits. I'd go through the relevant Chapter in Snell and <u>then</u> I'd go to see the boards. I found it easier to appreciate the information on the boards if I'd been through it first. I found I would be learning it because I already have the background."

(See Appendix)

1.1.16.

Generally, the students who worked out such a way of coping with Anatomy appeared to enjoy the year more than other students. Indeed, for those who had no such way of working the year was quite miserable:

> "For Anatomy I'd go in and read the boards and be overwhelmed by it all. Then I'd go home and perhaps go in a couple of dinner times and poke around bodies and then go home. I'd try to memorise it from the lecture notes. But I knew that I'd forget it. I always felt that I wasn't coping and not handling it properly."

(See Appendix)

1.2.0. Biochemistry

Biochemistry teaching is spread over the first three years of the curriculum. It aims:

> ...to allow the student a progressive and planned development of...biochemical understanding, starting in the first year with the basic principles of structure and metabolism. (Prospectus, 1983)

1.2.1.

The first year course is allocated 120 hours over three terms, with lectures and practicals. Most students found Biochemistry fairly easy, partly because Chemistry is a pre-requisite for entry into the course. For most students there appeared to be a clear relationship between their enjoyment of Biochemistry and their previous experience of Chemistry:

"I suppose I could understand a lot of the Biochemistry because at school our Biology teacher was a Biochemist and we'd done quite a bit of it."

A few students came to the Course with a Degree in Biochemistry and found they were able to cope, but were not uncritical:

"...it was all familiar. I had no difficulty with it. But I didn't go to practicals. I knew they would be a waste of time."

1.2.2
A number of students commented:

"The Biochemistry is well taught, but it is over-taught. Actually it was really excessive. I suppose it's because you are asking Biochemists to do it. They're specialists without any medical training."

1.2.3.

Several students commented that the mathematical component of the Biochemistry course was difficult:

"Biochemistry was alright but I couldn't cope with the problem solving."

(See Appendix)

1.2.4.

But most students found that "with Biochemistry you get by with the minimum work":

"Biochemistry was very factual. Not too much basic principles. Just learning the pathways. It could have been better but I had to spend my time doing Anatomy."

1.2.5.

Many students saw Biochemistry as a matter of learning by rote Biochemical Pathways (or "cycles"). Very few enjoyed the experience:

"...you don't learn much except for the cycles...You draw them out...and you learn it up. You can get away with doing that for Biochemistry but you don't remember it afterwards. You really don't see much point in it...It's not difficult, but the problem is that there's so much of it."

(See Appendix)

1.3.0. Pathology

The Pathology course is 116 hours and includes basic microbiology. It runs during all three terms of the first year beginning in the middle of the first term and teaches basic mechanisms. About half the time is devoted to a lecture programme and the remainder is divided between practical work and seminars. Teaching is held at the General Hospital unlike the remainder of first year courses which are taught at the Medical Sciences Building (Boldrewood) some three miles away.

1.3.1.

Many students enjoyed the Pathology Course, feeling that it was well taught:

> "In Pathology they are enthusiastic, and good teachers. It was at the Hospital, it got you out of Boldrewood."
>
> (See Appendix)

1.3.2.

A number of students felt:

> "The Pathology...was well organised. You're introduced to basic Pathology which was developed in the second year. Other medical schools don't do Pathology 'til later on. But it stimulates you...It's got clinical relevance."

1.3.3.

Relevance was noted by a number of students:

> "Pathology I enjoyed. It's the most clinical of the first year and it's good to have it then. You get the basic principles, but it is also related to medicine."
>
> (See Appendix)

1.3.4.

Several students mentioned the handouts as being valuable:

> "Pathology was really enjoyable. I still enjoy Pathology. They taught you very well and the handouts were really helpful."
>
> (See Appendix)

1.3.5.

However, some students appeared overwhelmed by the content, seeing the handouts as an indicator of the amount of information to be covered:

> "Pathology I didn't really understand too well in the first year so I found it difficult. I'd have to remember things without understanding so for a lot of it I got confused."
>
> (See Appendix)

1.3.6.

A few students questioned teaching Pathology in the first year:

> "I didn't really grasp pathology. I never knew what you were supposed to know. I felt it was perhaps a bit too early to do it. They'd talk about things and you'd think 'that's very important' but you never knew how much you were supposed to know."

1.4.0. Physiology

Originally there was no Introductory Physiology Course in year one. Instead it was taught as part of the Systems Courses which largely run in year two. However, the Curriculum Review Working Party (see Chapter 8) recommended that a short course (25 hours) be introduced into the first term of year one to cover basic physiological concepts such as homeostasis, water balance, transport across semi-permeable membranes, etc.

1.4.1.

For those students who already had A-Level Biology it seemed a matter of repeating old work. For those who did not it was another introductory course which some found valuable.

> "Physiology I found very interesting. I didn't learn details I just got a general outline, learning what Physiology was all about."
>
> (See Appendix)

1.4.2.

Some students were less enthusiastic because they felt they had done it all before:

> "Mostly it was for people who had done Maths and not Biology and I had done Biology."
>
> (See Appendix)

1.4.3.

Others were rather more sanguine about having to do a course in Physiology where there was little for them to gain:

> "The Physiology Course seemed pointless, looking back. But I did A-Level Biology and found that I didn't need it."
>
> (See Appendix)

1.4.4.

Some students felt uncertain about the Physiology Course for another reason. One first year said:

> "Physiology, I'm not quite sure what to make of it. Much of it I'd gone over

> before...but I'm not sure how useful it is going to be, all this background and basics. I suppose it is a grounding before the Systems Courses. Perhaps it will be better when I've done the Systems Courses and then I'll know how useful it was."

This comment is reflected by other students who, looking back, felt that the introduction had not prepared them for their later work:

> "Physiology is just a waste of time. I didn't use it 'til the next year. I was shocked to find in my Endocrine course in the second year that a lot of the basic stuff we'd been given in the first year and I couldn't remember having done it. It's a terrible waste of time. If you don't use the information at the time, then you don't learn it."

However a few students found that it was a useful introduction:

> "The Physiology was OK and they took you from basics. It was almost too simple. But if they hadn't taught us that then, we'd have been a bit lost in the second year."

1.5.0.

Man, Medicine and Society

In Southampton's curriculum students are introduced to social aspects of medicine from the very start. Man, Medicine and Society, is taught during the first five weeks of the first term. The course is 20 hours and:

> ...contrasts man as a machine with man as the personality and man as the unit in human society. It's aim is to show the importance of groups of populations, as well as individuals, as units of study in medicine, and the way in which such studies are essential in understanding health and illness and their determinants. (Prospectus, 1983)

Mostly, the Course is taught in the form of lectures with two visits, one to examine differing social conditions within Southampton and the other to the home of a disabled person. In addition there are a few seminar discussions. The course, taught jointly by staff from the Medical School and from the Faculty of Social Sciences in the University, forms an introduction to the Social Sciences which are developed later in the first year and during the second year. There is no examination in year one but the subsequent courses in year two form part of the Intermediate Part I Examination.

1.5.1.

A number of students found the Course "quite interesting":

> "I think I enjoyed it quite a lot. It is quite different from the rest. It gave you some background to medicine."

1.5.2.

However, even these students qualified their comments:

> "Man, Medicine and Society is a good idea. But whether it makes any difference to students I don't know. It was totally apolitical and I don't think you can do that...I was aware of a lot of the problems anyway."
>
> (See Appendix)

1.5.3.

Some students felt that the Course came too soon.

> "Man, Medicine and Society was quite good but it was too early on. If it had been later I might have realised what they wanted to get out of it."
>
> (See Appendix)

1.5.4.

A number commented that they found pressure from other work encroaching upon the time they might have devoted to it:

> "The rest of the Course is so time-consuming that people don't take much notice of it. Actually it's quite interesting, certainly much more interesting than the rest of the first year."
>
> (See Appendix)

1.5.5.

A number said:

> "Because of everything else going on I just sat down to Man, Medicine and Society and enjoyed it."
>
> (See Appendix)

1.5.6.

A few students felt that the course did not add significantly to their knowledge:

> "In a sense I felt a bit beyond this. It was like teaching your grandma to suck eggs."
>
> (See Appendix)

1.5.7.

Quite a few students found they could remember very little about the Course:

> "This was a course that largely passed you by. It was not directly medical."
>
> (See Appendix)

1.5.8.

A few students were quite critical of the Course feeling it to be a "waste of time" or "a bad course." Some said it was "boring" and "badly taught." Others felt that it was a big disappointment:

> "...it really is a farce this clinical and pre-clinical business. If you think about how much you do in the first couple of years it's so small. It's all very nice but I can't see how Faculty can say they've got rid of the preclinical/clinical split."
>
> (See Appendix)

1.6.0. Early Medical Contact

Early Medical Contact (EMC) is one of the features that attracts students to Southampton. The Prospectus notes:

> ...Students are, from an early stage, given contact with patients...From time to time during their first year students undertake visits which provide a gradual introduction to patients in hospital, in general practice and in their homes. (Prospectus, 1983)

In fact no timetabled time is allocated to EMC and the 24 hours devoted to it has to be 'found' within the existing timetable. EMC comprises two elements. The first involves General Practitioners. On four afternoons pairs of students visit a general practice, see a patient at home with the GP and return for a seminar discussion. The second part of EMC involves the student in two ante-natal clinic visits, a whole day on a labour ward, and a follow-up domiciliary visit to the patient they saw delivered.

1.6.1.

Most students find EMC a useful part of the first year:

> "It was lovely, I really enjoyed it. Getting out and meeting people. You realise that this was the Course you came to do in the first place."
>
> (See Appendix)

1.6.2.

A number of students comment that it made a pleasant break from the rest of their Course:

> "It's light relief in a way."
>
> "EMC kept me going."
>
> (See Appendix)

1.6.3.

One of the aims of EMC is for students to begin talking with patients. Some found this difficult at first:

> "I was very nervous, certainly the first couple of times. I couldn't think of what to say at the time."
>
> (See Appendix)

1.6.4.

Some students felt they were unable to get much out of it because they did not know enough:

> "At that stage you dont have much idea what its all about and afterwards I'm not sure you know any more."
>
> (See appendix)

1.6.5.

Some thought it was an encroachment on their time.

> "EMC I remember it as at the time of being slightly annoying. It got in the way of working on the Anatomy Boards."

1.6.6.

A number commented that the amount of time given to EMC was rather less than they had expected:

> "I enjoyed EMC but it was disappointing in a way. It's not what I thought it would be. I sometimes feel that they got us here under false pretences. I've a friend at Newcastle who has far more EMC than me, though they don't call it that. I suppose I felt let down."
>
> (See Appendix)

1.7.0. The Primary Examination

At the end of the third term in Year One, students sit the Primary Examination. This tests their knowledge of the three main subjects taught in the first year: Anatomy, Biochemistry, and Pathology. Previous papers (other than MCQ's) are made available and several assessments are held during the year in each of these subjects. Most students know what to expect.

1.7.1. A few students were not perturbed at the prospect of the Primary Examination:

"For me the Primary was just another exam."

(See Appendix)

1.7.2.

But most felt it was "tough". A number commented that it was difficult to revise at the end of term when their non-medical friends, perhaps in a Hall of Residence or in their flat, had finished and were relaxing:

"I went home three weeks before the exams because I couldn't work here. We had exams when everyone else had finished."

(See Appendix)

1.7.3.

Some students describe how ill they felt:

"It was unpleasant because of the pressure. The whole year was neurotic. You can't cut yourself off from that general feeling. People looked really ill. I dreaded Primaries and we were told they'd be awful by previous years and by the staff. But the exams were easy."

(See Appendix)

1.7.4.

Most students began revision by about Easter and several spoke about "getting organised":

"At Easter I looked at what I had to do and got a timetable...but concentrated on some things indicated from past papers, and from the fact that you spend more time on some things in courses than others."

(See Appendix)

1.7.5.

A number adopted a revision technique in which they condensed their notes down to a form which they could learn:

"I just went through my notes and read them. If they weren't any good I'd make some new notes from books. I'd then make them clearer and make sure they were worth looking at. Then I'd go through them. Then I'd make shorter notes from these - summaries to revise from. Then I'd learn these. These were the major headings which I then committed to memory."

1.7.6.

Most students revised for the Primary Examinations by committing knowledge to memory, though their approach did vary between the three subjects:

> "I suppose I did Anatomy most...I'd just read and make some concentrated notes and tried to remember it in my mind. With these notes you've got something to look at later on...Biochemistry was quite easy. It was just the pathways and I learnt those. I would get them down on paper and go through them and try to write them out without looking."
>
> (See Appendix)

1.7.7.

A few students adopted what might be called a 'tactical fail' strategy. Rather than working on all three subjects they would study two intensively but deliberately fail the third, getting a resit in September:

> "I realised my Anatomy was irrecoverable. I just hadn't kept up with it or learnt enough of it during the year. I realised that I'd have to sit down and learn it all again. So I concentrated on Biochemistry and Pathology and didn't do any work for Anatomy. I had wished it away. It was a predetermined failure."

When preparing for her resit this student:

> "Just started the first day of the summer holidays and worked three or four hours a day, every day. I was frightened of not getting it done. It really was gruelling. I worked every day. It was as though I hadn't done it before and I came to it fresh. I wasn't having to do the other subjects. I worked through it just as in the year, learning it parrot fashion. I would learn a section, close the book, and write it out until I got it."

1.7.8.

A number of students reported that this approach to studying was most unsatisfying and demotivating. For many this was the lowest point of their undergraduate career. Many spoke about seriously thinking of giving up:

> "The Primaries dominated life. I just worked and worked and worked. I was very worried about them. I'm not sure why because I'd never worried about exams before and I got on alright. But you get so little feedback that you just couldn't judge whether you'd done enough and I thought that I hadn't. It was a very traumatic time and I wondered if it was all worth it now and again. I did begin to feel 'this is no way to live' but I still did it."
>
> (See Appendix)

SUMMARY OF YEAR ONE

1. Most students (nearly half of those interviewed) found the year "hard going". Of the remainder, two-thirds reluctantly accepted this as being "the lot" of medical students. Only a few described it as enjoyable.

2. The year is dominated by three subjects, - Anatomy, Biochemistry and Pathology. They occupy 80% of timetable time and form the basis for the Primary Examination at the end of the year.

3. Science subjects account for 88% of the timetable, Social Sciences 8% and Early Medical Contact 4%.

4. Students allocate their time in response to the demands they see being made on them. Timetabled sessions account for between 20 and 26 hours a week and generally students attend sessions in the science subjects. However many tend not to go to the Social Sciences. Early Medical Contact is generally welcomed, by some students as "relief", though a number comment that it is less than they thought it would be.

5. Students non-timetabled time is spent working largely at Anatomy, spending, on average, 20 hours a week working outside classes and, of this, roughly two-thirds was given over to Anatomy. Most of the rest of the non-timetabled work is spent on Pathology with about an hour a week being spent on Biochemistry. Generally students do not spend much time on other aspects of the curriculum.

6. The Primary Examination is a big hurdle. Students become very anxious and concerned. It occurs at the end of the third term at a time when most other first year students in the University have finished examinations. Most students begin to prepare for it at about Easter and generally revise by memorising, with or without attempting to understand what they are learning. The failure-rate in the Primary Examination has been as high as 15% although about two-thirds of those who fail subsequently pass at re-sit in September.

7. Generally, a student's work load in the first year appears very high. Most students approach it by some form of memorising or rote learning. Very few seem able to see it in any sort of a wider context than that of the immediate demands of the year.

8. The motivation of students appears severely tested during the first year. Generally it is far from being a pleasant experience.

2.0.0. YEAR TWO

Nearly two-thirds of the second year programme is taken up by the Systems Courses:

> ...Each includes the teaching of the relevant physiology, morphology, pharmacology and pathology of the systems, together with practical work and clinical demonstrations. Clinical and non-clinical members of staff in different specialities are involved in the teaching, which is planned on an integrated basis. (Prospectus, 1983)

As well as attempting to be integrated, these courses, which run consecutively, are also concentrated: they extend over periods ranging from ten days to five weeks and include an intensive study of a particular bodily system. This mode of working is strikingly different from the first year in which major subjects were spread over the whole year, running, for the most part, concurrently.

2.1.0. Transition

> "This was an improvement. I was quite impressed with the Systems Course teaching. They did that very well. Mixing up the material with the clinical aspects and getting clinicians in."
>
> (See Appendix)

A few students liked the year, but qualified their opinion in some way:

> "Really it was more or less the same. More lectures, yet I liked the way they tried to integrate them. I do like the idea of the Systems Courses."

2.1.1.

Quite a few students commented:

> "It was a pleasant surprise. It was much better than I'd expected - much better than the first year."
>
> (See Appendix)

2.1.2.

A few students commented that although the year was, in one sense, more structured, it allowed for more free time and this meant organising one's own study habits:

> "I had a Systems Course routine: I'd go to the lectures, take notes, get the set book, but not make any more notes. I'd go home and read as much of the book as I

> could...Things that interested me I learnt in detail. I would spend more time on them and it would stick automatically."
>
> (See Appendix)

2.1.3.

A few found the year much less pressurised:

> "It seemed different. There were no big exams, no major hurdles of assessment and more relaxed. Whether this helps you for your third year is another matter."

2.1.4.

Although most appeared to enjoy the second year quite a few were disappointed:

> "Everyone said that it would be easier, but I don't think it was. It was more enjoyable, more interesting but very rushed. There was a huge number of lectures."
>
> (See Appendix)

2.1.5.

It was not only the heavy lecture programme that despressed students but also the number of end of course assessments:

> "I set off thinking the second year would be very different, more sitting about thinking about things, then the second day a whole list of assessments for the year was given and I had withdrawal symptoms for about three days...It was just one assessment on top of another."
>
> (See Appendix)

2.2.0. Systems Courses

2.2.1.

The approach most students adopted was determined by the lecture programme and the end of course assessment:

> "(They) would recommend a textbook. I bought most of them but I never got round to reading them. I would go to the lectures and make sure I'd take very good notes...For the assessment I'd revise the handouts for the MCQ's. Usually I'd study the night before and just read through the notes and the handouts...Mostly I got C's but a couple of D's and an F and an E."
>
> (See Appendix)

2.2.2.

A few students felt that it was better to concentrate on learning from the recommended texts rather than following the lecture programme:

"I got much more selective about attending lectures. I chose the ones I thought I'd learn from and didn't go to the others. I worked a lot from books."

(See Appendix)

2.2.3.

About a third of students commented that now that they were in the second year they were concentrating more on attempting to understand what they were studying:

"I took lecture notes...I was trying to understand and learn them. Some required more understanding, such as Respiratory. We had tutorials which helped to sort the understanding out for this one."

(See Appendix)

2.2.4.

Most students, however, studied the Systems Courses by attempting to commit information to memory:

"I would try to work through (my notes) but at the end it was just a matter of learning the facts."

(See Appendix)

One student made the comment that this was the only way to cope:

"For the assessment I just read the notes. I didn't want to learn it by rote so I made an attempt to stamp my own personality on it. But there is too much, I never got on top of anything. As the year went on my grades went down."

Another student commented:

"I really didn't know any Neurology. I learnt it two or three days before the assessment and forgot it two days after. I got a C which reflects my good short-term memory. I certainly don't know any now. CVS and Respiratory I found very good. They were probably the best...I learnt things in these subjects. I had some comprehension of what was going on around me. It's so much easier to learn if it is clear and it's fun and it sticks better."

2.2.5.

One or two students commented that assessments were valuable in bringing things together:

"In the second year I wouldn't really understand things 'til the night before the assessment and it would all fit into place."

But one reflected that the end of course assessment merely acted as a junction between courses:

> "After the assessment I'd think to myself 'good, well that's over, I'll forget that system and go onto the next'."

2.3.0. Biochemistry (Nutrition)

Running concurrently with the Systems Courses in term one of year two is a 60 hour course in nutritional aspects of Biochemistry. This course is concerned with:

> ...human nutrition and metabolism and it's most common disorders. (Prospectus, 1983)

It is taught largely by means of a lecture programme with a few practicals.

2.3.1.

Only 14 of the fourth year students interviewed commented on this course. Of these a few said:

> "I never really got into the course. When revising in the third year I found a lot of my notes were very inadequate."
>
> (See Appendix)

2.3.2.

A few students questioned the relevance of the course at that time:

> "The Biochemistry didn't seem relevant, well the Nutrition part of it might have been I suppose."
>
> (See Appendix)

One felt strongly about this:

> "I've forgotten so much of it really it's of debatable value. Why do we have so much? They are professional Biochemists, not medics. That's their angle on teaching. One came in and put up an OHP with a whole load of information on it which was just a joke. Nobody's going to remember all that. It could have been much more clinically orientated, made more relevant. That's the problem with academics with specialisms. I'm not pleading for mediocrity. But they should take note of what you're going to become. Better to have done half of the Biochemistry and got to grips with it and applied it."

One student, however, commented that he found the Course interesting and noted a paradox:

> "I was particularly interested in Nutrition yet I didn't do any work for the exam and I got a B. It seems I do better in assessments when I don't work for them, or at least when I don't take specific information and I read more generally round

the subject."

2.3.3.

Students currently in their second year were rather more enthusiastic about the course, certainly in relation to their first year Biochemistry:

> "Biochemistry is easier this year. I've never been one for Chemistry and my Biochemistry here was always a struggle. This year it's easier, or at least it's more interesting. They relate it more to disease and things that go wrong rather than just metabolic pathways."

2.3.4.

Several students noted an increased relevance in second year Biochemistry:

> "Nutrition is a thing you can relate to yourself, to your own diet. Biochemistry last year was essential but all at a cellular level. Now it's more easily comprehended."

2.3.5.

But other students felt the course did not seem relevant:

> "The Nutrition was interesting but the bit on DNA and genes was rather long and I got lost on it. I wasn't sure how relevant it was. After he'd finished he said 'you won't need to know all of this'. It's not difficult but I don't know what to learn or what I'm supposed to know."

(See Appendix)

2.4.0. Pharmacology

In the first two terms of the second year there is a 65 hour Pharmacology course as a supplement to that being taught on the Systems Courses. It:

> ...is concerned with general mechanisms of drug action...These principles are illustrated by reference to drugs which are in common clinical usage. (Prospectus, 1983)

The course is largely taught by means of a lecture programme with a few practicals and some tutorials. At its beginning students are given a substantial handout of notes which relate to the course. There is an assessment at the end of the second term.

2.4.1.

As with the Biochemistry, relatively few of the fourth year students interviewed commented on the Pharmacology Course.

Generally it was liked and students reported it as being "interesting" but only a few commented positively on it without reservation:

> "Pharmacology I enjoyed a lot. It was the first time the practical was worthwhile and the tutorials were too. We discussed how things worked."

2.4.2.

Most students, however, qualified their enthusiasm:

> "Pharmacology was very interesting, but impossible to learn. Too many drugs that were similar to each other but did different things. I could understand drug action and the basic principles of pharmacology but not the names of groups or individual drugs."
>
> (See Appendix)

2.4.3.

The substantial Pharmacology handout came in for comment. But only one student was unreservedly positive:

> "Pharmacology - it was a good course. They gave us a wad of notes at the beginning and that was good."

Other students were rather more critical of it:

> "They give you a nice book of handouts at the beginning. I tend now to leave my handouts at home and then make a few notes in the lecture... If you've made a few notes it becomes more familiar later when you do some revision."
>
> (See Appendix)

2.4.4.

Second year students approaching their Pharmacology assessment commented that up until about the middle of the second term much of the Pharmacology Course had "passed them by":

> "People just go through the Course collecting information and then they have to sort it out in time for the assessment. Now I regret it. Now it's just a matter of stuffing it in. This is a shame because now I'm revising it I find it interesting."
>
> (See Appendix)

2.5.0. The Behavioural Sciences

Students had been introduced to the behavioural sciences through the Man, Medicine and Society Course in the first term of year one. Some topics are expanded and developed in three separate courses: Psychology, Sociology and Epidemiology.

Psychology is allocated 50 hours and is spread over term three of year one and the first two terms of year two. The course is divided into two parts. The first is a lecture programme of core material:

> The areas covered include learning, perception, development of the individual, social introduction and deviant behaviour. (Prospectus, 1983)

Following this students are required to undertake two projects for which they must choose from a list of alternatives. These include:

> The management of chronic pain, the care of the elderly, educational problems encounted by school children, doctor/patient interaction, the treatment of the offender, and abnormal development of the child. (Prospectus, 1983)

Having chosen a project area, students work with a tutor in a small group. They are given suitable background reference and reading material and do much of the preparation of the topic themselves. The project essays are marked and assessed, and form part of the Intermediate Part I Examination which occurs towards the end of year two.

Sociology is allocated 35 hours and occurs during the first two terms of year two. In the past there was a lecture programme, just as for Psychology, and project-based essay work. But the lectures were highly unpopular and it is now taught through small groups and projects. Again students choose from a number of options and work under supervision and their essays count towards the Intermediate Part I Examination. The Sociology Course aims:

> To give medical students an understanding of the social context within which they and their patients will function. (Prospectus, 1983)

The third aspect of the behavioural science teaching is a 40 hour course on Epidemiology and Medical Statistics. This runs during the first two terms of year two, comprises a lecture programme and includes small group discussions on different subject areas for which students opt. Assessment is by means of an essay and an examination held on the first day of term three. The Course is designed:

> To demonstrate the scientific validity and medical importance of studies involving groups and populations with special reference to determining factors affecting the cause and prevention of disease. (Prospectus, 1983)

2.5.1.

Some students welcomed the behavioural sciences as a break from the rest of their studies:

> "The Psychology and Sociology I found particularly interesting. It wasn't just rote learning like Anatomy, not just cramming the basics in. I was thinking about things."
>
> (See Appendix)

2.5.2.

A few recognised their importance but found difficulty in appreciating them here:

> "It didn't really get off the ground for me and that's a shame because they are very important. But either they are seen as very important parts of the curriculum or you get rid of them. At the moment it's a waste of time and effort. Psychology is very interesting and it's vital really, but there's not the investment of time... They just skate over things."
>
> (See Appendix)

2.5.3.

But many students approached the behavioural sciences either with indifference or criticism:

> "I was not overimpressed...and I never got to grips with it...I didn't enjoy the Sociology at all. The essays were just another hurdle to overcome."
>
> (See Appendix)

2.5.4.

Most students found writing the essays was of some value:

> "The essays I quite enjoyed even the Sociology. Probably it was because I chose subjects of interest to me."
>
> (See Appendix)

2.5.5.

However, a number said that they found working on their own a personal challenge:

> "These essays were the only exams I did quite well in. You can take it away and look at it and read round the subject. I had control over the subject instead of being spoon-fed it. I wasn't just regurgitating facts like the course had been up 'til now...Initially I hated

> writing essays but when I started I really enjoyed it."
>
> (See Appendix)

2.5.6.

Some students were rather more neutral. They felt that studying one or two areas in depth meant not learning the subject as a whole:

> "These projects were good but I feel that I've only studied one thing in a course and I don't really know much about the rest, for example what Psychology is all about."
>
> (See Appendix)

2.5.7.
Some of the current second year shared this view:

> "Some of the things are so important that everybody ought to study them. Like care of the terminally ill which we looked at. Every medical student should have done that."
>
> (See Appendix)

2.5.8.

Quite a few students were equivocal about the projects:

> "With the essays we were given the references then you'd go and read them, paraphrase them and then just go and write it down."
>
> (See Appendix)

2.5.9.

A number commented on the amount of time the projects took either because they felt they had not gained much from the exercise or because it encroached upon other parts of the curriculum:

> "It's pretty jam-packed - especially in the second term. You've got three or four essays and then three systems courses to go over and then you've got to go back in the vacation and learn up for Part I's... You have to find time to fit in the projects."
>
> (See Appendix)

2.5.10.

A few of the present second year made the same comment:

> "You tend to feel you're spending so much time on essays that it's in the wrong proportion. You feel that you should be spending more time on hard facts."
>
> (See Appendix)

2.6.0. Introductory Course to Clinical Medicine.

In the third term of year two students have an Introductory Course to Clinical Medicine. This comprises a week of lectures and demonstrations followed by attachments of two half days a week throughout the term in which students are introduced to the work of the third year. The course presents some of the practical problems of working in clinical medicine, such as being at ease with patients, learning correct ward etiquette, dressing appropriately, etc. It also introduces students to history-taking and physical examination - known as 'clerking a patient'.

2.6.1. The vast majority of the students were thrilled, and a little relieved to reach this stage in the Course:

> "It was good. I enjoyed it. It was the beginning of better times. We were actually getting to do it on people at last."
>
> (See Appendix)

2.6.2.

Some commented that the Introductory Course helped them to see the rest of the curriculum in perspective:

> "I enjoyed it very much - it was great ...I found I was learning a lot. Bringing together things. I learnt far more about the Cardiovascular System and Respiratory System during this time than I had when I was revising for their assessments. And it was nice being in a white coat and being on the wards. You felt you were doing what you'd come for."

2.6.3.

Students commented on the different things they learnt from the Course:

> "It was good. It teaches you how to examine the different systems."
>
> "You were learning skills and talking to patients. It was a challenge."

2.6.4.

Several students commented that they were pleased to have the experience for other reasons:

> "It's extremely useful to learn about taking a history and examining a patient before the third year."
>
> (See Appendix)

One student, however, commented that he felt ill-prepared:

> "I enjoyed it I suppose, but felt rather put in at the deep end. Especially as some Systems Courses are not very clinically orientated."

He added that the amount you got out of it depended on where you went:

> "Some said it was dependent upon the batch you were in. The staff in some places weren't very interested, but I enjoyed mine."

2.6.5.

Other students felt that the groups were rather too large (about 12 students to a group):

> "It was good, well taught, but it was rather a large group to go and see a patient."
>
> (See Appendix)

2.6.6.

Most students enjoyed the Course but about a quarter were less than enthusiastic. One reason given was to do with its organisation:

> "I was very much looking forward to it. But the afternoons seemed so spaced out. Clinicians didn't turn up so it was a bit disappointing."
>
> (See Appendix)

2.6.7.

Several students felt that they had not gained much because of their own diffidence and nervousness:

> "It was jolly nerve-racking. I was petrified. But it's really a good idea."
>
> (See Appendix)

So the Introductory Course to Clinical Medicine appears to be a turning point in the student's life. Most welcomed it, but one student commented:

> "One girl left because of it. She felt she didn't know enough and that she might be picked on to answer questions when she didn't know anything."

SUMMARY OF YEAR TWO

1. Most students are relieved to find themselves in the second year which they believe "will be better." These expectations are not altogether met.

2. Most students prefer and like the Systems Course teaching with its multi-disciplinary approach and demonstration of relevant clinical examples. Students concentrate their efforts on these eight, concurrent courses at the expense of the consecutive courses.

3. Systems Courses account for nearly 60% of the timetabled time of the year as a whole and of over 80% of the timetable of the first two terms of the year. They dominate everything else, are taught by a lecture programme, practicals, demonstrations, and a few with small group teaching, some involving relevant case studies. Each course terminates in an assessment.

4. The other science courses - Biochemistry and Pharmacology - run concurrently with the Systems Courses, taking a quarter of the available time in the first two terms (18% of the year as a whole). Like the Systems Courses these are taught largely by a lecture programme with practicals and a few tutorials. Biochemistry is assessed at the end of the first term and Pharmacology at the end of the second term. Because students are concentrating on the Systems Courses many of them describe these courses as "passing them by" until the examination when they go back to and revise what they have been taught. Some students see Pharmacology as having links with the Systems Courses but most students describe it as being quite separate.

5. The behavioural sciences, introduced during the first year, are completed in the second. Separate courses of Sociology, Psychology and Epidemiology are run in the first two terms of the year. Psychology and Sociology are taught by means of small group discussion and are examined by project-type essays largely written during the second term. Epidemiology is lecture-based with small group discussion, and examination is by a written paper and by a project-type essay. The behavioural science courses account for 18% of the teaching in the first two terms (13% of the year as a whole). Students

hold a wide variety of views about them.

6. During the third term students receive an Introduction to Clinical Medicine. Nearly 40% of the timetable for that term (11% of the year as a whole) is given over to this Course which comprises a lecture programme plus practical work on the wards for two half days a week for eight weeks. Many students approach this time with a mixture of trepidation and eager anticipation.

3.0.0. YEAR THREE

In year three students spend about 80% of their timetabled time on clinical attachments. The remainder - two afternoons each week - is spent attending a lecture programme in Clinical Pharmacology, Clinical Pathology and Biochemistry with additional short courses in Clinical Genetics and Occupational Medicine. The clinical attachments are of two types. Most are spent rotating between Medicine (ten weeks), Surgery (ten weeks), Psychiatry (five weeks), Geriatric Medicine (five weeks), Child Health (five weeks) and Obstetrics and Gynaecology - O & G - (five weeks). The second type of clinical attachment is to Primary Medical Care which students attend for a half day a week.

Clinical attachments are quite a different experience from years one and two, spent largely on a hospital ward, being attached, in groups of between four and eight students, to a clinical unit (known as a firm). Students spend most of their time clerking patients - taking a history and carrying out a physical examination - sometimes with a follow-up seminar known as a teaching round. On some attachments - notably Obstetrics and Gynaecology - there is rather more formal teaching. During this five week attachment students are taught particular aspects of clinical medicine in that specialty through a clearly timetabled seminar programme. On most other attachments students learn from the cases they see on the wards.

At the end of each attachment students are assessed on the clinical skills they have acquired - their grades not being used in any accumulative way as an examination unless they have a succession of poor performances in which case they may be referred to a Student Progress Committee. The year concludes with an important examination - the Intermediate Part II.

3.1.1. Transition

About half the students who made some comment about the third year said it was "very good" or that they "really enjoyed it."

A few said, wistfully:

> "I enjoyed it. It's a pity that they're dominated at the end by the Part II's and all the work that you have to do for them."

Several students commented that year three was more like they expected Medical School to be:

> "Very enjoyable. The first time you got to do what you thought it was all about, coming to Medical School."
>
> (See Appendix)

3.1.2.

For other students the enjoyment of the third year was a personal one:

> "I really enjoyed it. It was pleasantly surprising to find that doctors weren't as awesome as I'd thought. They were even human and I was amazed at the change in myself."
>
> (See Appendix)

3.1.3.
Several students felt more motivated:

> "The clinical was very good. It was a very different form of learning. You are interested. You go back and you see a patient or you ask how they're getting on."
>
> "I hadn't felt like this in years one and two. Now I worked because I wanted to and I worked very hard."

3.1.4.

Other students saw it differently, suggesting that they felt the curriculum hadn't prepared them for this point:

> "The clinical side of things is very different and you are rather flung in at the deep end despite what they say about it being an integrated course. It's nice to see patients in the first year and they brighten things up, but no way can you say that the clinical course starts at any other time than in the third year. It's a big change from sitting in lectures to organising your own time on the wards. It's very different and takes some time to get used to it. At first you almost stand there waiting for people to come and tell you to clerk a patient and then you realise it's your own responsibility and that's quite different."
>
> (See Appendix)

3.1.5.

The enthusiasm of some students was qualified:

> "I enjoyed the attachments, some very much, others not quite so much."
>
> (See Appendix)

3.1.6.

Some students were apprehensive about the year:

> "I wasn't particularly looking forward to it. I didn't know what it would be like. ...I couldn't imagine how we'd spend our time on the wards. I didn't have many friends higher up in the Medical School to tell me what to expect."
>
> (See Appendix)

3.1.7.

One or two students commented on a change from being a student to being a doctor:

> "In the third year it really hit me. I was a typical student, jeans and baggy jumpers. It was a great change to have to look tidy as well as to study. It was going into a working environment from a learning environment that was quite hard...It was really quite a shock and I never really coped with it."
>
> (See Appendix)

Another student found the experience depressing:

> "I'm glad I just got through it. I didn't like what I saw about hospital medicine and how they treat patients in hospital but it's a means to an end. I'll endure it and do what I have to do to get through."

3.2.0. OBJECTIVES OF THE CLINICAL ATTACHMENTS

The Faculty of Medicine produces a handout for students which acts as a guide to clinical attachments and a timetable for their rotations. Early editions listed the following objectives:

> (a) to continue to develop the skills of history taking and physical examination:
>
> (b) to introduce you to the effect of clinical disorders on the patient as a whole, and on his family. (FM 1098)

These objectives, however, omit to mention one key feature of the Southampton curriculum - the overlap between pre-clinical and clinical teaching. The Curriculum Sub-Committee noted this omission in 1976 and asked the Clinical Curriculum Working Party to examine ways in which third year attachments could contribute towards a reinforcement of Pathophysiology. Now the third year objectives include a recognition of "the need to reinforce Systems Course teaching, basic sciences and the mechanisms of disease".

3.2.1.

Most students said "We basically learnt how to clerk a patient". Some noted that they clerked several patients but wondered how much they got out of it:

> "I only clerked one patient in the whole of the time. Nobody was pressing you or saying that you must clerk patients."
>
> (See Appendix)

3.2.2.

Others felt that third year attachments were rather more concerned with learning clinical medicine:

> "The emphasis in the third year it was more of clinical orientation...It was diagnosis and management becoming more important...The books gave you the clinical emphasis. I concentrated more on the clinical knowledge you had to learn."
>
> "The consultants want you to know what to do with a patient. It's more clinical management."
>
> (See Appendix)

3.2.3.

A number of students commented that seeing patients on the wards encouraged them to read around the topic and to look up these particular cases. Very few would refer to their own lecture notes, most used clinical textbooks, particularly one by Davidson and a whole series with the title Lecture Notes In ...:

> "Generally I didn't look up information if I'd seen a patient. I did it a bit, then in Davidson, not in my second year notes."
>
> (See Appendix)

3.2.4.

Several students commented on an ambivalent relationship between what they saw themselves as having to do in the third year and the courses they had studied in the first two years:

> "I didn't really draw on the second year work in the third year. You can do an attachment without it."
>
> (See Appendix)

One commented on almost resenting the intrusion of the basic science work into clinical attachments:

> "It was almost as though on Medicine you

> were expected to know your Physiology. You almost felt annoyed at the idea of being asked to do so. That was last year's work, not this year's work. It didn't relate. I certainly didn't bring any knowledge forward...You should do the third year first and then the second year."

But another student found that making the links between what she was seeing on the wards and the basic sciences helped to see it all in some kind of perspective:

> "When you were talking to a patient and taking a history and then you read it up afterwards, then, for the first time, it fits into place. But it seems more like new knowledge fitting into place rather than taking the old knowledge and making sense of it. You can't relate to the information you're given in the first two years. It doesn't mean anything. But when you see patients you have something to fit into your mind. That's how you remember things isn't it?"

3.3.0. <u>Remembering and Relearning</u>

This student raises two issues here. First, generally students felt unable to remember in the third year much of what they'd been taught in the first two years, and second that if they saw a patient with a particular condition and <u>then</u> studied the background to it, they would understand it all much more easily.

On some attachments, notably in Medicine, the small group of students would be taken, by their clinical teacher, to see a patient. On these 'teaching rounds' a history would be taken or briefly summarised, there would be a short physical examination of the patient and the group would return to a seminar room to discuss the case. During this discussion it would be typical for the clinical teacher to ask questions of the students which related to their knowledge of the basic science mechanisms involved here. It was under these conditions that students became aware of what and how much they could remember from years one and two.

3.3.1.

A few students unreservedly commented that they were able to bring forward knowledge:

> "You remember a few things. It's

> surprising what you do remember. Things hadn't gone. You could remember facts from year two."
>
> (See Appendix)

One student felt he was quite able to remember what he'd previously learnt. He was a qualified dentist:

> "I found that I could easily bring forward the information from the first two years into my clinical work. But then, of course, I'd been a clinician before."

3.3.2.

Some students initially felt they were able to recall information from the first two years but, on reflection, realised that it was more that third year teaching was helping them to learn, in some cases for the first time, information which had previously been presented to them:

> "I found that I was remembering work from years one and two, but it's really the other way round. I was finding that the third year stuff was helping revision for the other stuff (the first two years). I needed to go back to the second year stuff and expand on it from what I'd seen in hospital. It seemed so different seeing a patient with bronchitis than reading about it in books."
>
> (See appendix)

3.3.3.

A number of students commented that they felt they were able to remember <u>some</u> of their previous work:

> "Odd things I'd know...but most things my mind went blank. It wasn't very easy to relate from a patient sitting there to what you'd been taught in the first and second year."
>
> (See Appendix)

3.3.4.

Several students mentioned their lack of Anatomy knowledge on their Surgery attachments:

> "In theatre we didn't know the names of things. We'd forgotten them. You'd think 'oh it rings a bell', but it certainly wasn't on the tip of your tongue."

3.3.5

But the vast majority of students found they were <u>not</u> able to recall first and second year work when they came to their third year attachments. One student spoke for many:

"I found it frustrating. I knew it was in there somewhere. You knew it but it was as if the person questioning you was teasing you about it."

(See Appendix)

3.3.6.

A number of students felt a vague awareness:

"You can't always answer the questions, but when you're given the answers you'd say 'yes I know that'. Of course it's also having the courage to stand up and say things and I suppose that's one of the important things learnt during the year."

(See Appendix)

3.3.7.

Several students reflected that when they were asked questions on their attachments it was as though they had never studied these courses:

"On my Medicine, at the start, I thought I must have been asleep in the second year. Things came up and I was convinced that I had never had them before. I was very surprised at this. I went back to my notes and I found that we had done them before. I wondered how ever I'd got through the assessments in the second year."

(See Appendix)

3.3.8.

On one of the Medicine firms, two basic scientists, both Physiologists, attended teaching sessions on a fortnightly basis to forge links between the basic sciences and clinical problems. Some students found these valuable:

"They dredged up all the old systems work. This was good and useful, but it was very much from the depth."

But another student found this a most depressing experience:

"It was a good idea to have seminars...to apply your second year knowledge to your clinical cases...but not when you're being made to feel embarrassed by it all."

SUMMARY OF YEAR THREE

1. Students spend most of their third year on clinical attachments. Sixty-six per cent of their time is spent on ward-based attachments, twenty-two per cent in primary care and eleven per cent on taught courses. The clinical attachments dominate the students' time and effort. Primary Care and the taught courses were rarely commented upon by

interviewed students: the former generally received positive comments and the latter negative ones.

2. About half of the students interviewed commented that they unreservedly enjoyed their clinical attachments but a half of the remainder said that their experience had been variable. A quarter of the students said they did not enjoy their attachments.

3. Whilst on attachments students tend to focus on clinical matters - clerking patients (taking histories and carrying out a physical examination), diagnosing, management, therapy, etc. It was rare for students to see attachments as a time for consolidating knowledge gained in the first two years.

4. Generally students would read around the cases they were seeing by using clinical textbooks. Rarely did students refer to their own notes or lecture handouts from courses in years one and two.

5. Generally students were unable to remember much information taught during the first two years when it was called for. The type of forgetting experienced ranged from one extreme where the information was "on the tip of the tongue" to, at the other extreme, a denial that the information had ever been taught though, when the information was given, they realised that it had.

4.0.0. INTERMEDIATE PART II EXAMINATION

The Southampton Curriculum is unique in the United Kingdom in the timing of its major examination of students' basic science knowledge. All other UK Medical Schools hold their Second MB before students enter their clinical attachments. Southampton's Intermediate Part II occurs in early July after completion of third year attachments, and comprises five papers: three are essay type, one is called problem solving and there is an MCQ paper.

4.1.0. A Big Exam

For many students the Intermediate Part II Exam is 'big' in a variety of senses, partly because it is important:

> "I was conscious of the fact that I wanted to learn it so that it would be useful for the fifth year and later on, not just to pass the exams."
>
> (See Appendix)

4.1.1.

For others the exam was big because they saw it as threatening:

> "They really are horrific. Before an exam I get worried because I'm not worrying enough. I can go to sleep, not have dreams or anything like this when everyone else is really getting worked up. But for Part II's I'd wake up at one or two in the morning and then not be able to go to sleep for hours. It was really horrible. On the Monday of the first exam I was so tired I just wanted to sleep. I was so glad it was only three days. If it had been any more I just couldn't have done it."
>
> (See Appendix)

4.1.2.

For some students these exams were a big load:

> "It was partly the amount that we had to learn, but also the nature of it. When you looked at the papers they seemed to want so much detail."
>
> (See Appendix)

4.2.0. Getting Organised

As seen earlier students rarely referred to their lecture notes during third year clinical attachments. Thus, when beginning to revise for the Intermediate Part II Examination, they had to organise their notes, in some cases for the first time since making them several months or even years earlier.

4.2.1. A number of students commented:

> "They all seemed so disjointed. They seemed to make a fair amount of sense at the time but there was no continuity. They didn't form a whole pattern."
>
> (See Appendix)

4.2.2.

A few found their notes of variable quality:

> "When I looked at my notes the nervous system was a complete shambles so I didn't use those. Most of the rest were quite useful. I found that it had been worth writing notes in these. It cut down the amount of work you had to do."
>
> (See Appendix)

4.2.3.

Quite a few students saw the need to organise their revision time:

> "I got a plan - it's very important to get organised."

4.2.4.

But several attempted to work steadily throughout the year:

> "I started about mid-February. I had 25 weeks 'til the exam so I allocated two weeks to each course and then one every week and then one every couple of days."
>
> (See Appendix)

4.2.5.

A few students intended to start revision early:

> "I suppose some people say they're going to start at Christmas - the keenies that is - and they tell everyone so. So between then and Easter I thought 'well I'll start tomorrow, or I'll start today', but of course I never did. I started at Easter at home. I sorted out all my files and got myself organised."
>
> (See Appendix)

4.3.0. Revision and attachments

By Easter, then, most students were beginning their revision, but clinical attachments continued until just before the Examination.

4.3.1.

Students were thus faced with a dilemma: whether or not to focus on revision at the expense of their attachments or whether to attend the attachment and sacrifice some revision:

> "I was a bit panicky by the end and I couldn't carry on with my Surgery. That was my last attachment and I got into my pre-exam mood."
>
> (See Appendix)

4.3.2.

For a number of students this dilemma was frustrating:

> "Medicine was whilst I was doing revision for Part II's and I was sorry about that. You have to make this decision about going to the attachment or doing some revision."
>
> (See Appendix)

4.3.3.

Several students resolved the dilemma by giving up their attachment and focusing on revision:

> "A lot of attachments just shut down, but I did Psychiatry at the end. Sometimes I went in and there was nobody there so I thought 'oh well if that's the case, then I'll go home'."
>
> (See Appendix)

4.3.4.

However, in spite of the pressures of revision, a number of students attended their final clinical attachments:

> "I did O and G last and enjoyed it so I went in. A lot of people didn't"
>
> (See Appendix)

Indeed, a few students found that there was no dilemma - attending their final clinical attachment, particularly if it was Medicine, made a positive contribution towards their revision:

> "Medicine, my last attachment, was so interesting that I couldn't waste the opportunity. So I didn't. For example I had a stroke patient and so I went over the nervous system in the book and I found it all fitted into place, so it helped me with my revision."

4.4.0. <u>Learning for Part II's</u>

When students began to revise some were surprised at the sheer inadequacy of their notes.

4.4.1.

Some commented that they could not even remember writing them:

> "I didn't look at my second year notes 'til I came to revision. I got the impression

> that I must have done something else because I couldn't remember doing it."
>
> (See Appendix)

4.4.2.

Some were surprised at ever having understood them:

> "I discovered that I never really learnt any of it. I'd learnt it for the assessment but I found I was understanding it now, for the first time. I suppose it wasn't until I started revising for Part II's that I really began to understand it."
>
> (See Appendix)

4.4.3.

One student commented that she was surprised:

> "Looking back at my notes...I was amazed how much was relevant to the year. I'd always seen the second and third years as detached until I got to the revision. Then I realised just how much they had told us that was relevant to what we were doing in third year."
>
> (See Appendix)

4.4.4. About a third of the students interviewed based their revision strategy on what they had done for other examinations:

> "I always revise in the same way. I don't feel I have the time to do it differently. I just go through the notes."
>
> (See Appendix)

4.4.5.

A few claimed that this was not rote learning:

> "I read all my notes and made a summary of the essential points. Then you read through the summary. For Part II's it is not rote memory that is needed but understanding."

4.4.6.

Some students recognised their revision as rote learning and acknowledged, in retrospect, its inefficiency:

> "I looked through my notes and then got down to learning it...I tried to do everything and paid for it; I got a D."

4.5.0. Role of Clinical Experience in Revision

Students who revised in much the same way as previously share one characteristic - they commented that third year clinical experiences had not helped their revision:

> "Some bits seemed to have more relevance I'm not sure why. I'd like to say it was the patients, but I don't think I can."
>
> (See Appendix)

4.5.1.

The remaining students, two thirds of those interviewed, began revising as before but then changed their approach. All of them commented that the third year clinical experiences had helped them with their revision. For just over a quarter this had not been very great:

> "The clinical didn't help much, but it did a lot for a few specialised points such as heart failure or diabetes."
>
> (See Appendix)

4.5.2.

A few students felt that clinical experiences had helped their revision but that, at the time, they were unaware of it. Only when they were in the examination did they realise the benefits of their third year."

> "I could answer some questions without having revised them. There was one question...that I answered without really knowing anything about it. I quite enjoyed doing those questions."
>
> (See Appendix)

4.5.3.

But for several of these students clinical experiences greatly helped them to understand, sometimes for the first time, things they had been taught earlier on:

> "I discovered that I had never really learnt any of it. I'd learnt it for the assessments but...Now I was understanding for the first time. I suppose it wasn't 'til I started revising for Part II's that I really began to understand it."
>
> (See Appendix)

4.5.4.

One student felt that the revision not only made the work take on a new meaning but he was now finding it interesting:

> "Motivation was a problem...but once I started (revision) I really enjoyed it. It rekindled my interest in medicine again."

4.5.5. Some students noted that third year clinical attachments had significantly influenced their revision:

> "Things seemed clearer now...when you go back to your notes you really see how it fits in."
>
> (See Appendix)

4.5.6.

Some commented that their understanding now was dramatically greater than it had been in second year:

> "What did surprise me was how the physiology and the pathology fitted into the clinical work I had learnt. It fitted by going back."

> "After revising for Part II's I'd found I could understand it far better than I had done in the second year. Now you can relate one system to another."

> (See Appendix)

4.5.7.

Several students commented that seeing particular patients helped them in their revision:

> "A lot of the Pathology I found easy to learn after the clinical work. I could remember it for a certain patient I'd seen. After you've seen a patient it all makes more sense."

> (See Appendix)

4.5.8.

For other students clinical work helped them with their revision, not so much because of particular patients, but rather more because they now saw that the knowledge they were expected to learn had some application:

> "Doing Medicine really helped me. For every patient I had I'd learn that as a topic for revision and I would find that I could remember."

> (See Appendix)

4.6.0. <u>Intrinsic Reward</u>

A characteristic theme running through the comments made by these students was that revision was rewarding:

> "I really enjoyed it! It sounds strange, but I did. It was satisfying. I had seen cases and they made it easier to remember the theory."

> (See Appendix)

In short, the students who found "things coming together" were those for whom clinical attachments had facilitated their revision; it was not so much that they now knew <u>more</u> but that they now knew <u>differently</u>.

SUMMARY OF THE INTERMEDIATE PART II EXAMINATION

1. Many of the students interviewed saw the Intermediate Part II Examination as being big. Of those who did, a quarter saw it as being important, whilst another quarter saw it required a great deal of work. About a half saw it as being stressful.

2. Most students saw a need to get organised well in advance though about a third reported that their plans had not worked out. A number felt that the final attachments interfered with their revision but a few commented that attending the attachment positively aided their revision.

3. About a quarter of the students interviewed began their revision well before Easter. The remainder started at Easter or shortly afterwards.

4. When students started to revise several reported surprise at not being able to remember having been taught what they were reading.

5. Most students began by revising in the same way as for previous examinations. About a quarter of the students interviewed approached their revision by "brushing up" on their previous knowledge. The remainder found that, whilst revising, they changed their approach, largely because clinical experiences seemed to help their understanding. They spoke of "things coming together".

6. Many of the students who experienced a 'coming together' reported that their revision had been an enjoyable and satisfying experience.

5.0. How Permanent is this Part II's Knowledge?

Fourth year students were interviewed about four months after they had taken their Intermediate Part II Examination. In the intervening period they had been on an elective, many to an overseas country and some to the Third World. Each had experienced some form of clinical medicine.

5.1.

A few students commented that knowledge acquired for the Intermediate Part II examination was already "slipping away":

> "...it's heart-breaking. All that time I spent revising and it's disappearing already."

5.2.

Others were less certain, though they felt their knowledge was unlikely to be permanent:

> "I am aware that things are going even now. Though some of it is there - the Respiratory physiology and the Cardiac physiology - they make sense, it's applicable, it's relevant...You've seen it in practice unlike some of the obscure Biochemistry. That you learnt for the exam and it's gone again."
>
> (See Appendix)

5.3.

But many felt that on their elective they had been able to recall what they had learnt for the examination:

> "(The Elective) pulled back some of the knowledge (I had) but I felt even this was going. That was worrying."

5.4.

Some students felt that what they called "Part II's" knowledge had not been called for since electives were rather specialied. However, the remainder - well over half the students interviewed - reported that Part II's knowledge <u>was</u> need, <u>was</u> coming forward and that <u>they could remember quite a lot of it</u>, irrespecive of the type of medicine they were exeriencing:

> "On my elective I realised how much more I knew now and I remembered it all and felt much easier...especially mechanisms such

> as diarrhoea. It fitted more into place when I was revising and now I have a better knowledge of it."
>
> (See Appendix)

There is then a prima facie case for suggesting that for some students the knowledge gained for the Intermediate Part II Examination is rather more durable than that acquired for other examinations.

APPENDIX 5

SUPPLEMENTARY INTERVIEW DATA

Introduction

In Appendix 4 data from interviews with students were presented chronologically. Selected quotations were given to indicate the type and variety of experiences students had of the first three years of Southampton's undergraduate medical curriculum. For the sake of brevity, generally only one comment was included which illustrated the point being made. In this appendix further examples are given in order to elaborate and further substantiate the evidence. A numerical coding system was used, and the same one appears here.

Additional data

1.1.1.

"I enjoyed Anatomy, I thought it was good...It was well defined and I could keep up with it. I went to the lectures and found they were quite good introductions to what was going to be shown you in the Anatomy Room."

1.1.2.

"You'd get a lecture which was a general introduction, which didn't attempt to teach you the Anatomy. It couldn't in the time. They tried to parcel it up into easy bits, in the lectures. For example if it was an arm they'd tell you about the extent of the muscles and the root of the radius nerve and so on. So they did give you tips and hints. But overall the lectures weren't very useful. They were so boring after five minutes you'd just had enough by then. The information would just go into your ear and come out of your pencil, connecting with nothing in between. You couldn't remember the day after if you'd been to the lecture or what it had been on."

"I would make notes on the lectures but never use them again because it was all in the textbook. Some of the lectures were very frustrating and I never grapsed it at all. I wondered whether it was because I was taking notes, because if you just sat back and listened you'd try to get the general principles and that was better. Looking back, the lectures were trying to give you the general principles and broad outlines of what was coming up in the practicals. It would be more use if they told us this and told us not to take notes. But everyone was furiously writing so I thought I'd better do so as well."

1.1.3.

"For Anatomy I'd go to the lectures but they weren't very useful. They'd presented information but it was difficult for me to get it all down in a neat, compact form that was useful or easy to revise from. I just listened in the end and stopped taking notes."

"In the lectures I'd make some notes and I've got a big fat file of them but really they're a waste of time. I'd have been better off if I'd just have gone along to the lectures and not taken notes and just listened. All of it is in the books. If I'd known that then I wouldn't have bothered to take notes."

1.1.4.

"The lectures varied a great deal from person to person. Most of them were wishy-washy. Generally they weren't very good. They'd perhaps make a couple of points. But (lecturer's name) was best. He tried to set the scene. For example he'd try to tell you about the ligaments that hold the knee joint together. He'd give you a path to follow and you would remember it afterwards, otherwise you would just read it up and forget it. The peritoneum was good. It all clicked together in one minute and I wondered why I hadn't seen it that clearly before."

1.1.5.

"I feel it is better if you have a handout beforehand so that you can read it before the lecture. It's better to cover it in advance. If you can read the subject beforehand you can understand it such that when you listen it sticks. If you get it verbally before you've got comprehension then you can appreciate the significance of the facts when they come."

"The lectures didn't teach you very much. I found it was very hard to get to know what they were getting at. You'd know that it was the arm but if you hadn't read it up beforehand, which ideally you should do, you haven't really got much clue what it's all about."

1.1.6.

"I spent hours up there. All of my spare time. It was absolutely ridiculous. Even Wednesday afternoon when we were supposed to have the time off. All the timetabled time, but this bore no relationship to what I was actually doing. I suppose I doubled that time. Sometimes I thought that Anatomy was the only thing I was doing that week."

"All I could remember about Anatomy is hours in the Dissecting Room...I went up there (at the scheduled time) and I'd go for a few hours afterwards. Perhaps three or four more hours and on Saturday mornings. I suppose my total for the week would be about ten hours."

1.1.7.

"I'd go into the lab and work on the boards. I suppose I'm not a very diligent worker. If I couldn't cope I'd just go out. The atmosphere in there was awful. People reeling off to you what they knew, etc. There was too much information you were blinded by it."

"The problem was having sixty people in that dissecting room. Everyone was chatting and you can't really learn in that way. I stopped going there in the week and only went there on Saturdays. It's more of a social meeting place, otherwise it was a waste of three hours that you could spend in the coffee lounge."

1.1.10.

"I copied great chunks of it down off the boards, copying down nearly everything. But I found that it didn't get through to me."

"At the beginning I copied notes from the boards, but very soon realised that this was taking up too much time and I'd got the book anyway. Most of it was in that."

1.1.11.

"I would read the boards, sometimes I'd copy it down, especially at the beginning. Everybody seemed to be doing that and I was part of a group at that time. But I opted out because I thought it was pointless just copying it all down: it was all in the books anyway."

1.1.12.

"In Anatomy I didn't learn much going round the boards. Mostly it was from looking at the dissections. It was good when they were labelled and I'd have liked to have spent more time on the dissections. The boards were all words. I found that if I spent the time looking at the dissections I could see what it was all about. Unless it was visual I couldn't remember it. The boards were just a long sequence of things. For example if you were studying the biceps you'd be told that they were attached here, here and here. But this would be a lot of words. But if you see it in the dissection, that helps you understand it. I think early-on I wasted a lot of time on the boards."

1.1.13.

"I'd look at the boards and dissections and mix the two to fit in the relevant bits. I'd go back and look at the board again if I found it difficult and I'd write down what was on the board. That way you know what they want us to know."

"I took notes to try to get some idea of what was important but you could read a whole board and it would take two hours and you'd not know at all what you've just read. I'd look at the dissections to work out what was what. I'd do a board and then the appropriate dissection and then another board often working backwards."

1.1.14.

"In the evening I'd read Snell. I'd go through the same stuff. I'd read chunks of it and try to repeat it to myself, but I had to understand it before it came in, otherwise it was just verbiage which didn't stick."

"I would try to relate it to the book in my mind and then I'd know what it was. I'd just read the book over and over again to force it in...The books are 'clean' but the bodies are a 'mess'. You've got to try to get a picture."

1.1.15.

"I would go to the lecture, then spend something like three hours going through Snell and then go to the Anatomy Room. I would always go to the Anatomy Room at the end of the sequence. I find it best to do this because you know what the Anatomy is, you know where the muscle attachments are, so that when you go and see it you can pick up a piece and recognise it and then check it out on the little tags."

"I'd spend about half an hour to an hour looking at the boards. I'd go round them for the main headings. I wouldn't take notes, I'd just skim through them. Then I'd spend a couple of evenings with the books, Snell in particular, and read through and learn each of the points trying to get a picture in my mind of the Anatomy of it. I didn't learn it to remember it but to recognise it again - to understand it. Then I'd go back to the dissections and look at them. Look at the bits, then look at the labels to see if they were what I thought they were going to be."

"I would use a textbook. It helped if I looked at it before I went into the dissection room. And then after I'd been in I would do some more book work. You've got to look at the books first. Things stick in your mind more and when you see it it is more familiar, things piece together more. I always feel you have to reach a stage to get a grasp of things, then things fit in more. And when I looked at things I didn't worry about the minute detail I just got the basics. You can add the detail to that later...I had a good grasp of the principles so the facts were easier to learn."

1.1.16.

"I was amazed by the Anatomy. You know that medics have to learn a lot. But all of this...In the end you just have to learn it and it's all forgotten. You just do it. It's something you've got to go through...I'd look at the boards and the bodies. I suspected it was a waste of time and in retrospect it was. But I was scared really and when you are 'caught up' you don't experiment with the ten different ways of learning. You pick up bits and bobs and I don't feel that I've picked up any less than any others."

"Anatomy was overwhelming. Loads of isolated little factlets to absorb. All those boards to read and learn."

"Anatomy was a pain. I don't normally learn lists. Some people do. I learn generally by getting a broad idea and knowing how to apply. But I couldn't do this with Anatomy. You need to know the facts. In the assessments they wanted the facts. It wasn't that I didn't know the stuff, I just couldn't do the questions. The assessment finds out what you don't know. I wasn't giving them what they wanted. They wanted facts rather than general knowledge. So I just sat down and learnt the facts until I could remember them, 'til I could recite them over and over again parrot fashion. I had lists on my wall and I'd look at them and try to memorise them."

1.2.3.

"I couldn't cope with the numbers which is silly because I was quite good at Maths at school."

"The biggest problem was the Maths. I still can't do it and in any case a lot of it is repeated in years two and three. If you've done Maths A-Level then that part of the course seems to be much easier. And some people are lucky because they have done all this in A-Level Chemistry as well."

1.2.5.

"I went to the lectures and took notes all the way through, but I've struggled with it. I tried to make an extra effort but found it difficult to get myself motivated to learn facts. There were not a lot of principles behind it."

"People told us that all you've got to do is to know the pathways...I knew that if I'd learnt them a month before the assessment they'd be gone so I left them 'til about a week or two beforehand. I wouldn't like to learn everything in that way only one or two things. I wouldn't learn things in that way that I wanted to remember. Lists are to be learnt by rote, but if it is about diseases you wouldn't use rote."

"A lot of it is learning by rote - the pathways, sequences, names, etc...You've just got to get down and draw it out and learn it. I certainly couldn't do those now."

"Biochemistry...was my nightmare of the first year. However hard I tried I couldn't do it. It made me feel so stupid and it's not worth it now. It's not worth all the stress. You don't use it. I could learn the cycles. The pathways weren't so bad. You learn it but you don't understand it."

"I just learnt it all by heart. I used to write poems to learn the pathways. That helped a great deal. I'd make them up. If I could remember the poem I could remember the pathway. But I started one question in the exam and I forgot my poem so I had to change the question."

1.3.1.

"Pathology I enjoyed. It was the best course. The lecturing was very good and the practicals good as well. It's new and it's interesting."

"Pathology was good. It's all good here - the Pathology. They're keen people and enthusiastic. They're young and the tutorials were good...You're not learning things off pat. It sticks because the lectures are good. They use different approaches to get the facts in. Slides, tutorials, practicals, etc. Having different approaches helps. It's not just facts, it's general theory that you grasp - the principles of disease and processes."

"The Pathology was enjoyable, in fact I enjoyed it most. It was well taught. There were handouts, regular tutorials, practicals and so on. It was presented in such a way that you could understand it more easily and this made it interesting. It was more like real medicine. They were good lectures and good lecturers."

1.3.3.

"Pathology I enjoyed. Things fitted together, unlike Anatomy where it was learning and no joining together. In Pathology it seemed to mean more. You see the manifestations of such-and-such a disease."

"I really enjoyed Pathology because you were seeing how things worked out and interesting things were taught. It wasn't so dry as Anatomy or Biochemistry. You saw things functioning. It was taught well."

"Pathology I enjoyed very much. It seems to have a lot of clinical relevance. The relevance is obvious, unlike Anatomy. It's well taught. It's a mixture of different types of teaching. The people seem enthusiastic. The handouts were good."

1.3.4.

"They gave us good handouts and I concentrated in the lectures and annotated the handouts as I went through. I did use the textbook for tutorials though. I'd look something up using it rather like a dictionary."

"Pathology was fine, I enjoyed it, it was very well taught. Getting the handouts in advance was good. I prepared before the lectures...but the Pathology lecturers were very good anyway. They came across as being interested in it and they enjoyed teaching. It all seemed to bear much more relationship to medicine."

"The handouts made a lot of difference. If you don't understand a point in a lecture and if you don't have handouts then it is lost and there is a whole blank space for about ten minutes and you don't know where you are. But if you look at the handout afterwards it might have filtered back. The handouts were good enough to revise from, and the notes that you made from these were much better."

1.3.5.

"In Pathology if you learn the lot, then you will pass. But to get an A or a B you need to read much more. I didn't use a textbook. I felt it was too big and not relevant. You pick it all up later in the systems courses anyway."

"In Pathology you learn a lot of the basic stuff like 'what is inflammation?' I didn't pay much attention to it in the first year. They recommend the textbook - Muir's. But it's horrible. I sat down to read the first Chapter and never got any further. I've never looked at it again. Perhaps it is a good book but not in the first year unless you want to become a Professor of Pathology, or something like that. In any case, they said that the handouts were good enough."

1.4.1.

"Physiology was alright. I'd done it all in Biology. It wasn't very difficult for me."

"Physiology was easy going. It was quite nice really, you just sat down and you knew what was going on."

1.4.2.

"Physiology I can't remember much about. The lectures were quite good. Quite a lot of it was just like A-Level Biology which I had done."

"Physiology I used as revision. I had covered it all in A-Levels but didn't take much notice of it."

1.4.3.

"Physiology was a waste of time. There was no particular rationale behind it. It's all done again in year two anyway when it's properly explained to you. In any case I had A-Level Biology."

"Physiology was a dead loss, a stupid course, not related to anything else. I couldn't quite see why it was there. It was taught again, in fact, in the second year. There is no real benefit in the second year for having studied it in the first year."

1.5.2.

"I enjoyed the Course. A lot of people didn't, it was a bit tame and there wasn't enough depth. But it did give you some ideas. For example about the third world, health issues and social factors and so on. It made you realise whether you saw these as issues or not. But if you didn't is wasn't hitting hard enough. It was really preaching to the converted."

1.5.3.

"There was too much time spent on it. Perhaps it would be better later on."

"It was different but I think perhaps it was a bit too early on in the curriculum. We didn't think much about medicine then. It was just something you put on your UCCA form."

"All I can remember is a few what seemed to me to be irrelevant lectures. I can't remember a thing about them now. I couldn't really see the point of them."

1.5.4.

"I enjoyed the lectures. I didn't concentrate very much on them because we didn't have to know it and there was pressure from all the other things."

"I don't think it got off the ground for me. It was partly being swamped by the other subjects."

"It's a shame about Man, Medicine and Society with all that Anatomy to be learnt. So the Course isn't taken seriously by the students, even though it's much more important for what most of us are going to do."

1.5.5.

"I guess you went to the lectures and sat back and listened but you didn't take them very seriously partly because of the other pressures."

"It was a slightly less pressurised hour or two in the morning in amongst all those nasty lectures."

"We'd have seminars which made you do something yourself. And it was good to talk about it all."

1.5.6.

"I found I wasn't attending later-on in the Course. I suppose I thought it was a waste of time. A lot of things they were saying you either take for granted or you already think. So you think to yourself 'I already know this and I don't want to sit there and listen to someone who has got the same thoughts as mine'."

1.5.7.

"I can't remember what they told us about."

"Man, Medicine and Society was quite interesting but it didn't have much impact on me."

"It was not a lot of use. I can't remember much about what they taught us. A lot of it seemed common sense. They were saying things we already knew. Physiology was also saying what we already knew but you thought that may be useful later on."

1.5.8.

"Man, Medicine and Society is not as important as it is made out to be. In reality the first year is just like a traditional first year. You learn the basic sciences but you also do go out and see some patients as well. But you don't pick up that Man, Medicine and Society is an important part of the Course."

"Man, Medicine and Society was a terrible disappointment. You expect things to be more controversial and relevant. They could have allowed more time for discussion. But there is no time and there is no encouragement."

1.6.1.

"Early Medical Contact was a great relief. It's something that is really nice about Southampton."

"Early Medical Contact was very, very good. I really appreciated it. We actually saw a patient."

"Early Medical Contact I really enjoyed. It made the year. It made you realise that that's why you were doing medicine. It was good to meet people. When you are snowed down with all those lectures in Anatomy it was very good."

1.6.2.

"It was nice in that, whereas you seem to spend all your time in the lecture theatre, reading and learning, all of which seems unrelated to being a doctor, in Early Medical Contact you went out with the doctor and saw people. It's a pity that all your work couldn't be heading that way."

"Early Medical Contact was good. It was a change of pace. One minute you were trying to learn and being bogged down with the elbow joint and the next minute you were talking to somebody. And you could tell yourself, 'if only I can get through this, then it'll be alright'."

"Early Medical Contact I enjoyed. The whole of the first year is so detatched from what you thought had to do with being a doctor. It's so nice. You don't learn much but it brings you more in touch with what you're going to be doing in a few year's time."

1.6.3.

"I was a bit bemused by it. I can't remember if we had any lectures. I suppose there were, but I didn't really know what we were supposed to be doing. I'm a bit of a shy person and I was much more so in those days. The GP said 'Just go and ask questions' and I didn't quite know what to ask."

"Early Medical Contact was quite good. It was very nerve-racking at first but it seemed quite good after that."

"I'm glad I did Early Medical Contact. I was a bit terrified about seeing patients...I knew I was going to be scared with patients and I suppose the more contact you have with them the better. It builds up slowly."

1.6.4.

"Early Medical Contact was quite fun. I had one or two interesting talks with people, but I felt so ignorant and I still am."

"I didn't really get the hand of it until the third or fourth visit. I didn't realise that all they were interested in was looking at the people's homes and the social setting. I thought it was all about the pathology and of course we didn't know anything about it then. Perhaps it had been pointed out to me but I missed it."

"Early Medical Contact I quite enjoyed even though I hadn't a clue what was going on. How beneficial it is I'm not sure. It's a break and it's going out with a doctor, but I'm not quite sure."

1.6.6.

"It's not as big as the prospectus makes out."

"The Medical School makes it seem bigger than it really is."

"Early Medical Contact is farcical. It's built up to be more than it can be. It's pleasant, that's all."

"Early Medical Contact I enjoyed, but I had thought that there would have been much more of it. I was very surprised. I don't think Southampton is very different from other medical schools. I've got friends in London medical schools and it's just the same. I think Early Medical Contact is just window-dressing."

1.7.1.

"I stopped revising after Easter for about six weeks and I went back to going in and seeing what was going on. Then I got down to some revision in the last four weeks. Not that I didn't feel motivated, but I thought that I'd feel more motivated if I'd had my own time to do it in. The Primaries were not a big thing. They didn't really affect me."

"I never really worried about them like I did for A-Levels."

"The assessment was just by the way."

"They didn't bother me too much. I started with a revision timetable at Easter. But what got me down was that our exams aren't until the nineth week and all my friends, who aren't medics, finished well before then. I didn't get into a panic until the end and only then because people were finished."

1.7.2.

"Primaries were tough. I didn't think I'd pass them. I know that if I'd failed them I would have left. By now I was fed up with medicine...I was fed up partly because of the exams and the fact that they are so much later than everyone elses. It's tough if you're in Hall when everyone else has finished."

"It was a big exam and I got in a state about it. I just wasn't sure how well I'd do. It's two weeks after everyone else's exams and that's hard."

1.7.3.

"The year group as a whole had a lot of tension so I went home to study."

"The pressure of Primaries built up over the year but I didn't really feel it until the last three or four weeks. The biggest problem is everyone else sitting down and having coffee and saying how much they'd done, and what they were going to do tonight and so on. I went home for the last week to do revision and get away from the pressure and for a bit of piece and quiet."

1.7.4.

"I looked at past papers and decided what was important and what they would ask and try to predict the questions that would come up. You could do that with Anatomy and a few of them did come up. But the Pathology I just learnt the notes and that was a bit difficult if you don't understand it as I didn't."

1.7.6.

"That year I learnt everything by heart."

"With the Biochemistry I was just learning it. For the Anatomy I'd read the boards in the Library again and the textbook. Pathology just got left. I was just reading it over and over again. I got into something of a panic. I ended up not quite doing it all. Biochemistry was certainly learnt by rote."

"I slogged away at Snell, spending a lot of time in the Anatomy room...I revised by reading things over and over again ...Biochemistry I drew up the Pathways and stuck them on my walls. But I didn't spend much time on it...Learning pathways is the big thing and it's absolutely parrot fashion."

"I revised Anatomy straight from Snell, in the end I read it about six times. I found I could read it in a day in the end. I managed to learn just by reading things over and over again. I can take in information in that way...For Biochemistry I just made notes on the Pathways. It is parrot fashion in a sense, but you have to know what is going on in them. I suppose I couldn't do them now but I suppose I know vaguely what is going on. It does seem a waste all the short-term memory. For Pathology it was all from my notes and handouts. I had a good set of them and I made a few extra notes from the textbook. But Pathology is more understanding than say Anatomy."

"There's not too much to understand in Anatomy so I just memorised it...Pathology I tried to understand but Biochemistry is just the Pathways. It's a matter of memorising them."

1.7.8.

"I did think of giving up. I had had a lot of difficulty choosing what to do for a career. That's a bit awful when you think of it with all those people wanting to come to medical school. But I did sometimes wonder 'why am I slogging my guts out to do all of this?' Really I would have liked to have been an actor."

"From past experience you learn for yourself that what you learn for exams you will forget...I thought it was highly unlikely that people would retain this, nor that they would have to use this knowledge. I suppose they are caught in a trap in the first year of the medical school; doing what every other medical school does. But I feel they are wasting people's energies. Why don't they do anything that is relevant to medicine?"

2.1.0.

"I enjoyed the systems courses. It is nice to have a compact way of bringing it altogether. It fits neatly into place and you are moving from medical science to disease processes. You're seeing why things are happening. In the first year I think I wasn't awake enought to all of this. We were having to learn so much Anatomy and things like that, that the goal was almost learning those things for their own sake and you are not particularly aware of anything else."

"You start by thinking 'God, I made it'...(but) it's all tied together, not pulling in different directions like the first year when you'd like to study some more Pathology but you can't because you have got all the Anatomy. Less rote learning and more concept and understanding...They're talking about diseases, about normal and how it goes wrong and you felt you're getting somewhere. There's less pressure on your time."

2.1.1.

"It all got a lot more interesting, I suppose because after all the slog of Anatomy to actually be doing systems with the Pathology and Physiology as you went along made it much more of an interesting approach."

2.1.2.

"I found it not as demanding but it had to be kept up with. You had to make sure that each day's lectures were understood to be able to cope with the next day. I spent two or three hours each afternoon or in the evening to go through it all."

"The second year is a bit different. As well as the basics you've also got the clinicians' approach which gives you some relevance. It makes you feel 'I ought to learn that - that's important.' After the first year...I feel that I'd sorted out my own work routine a bit. I realised how to get on top of it all."

2.1.4.

"It started off OK. I quite liked it, but as it went on it just got less good."

"I didn't like it. It's lectures, lectures, lectures ... I'm really glad the second year is over. I suppose I took it too seriously. I should have done what others do and not go into lectures, and do it all using my own reading. But I feel that I do get something out of lectures. But then you don't have the time to read through. I never felt that I had time to myself for the whole year. I knew that if I didn't go to lectures I wouldn't do the reading, so I might just as well go to the lectures."

2.1.5.

"The pressure kept up. It wasn't so good. You just worked for the exams. It's those that motivate you, not interest. Interest gets in the way. And it didn't seem so interesting."

"I entered the second year thinking 'great - less work' but it wasn't. Most irritating thing was that every few weeks you got psyched up to do one of the assessments. It wasn't so much the assessments but just the feeling that if you failed a few you might be asked to repeat the year."

"It's just assessment after assessment. All this talk of integration - it doesn't happen. I failed most of my assessments...I was summoned before the Dean and he told me I'd have to repeat the year if I failed any more. I went to lectures then and took it all more seriously. I thought that if I'd been asked to take the year again I just wouldn't have. I'd have left. But I did make an effort and, after all, being a doctor is what I wanted."

2.2.1.

"I missed very few lectures. I'd take notes and use these as a basis for my revision, perhaps going over them three or four times in the week prior to the assessment. I did use some textbooks but not very much."

"I went to the lectures and got the notes. You think this will be enough. But I don't think that I got the basic concepts because in third year I used a textbook on basic physiology and some things I hadn't even realised they said in the second year."

"I worked from books. I went to the lectures at which I'd write a few notes, but the lectures were there for guidelines on what to learn. Then I'd read about it and make some notes afterwards to get it clearer. I wasn't really making comprehensive notes, just headings...For the assessments I would read over the notes and the printed handouts of my own lecture notes."

2.2.2.

"I just sat and listened and got a grasp of what they were talking about. I would use the apropriate textbook and generally went to the lectures, except when they were first thing in the morning, and I didn't want to get up...I just read through the books for the assessment. My grades were not brilliant but they were not bad. I was quite pleased to pass most of them."

"I'd go back and use the book. In the assessments I'd go through the subjects covered in the course by looking at them in the books. I wouldn't read the whole book, but the books they recommended were good and very helpful. You could learn the whole of the course from the book and you wondered why they had a lecture course."

2.2.3.

"I suppose it was understanding and learning; more understanding this year. There's less hard fact in Systems Courses, more physiology which you don't learn off by heart. More acquiring principles and just understanding it."

"I find it easier to try to understand things, it's much better than pure memory. My memory is not so good as others in the group."

"If you understand something you are pleased about it and you can remember it later."

"For the assessments I'd read through my notes once or twice depending upon how much time I'd got, and I'd do this to try to get a clearer understanding of it. I'd make sure I'd got that. That was the most important thing. I don't learn things parrot fashion. It's more important to understand than to have a memory of things."

2.2.4.

"You revise for the assessment in the last week. You read through your notes a couple of times, a lot of it pure fact, though the physiology you could work out. Most of the Pathology was facts to retain."

"I don't find it very easy to learn from books, it's easier to learn from your own notes. It was cramming a lot of the time and it went away just as quickly. Not quite all of it but most of it...I was a bit worried about the amount of forgetting. I could just remember things for a short time."

"It's just fill up and churn it out. You learn it the night before and then forget it. It seems so pointless, you think 'why am I slogging my guts out for this stupid test when I'll have forgotten it next week'. One of the problems is the bulk of it all. I felt that I only had so many square centimeters of space in there (the head). I felt as though I needed to build on an extension!"

2.3.1.

"Nutrition, I don't remember anything about."

"Nutrition I didn't really attend much of and got a B."

"Nutrition didn't get off the ground for me. It was just a matter of learning the notes and a lot of it was repeated in the third year, but of course you don't realise that at the time."

2.3.2.

"Nutrition, to be honest, I couldn't find any use for. So far I haven't used any of that information."

2.3.5.

"Biochemistry I'm not impressed with. I really enjoyed Biochemistry last year but I've done very little work this year. A lot of information seems to be the person's own research. We had one series of very complicated lectures and at the end of about half a dozen he said 'you won't need to know much of this'. That all seems a waste of time."

"I went to the lectures but it's more waffle. (One of the lecturers) came in and asked us what we would like to hear about this year. I thought the Biochemistry lecturers got together and decided what we needed to know and he came here and asked us what we'd like to do. It seems stupid. I didn't get to the rest so my notes don't make any sense and I can't see where I would ever need them."

2.4.2.

"The Pharmacology I wasn't too impressed with. A bit too much of a factual learning exercise."

"It's a funny subject. I was founded in the days when there were six drugs and now there are thousands. And they expect you to know everything about their interactions, their half lives, everything, it just makes you go crazy."

"Pharmacology, well you've just got to learn it. Learn it to pass the assessment that is. After all you're not applying it at the time."

2.4.3.

"You get a nice folder given to you. It's so easy to sit there and not listen. What you end up doing with the handout is to listen to the things that aren't in it and then write that down and you get quite good at that. Maybe we depend too much on the folders. We would be better to use a book. But Pharmacology was just rote learning."

"The Pharmacology I didn't seem to learn much of, but they were well-organised, they had a very big handout. Perhaps it was a good con-trick."

2.4.4.

"Going back to the notes there's a lot of things that I just don't remember doing...The trouble is the systems courses, every two or three weeks have some examination and you are busy revising for that and you really put the rest off...I feel that a lot of my Pharmacology revision is starting from scratch."

2.5.1.

"They were good to have. It was nice to see things in a different way."

"Psychology was interesting - the only thing I went to most of the lectures in. Sociology was interesting too but the lectures were rather boring."

"It's the bit of the course that is really good. You've got to think about things. The rest wasn't at all stimulating. At school I did Nuffield A-Levels. These make you think and you don't do rote learning. I thought Southampton would be a lot different, that's why I chose it; but in effect it isn't. There's still the emphasis on rote learning. I was living with people who were doing interesting things like Politics and their courses seemed much better. I felt that mine was destroying my brain. I like reading, for example, but it all eroded the time for anything else like that. But I realise that memorising didn't count for anything that's of use to you."

"I went into the Psychology and the Sociology feeling I didn't need it but I got very interested...I got good grades, better than my science."

2.5.2.

"The Psychology and Sociology are interesting but this place has a reputation for excessive Psychology and Sociology, and you can get away by doing lip-service to them. You just do the project and I wonder if the approach taken at Southampton is as good as it should be. These subjects are big, they are more like Arts than Sciences, and you really need to teach yourself. It's difficult for science students who are used to being fed facts to suddenly start to learn an Art subject. Most of this passed me by. I did what I had to do, at the last minute."

2.5.3.

"I can't remember much about them. I think they're a waste of time. Really even more so in the second year. In the first year I thought perhaps it must be good if they had decided to put it in the curriculum."

"The Sociology and Psychology I didn't bother going to. For me these, and Epidemiology, were non-existent. I didn't bother."

2.5.4.

"The lecture course was very poorly attended. It's really embarrassing how few people turn up. But I went to most. I was brought up not to scive and so I didn't. Not because I was interested but, just because... They weren't valuable. I learnt more doing the essays than I did going to the lectures. I think you learn a lot when you go away and do something."

"The essays were interesting and it gave you more time to go away and do the readings and to be a normal student."

2.5.5.

"I quite enjoyed doing the essays. It gave you something to do on your own. Not just learning."

"The projects were good. You were doing something yourself ...I got a lot of information out of it...I find it good for me to read something up, think about it and write an essay. We hadn't written an essay for a long time."

"It's nice to get out and read and think and put it down on paper. You felt you'd actually done something. It's nice to read a book and enjoy doing it. You don't do that in Medicine usually."

2.5.6.

"It's nice to learn a topic in depth but you miss out a lot."

"The projects were alright but you were only doing a couple of them. Perhaps doing a short essay would have been better so that you could move on to other important issues."

2.5.7.

"Subjects like Psychology are fascinating. But what we have is pathetic - just one topic out of all that. You have to spend hours reading it up and writing an essay, and what good does that do you?...They should give us a series of lectures."

"It's such a small area that you have to work on. I can't really see why we need to do so much about so little. It seems as if it's just a way to pass the course, writing an essay. You put one in and you pass. I really don't know how much use Sociology will be to my degree... really think it's a waste of time and Psychology is just the same...My Dad's a consultant and he is very critical of Sociology and I suppose that's where I get it from. I suppose there is a place for Sociology in medicine but the amount we pick up is very small."

2.5.8.

"The essays were just another hurdle to overcome."

"It was just a matter of copying it down."

"I don't remember much about it. I suppose I didn't enjoy it. It all seems a bit limited. You just did your subject and went to the seminars and it was so limited, you were just seeing a small part of the subject and not the whole picture, and the projects took up quite a lot of time."

2.5.9.

"The time was split between trying to do the assessments and other things. I tended to concentrate on the assessments, particularly for the Systems Courses which were coming along."

"Psychology and Sociology projects really made the second term awful - it was dreadful."

"Psychology and Sociology were good to have. It was nice to see things in a different way. It was a bit of a panic to get things done though, with the assessments and handing assignments in and so on. It was something every couple of weeks."

2.5.10.

"This term you're so pushed with assessments that you just have to write an essay for the sake of writing it without having time to devote to the subject."

2.6.1.

"It was really exciting. I really enjoyed it."

"It was good, very well done and very worthwhile."

"The Introductory Course was fantastic. The best thing in that last term."

"It was good - I enjoyed that...In Southampton we're told that Early Medical Contact is a good thing. But it's only a few days chucked into the first year. There's a sharp division between clinical and preclinical and it starts with the Introductory Course for Clinical Medicine. It's a different environment, confronting patients and talking about medical issues."

2.6.4.

"It's very important doing it then. You didn't have to worry about it in the third year. History taking and physical examination and all that. Then when you started your third year you could go straight in."

"The Introductory Course to Clinical Medicine was interesting. It gives you a taste of the third year."

2.6.5.

"The groups were too big and you felt a bit awkward impinging upon some poor soul in bed. We did practise on each other and that was very good."

"It was absolutely excellent but rather large numbers round the bed. You feel a bit sorry for the patient. But if you've got a good doctor with a good bedside manner you feel the patient wasn't too embarrassed by it all."

2.6.6.

"I think it's a good idea but ours was unsuccessful. Three out of seven occasions nobody turned up and when they did it varied from the very good to the indifferent."

"I didn't think much of it. It was a bit haphazard waiting around to be taught something, but not much chance to do very much."

"It was alright really when it happened."

2.6.7.

"I don't think I got much out of it. I was so shy and didn't relate to the patient then."

"It was a bit daunting but it was well done. I'm not sure how much it meant then."

"The Introductory Course to Clinical Medicine was nerve-racking. I was particularly nervous about it and wondered if I could manage. I felt so ignorant. You have to be a bit pushy. If that's your nature, then you're alright. But it isn't very good if you avoid that sort of contact."

3.1.1.

"I enjoyed the attachments. Really I'd been waiting for it. It was getting into contact with people."

"It's different. It's much more enjoyable, a lot of hard work, but it's more enjoyable."

3.1.2.

"It was much nicer to get out of Boldrewood and not to just be cramming information in."

"The third year is the best. You realise that what you learn you're going to use after the year is over and it is a challenge to work things out. It's not just learning for exams. You're trying to retain it."

3.1.4.

"In clinical work you're seeing things clearly, but for the first time...You live from day to day. It's a routine. There's so much to learn."

"It was great. When I started I was apprehensive. You were just slung onto the wards, but they are really, really good, excellent."

3.1.5.

"It was totally different. And the attachments differed too."

"It varied a lot. Some were good, but some were very bad and the people didn't seem very interested in what you were doing. You just kept hanging around a lot."

"Third year was very variable. It depended on your firm."

3.1.6.

"It was frightening at first...I didn't realise that when I examined a patient it would be so unlike a textbook. I didn't realise how a doctor could say 'it is such-and-such', I couldn't see it at all. It's this clinical judgement, and the variability of patients...I thought once I'd seen a patient I'd be alright for the next one but it's not like that. In your mind you know it's true but in practise it hits you."

"It's much more relaxed than in the second year, but I spent a lot of time standing around doing nothing, just hanging around corridors and wards, trying to bleap somebody. It was a frustrating sort of feeling. I felt I hadn't got any free time, but the time was being unproductively used. I felt it would be better to sit at home with the books, yet it was expected that I should be there, and yet you really felt as if you were getting in people's way."

3.1.7.

"I had great fears about it. These were created to some extent by the Introductory Course. I might have to conform to a stereotype - how was I going to cope with this? Had I to forget all about being an individual? By the end of the third year I was really fed up with the whole system and I even questioned whether I really wanted to become a doctor. It's this conforming. They don't allow individuals."

3.2.1.

"I was on Dr. X's firm...I think we got the short straw. They have so few staff on that firm that you are left to yourself. On other firms people get teaching all the time but we hardly got any. We had one hour a week and that was all. It was a pittance. Two of us would go around the wards and clerk as many patients as we could. One of my friends on another firm only clerked eight patients in ten weeks. I should think I clerked 80, but I didn't get much out of them, as I never went over them with anybody."

"You were left pretty much to your own. It isn't a criticism of the firm but there wasn't much teaching...You were lucky if someone would teach us on a patient. The rest of the time you were just clerking unless you present a patient or someone goes over it with you, you don't know where you 're going wrong."

3.2.2.

"In Obstetrics and Gynaecology you learnt about the complications and then you saw them in most of the patients. The things I learnt most from medicine were patients with a certain thing which I would then go away and learn about."

"Most of the third year work was clinical, not physiological."

3.2.3.

"If I did hear about something I would perhaps try to look it up in a textbook. If I did it I would do so that day. If I didn't then I wouldn't do it at all...Most of the time, though, I wouldn't avidly read it up. I'd use an appropriate textbook for the course, Davidson or Lecture Notes or ECG made easy."

"I would follow up the cases that I'd seen in the evening within a day or so anyway. Usually I'd look up Davidson, not so much my lecture notes."

3.2.4.

"As you do each attachment you should go back and look at your previous notes. The Pharmacology and especially the physiology...But I tended to look at each case as it came along and didn't go back to the basics...I feel that in the third year you should have some Physiology teaching along-side the ward work. It would help to put it into perspective. You tend to go towards clinically orientated books and look things up."

"Really the third year is all about clerking and taking a good history. It's not really about bringing out the previous year's work...You tended to read some things for what you were doing. I rarely needed to bring forward information from the past years."

3.3.1.

"I found I <u>could</u> bring the physiology forward and some of the pathology. Not the first year courses. I was asked a question in theatre about Anatomy but it just wouldn't come. The basic facts were a bit rusty but the understanding was alright. I must have come to grips with it for the assessments in year two. If something is learnt well, then the understanding doesn't go."

"It was easy to answer questions. Lots of clinicians think the way I do - using principles. It's common sense...I would always try to give an answer, perhaps an intelligent guess. I might not have known the name of the disease but I'd be able to say what was wrong."

3.3.2.

"Once you see a diseased person the facts from years one and two seem much clearer. Then you have a condition to remember those facts by...If you're in Surgery you've got to learn the Anatomy again. You learn it in theatre."

"I suppose I learnt things on the wards. I certainly learnt my diabetes on the firm, not from the systems course notes."

"I went to clinical books to relearn it. But the physiology seemed different when you read it in a clinical book...Most of the time you'd realise that you'd got a good grasp of it but then you still weren't able to really recall it."

"In clinical work you see things clearly but for the first time...I had to remember Pharmacology and Physiology in different terms. It didn't make sense at the time."

3.3.3.

"The second year suddenly starts to fit into place. You realise why it was taught. This happened especially in Medicine...They asked us about physiological processes that they had told us about in the second year and it all started to link in. It came to life really...I found I could answer about half the questions early-on but it got better. I could even pinpoint where it was in the notes."

"I couldn't bring much forward in the third year...I could remember what it was I couldn't remember...it was all a jumble. But after about half an hour it would come back. I would recall it all if I had the time."

3.3.5.

"It was very difficult. Some things I had done on a systems course and I knew that we should have known, I found I was just starting again. Going back looking at notes you realised that you had done it but you just couldn't remember it. It's silly. We'd done most of it but that doesn't mean you can remember it when it's needed."

"It just wouldn't come. It's very different in third year. In the second year you learnt things and put them aside. When you were asked questions on an attachment, about knowledge from the second year, I mean, it's in the background. You knew it then but you don't think about it now."

3.3.6.

"It's very hard to recall what you had learnt. But when someone said something you realised that you once knew it, or you once knew something about it. Then I'd go home and read it up and it would be fresh in my mind again."

"In attachments it was a free-for-all. Anyone could give an answer. I'd be able to give an answer from some areas...and some came back, but we were unsure about things. We'd say 'was it this or was it that?' We really didn't know. We were very vague."

"Our group was not particularly bad but our retention of knowledge was very poor."

3.3.7.

"I remember we were doing jaundice and knowing absolutely nothing about it. Pneumonia too. I couldn't remember any of the causative agents and it was all new to me, but of course they weren't, I'd learnt them all before!..(On one occasion) I sat there and thought 'I haven't got a clue what he's talking about'. Then when I came to my revision I looked at my notes and there is was and I thought to myself 'I'd learnt it all for that system and I'd worked hard in the second year, now I didn't know it existed'. Really this is very demoralising."

4.1.0.

"I got the notes out about November and tried to go through it all once before Christmas. I did this not so much for the exam, but partly for learning's sake. Things were beginning to come together and I thought 'I want to work this one out'. I would think 'I do know that but I had better check it out now'."

"The learning was done because there was a need to do it not just because of the exam."

"Passing the exam was rather ancilliary to understanding it. I'm doing undergraduate medicine to be a doctor and that is what I'm working for, not in order to pass the exam."

4.1.1.

"Intermediate Part II is an awful experience. I hated every minute of it. But I'm glad it's over now. It's a necessary evil."

"I was really scared. They got bigger and bigger as they got nearer. The more I learnt the more anxious I got. I started too late. I left myself ten weeks, and that's only one week per system and that's awful."

4.1.2.

"I found there was so much to learn and that it was going to be a struggle to do it. Other people, fourth years, said it was going to be tough and they say things like 'haven't you started working for them yet?'"

"I started a few months beforehand, going through the notes and throwing out the irrelevant bits and condensing the notes from the handouts. Just looking at the amount of the notes was daunting."

"It was absolutely phenomenal - the amount I found I had to get through. I realised that if I was going to get through it I'd never remember it all by the end."

4.2.1.

"Lots of notes didn't seem to make sense when I went back to them. I gave up looking at my notes in the end. They would give me the guidelines for revising and I'd use a handout that they'd given for the course...This would tell you what you'd covered. You'd use it as a guide. But then I'd use a textbook."

"I realised how bad they were and a lot of them I had to chuck away and start again. I'd never read textbooks before but I read them now and got more out of it by that. Then I'd write notes and chuck those away, write them down and chuck them away. I was writing notes not to test myself but rather to keep myself active."

4.2.2.

"My first year notes were not very good. I certainly didn't understand them. My second year notes were a bit better. My boyfriend taught me how to make notes and in looking at the second year notes I felt that I had done it all before."

4.2.4.

"I started to get things moving at Christmas...I started to go over the basics again as a bit of revision because I thought I might get stuck on some topic without it. About Easter I made a timetable and I spent equal time on each subject."

"I went through it slowly whilst doing the clinical work thinking that I'd be able to go through it all once before Easter. I felt that I would attempt to understand it by Easter, but then learn it in detail after Easter...Then we had the two weeks off and I thought I would be able to go through it all again. I spent the two weeks doing a system a day but I only spent a couple of hours a day doing it. I took it really in my stride."

"I started about December. I worked out how many weeks I'd got left and decided to do a System in so many weeks...I reckoned to spend something like an hour a night. I didn't always stick to it. Sometimes I'd do more and sometimes I wouldn't do any."

4.2.5.

"I said to myself, 'there's no point in saying start in good time because I knew I wouldn't'. So I had Easter off. I realised there was no point in taking a book home with me and feeling guilty because I wasn't reading it! But I came back into the third term and went straight into it."

"I intended to work from Christmas onwards but I got down to it straight after Easter. I did five to six evenings a week plus Saturdays and I worked quite intensively. It was more intensive than Primaries. The volume was greater."

4.3.1.

"Medicine was interesting because it discussed things like Pharmacology and broad aspects, but it was the last attachment before the exams and so I couldn't concentrate on it...I didn't open one book on Medicine to read up on something, only concentrating on revision for the exam. I had a routine and had to keep up with it."

4.3.2.

"Surgery I liked and wished I had more time but there was the pressure of the exams. I turned up a lot but didn't do much reading in the evening. All the surgery I picked up was from the wards."

"Medicine was good but it was just before the exams and I was very torn. In Medicine you need to hang around a lot and you were told 'some teaching may happen later this afternoon if you wait'. Then you think 'I could be doing a lot of work in this time instead'. Sometimes I took revision up there with me, but I didn't do much as I can't work in the Library. So in the end I went home and worked there."

4.3.3.

"I was doing Medicine at the time of revision and I'd only clerk patients. But I wouldn't go in 'on-take'."

4.3.4.

"Surgery - even though it was my last one before the exam, I didn't give up going in. None of my group did, actually. I might have if it was Psychiatry or Geriatrics. I felt that those people were lucky. They could take time off."

"I was enjoying Surgery, my last attachment, and I was keen and interested to do more. I got on very well with the house-officer and I didn't scive off to revise like a lot of people did. I revised it all in two weeks."

4.4.1.

"Looking at my notes I felt that I hadn't written half of them. This happened quite a lot."

"A lot of the time I would look at my notes and ask 'did I write this? It's my handwriting, but I can't remember doing it.' If it was another person's handwriting I would have said that I'd never done it. It was utter amazement, this. I thought 'I must have been to that lecture and I must have written it'. I must have been through it before but I just didn't remember doing it...I suppose as much as half of them were like this."

4.4.2.

"Looking at my notes I wondered at the way I'd written them. I wondered if I'd understood it in the second year. But it's only when I got to the clinical work that I got to grips with it and I understood it. I felt as though I hadn't understood it then, but that I did now and I would remember it."

4.4.3.

"A good example is that during the Respiratory Course we had been told about 'blue bloaters' and 'pink puffers', and in the second year it doesn't mean a thing. In the third year you see someone sitting there and there it is. Certainly seeing patients made me look at my second year notes in a new way."

4.4.4.

"I tried to get through a system a week doing them thoroughly, reading notes, adding anything that was appropriate from third year. I tried to understand it all...I tried to cover everything...I flicked through my notes just before the exams. I don't like last minute revision but there's so much to do. It wasn't cramming...just refreshing the memory."

"I went through everything and read and read it again. The first time through I'd look at the information and try to absorb it and reproduce it. The second time through I would read large chunks and try to remember the bits that I thought were more relevant, based on past papers."

4.5.0.

"The clinical experience didn't help very much. It did in some cases because you'd seen a patient, but it didn't help that much really."

"The third year added to my knowledge of course, but I don't really remember patients or cases. I do know that I am much more familiar with it. It's things like the relevance of the tests and so on, but not specific people."

4.5.1.

"Seeing clinical patients helped. For example, you would see a liver and it helped you to understand jaundice and it helped you to think it was important to remember this. But patients only helped a bit. There was still a lot of totally irrelevant things that you had to learn to pass the exam."

4.5.2.

"In the exam I was able to answer a question on what I'd learnt in the clinical year. I felt that I wasn't giving them what they wanted. Surely they needed the theory now from year two, but I was basing my answer on some clinical experience I had. I hadn't actually revised it, I just said what I'd learnt from the clinical work. I thought 'this is lunacy I haven't revised it'. But I was able to answer the question."

4.5.3.

"If there had been something on the wards, a patient for example, then it was really good. It helped you to understand."

"For the first time I was thinking about what I'd done in the second year with the work that I'd done in the third year. If nothing else, exams do make you think about the work. That was good and helped me to understand this work. When you see a patient with a condition you believe it...rather than it being a fact from a book or a lecture. And you remember it...I got a C in my Part II's and was very pleased."

"You remember much more partly because you've seen cases."

4.5.5.

"My understanding of my notes was much better now. It is... because you have done it again...and...because you've done it with the patients. It really does help. It's surprising. We were told at the time we should spend a lot of time on the wards because this experience would help you to understand things especially for the exams. But we were a bit cynical about that, but it really does help. It's not 'til you've seen a patient and then gone back and read it and understood it and then you'd know you'd never forget it."

4.5.6.

"I did find that if I hadn't understood something in second year I was now understanding it better...Some things clicked. I can't really put my finger on it. It was a general understanding and getting to know it better. When something clicks you feel more confident about talking about it. During the third year I would know some things but hadn't done my second year very well so this didn't help me. In revision it did come together."

"I found that if I could relate it to something I could remember it. I would relate it to perhaps a patient I had seen or a person with a certain infection. I'm not very good at parrot fashion learning, and learning for Part II's was much easier than in the second year. That (second year) was much harder to learn. That is why things like Respiratory and Cardiovascular meant so much more now. Before it was very hard just to learn...but now I could relate it to patients. If you haven't got that to relate it to, it is very hard to learn... The Part II's weren't as hard as I thought they would be."

4.5.7.

"You see a patient with cardiac failure and you can almost work back from what the patient looks like to what's wrong with the patient and work out what's wrong."

"I couldn't have done the Part II's without the clinical bit. Doing questions I would recall a patient I had seen. Either remembering what the patient was complaining of or the treatment they had got. They certainly weren't as big as I'd expected - these exams."

4.5.8.

"With the patients I had clerked I would never forget them... I would read them up and then it would be engrained in my memory - that helped a lot. I tried to get into the habit of that, see a patient and then read it up afterwards. That way it goes in much more easily than just reading a textbook on its own."

4.6.0.

"Revising for these wasn't as bad as for Primaries. It was quite hard work, but quite enjoyable. It was applying what you'd seen and what you'd been given on the wards...It made it all a lot easier to grasp. It was easier now to sit down and read it. It was more interesting now, having seen the patients, rather than learning the facts straight from a textbook when you'd not seen it applied to everybody."

"I could honestly say that the most enjoyable part of the three years was revising for Part II's. No, don't fall on the floor! It really is true. It all came together. Of course it's a big strain and I'm really annoyed about the paranoia we all get into. But if I'd known that I was going to pass I would really have enjoyed it. It's surprising to me that I got worked up about exams. I surprised myself that Part IIs really rattled me. I never got worked up about exams before. But take that away, and revising for the exams was really enjoyable."

5.2.

"I would be interested to know how much of it has stuck now. I hope my approach is better now and that a lot of it is in my long-term memory and not short-term memory. But I just don't know. Now I think I have forgotten everything but I hope it will come back. But I feel more confident. But I am not sure that I know much now."

5.4.

"I did E.N.T...I really feel that I understand the facts now although some of the detail might be slipping away. But I do know that I can pick up a book and fit it back into place again."

"I was in India...but the Part II's did help a lot in organising topics and diseases into systems in my brain. It's easier to recall it that way."

"On my elective I saw one or two patients where I could clearly understand what was going on. One was immunology and I knew that better than many of the doctors there."

APPENDIX 6

INTERPRETATION OF INTERVIEWS WITH FOURTH YEAR MEDICAL STUDENTS AT THE UNIVERSITY OF SOUTHAMPTON

1. INTRODUCTION

The undersigned was requested by Mr. CR Coles to interpret 25% of the loosely structured interviews he had with 67 fourth year students at the Medical School of the University of Southampton. It was thought that an independent interpretation of 17 randomly selected interviews which were written down verbatim, could reflect on the reliability of the method used as well as on the validity of the conclusions which Mr. Coles arrived at in his Ph.D.-thesis entitled "A study of the relationships between curriculum and learning in undergraduate medical education."

During the interviews students reported on the following aspects:

- Overall view of the first three years
- Their experience of the first year
- Preparing for the primaries
- Their experience of the second year
- Their experience of the third year
- Preparing for the Part II Examinations
- Their experience of the elective

2. INTERPRETATION OF THE INTERVIEWS WITH THE FOURTH YEAR MEDICAL STUDENTS

A report on, in the view of the writer,some of the most important student comments on the undergraduate curriculum for medical students at Southampton will now follow under the headings mentioned above.

2.1 OVERALL VIEW OF THE FIRST THREE YEARS

There was a general feeling amongst the interviewed students that the first three years of their course did not form a whole, and that the third year was different from and not a continuation of that which had been taught and learnt in years one and two. One gets the impression that students experienced the first two years as a period during which facts had to be memorized with the objective in mind to reproduce them during assessments and an examination. It seems as if much of the work has been "studied" as isolated facts which for many students only formed a meaningful whole when they started to prepare for the Part II examinations. The feelings expressed in this"overall" experience will again be raised and commented on.

2.2 STUDENT COMMENTS ON THE FIRST YEAR

It soon became evident that Anatomy "took over" right from the start and that most students found it very difficult to "come to grips" with the subject. Students generally commented on the fact that they did not know how to learn and that all the facts soon forced them into a memorizing learning style which for many soon resulted in little less than rote learning. A shallow level of understanding is unavoidable in situations where students are confronted with so many facts that there is no time for the processing thereof and the integration of these facts with their own personal frame of reference. Many students felt that the copying down of notes from boards in the dissection room was a waste of valuable time and that it was therefore better to resort to their Anatomy textbook and learn at home. The fact that many students now studied in isolation from the bodies in the dissection room separated theory from the clinical situation even more. Some students fortunately realized that they have to understand what they were learning in order not to forget quickly. If students resort to rote learning and perceive course content as irrevelant because they find it virtually impossible to link-up the theory with the clinical situation it can only be concluded that the educational aims of the course are not achieved.

As regards the Biochemistry a substantial number of students admitted that they "did not work very hard" and most commented on having only had to learn the pathways "off by heart" in order to pass the course. Some referred to the fact it was not necessary to understand the work in order to pass. Again it has to be pointed out that students soon resort to rote learning and the use of meaningless Mnemo-techniques if the work is not understood.

Most of the students who referred to Pathology mentioned that the teaching was exceptionally good, that the course content was relevant to "real medicine", that they enjoyed this particular course much and that it was very interesting. Relevance is an extremely important factor in intrinsic learning motivation and often results from a situation in which the studant experiences a meaningful relation between theory and practice.

Although a significant number of students indicated that they found "Man, medicine and society" interesting and some commented on the fact that it was enriching to talk about things and discuss controversial issues, there were also those who experienced the course in a negative way. According to some the course was irrevelant and a"waste of time". Could it be that medicine is viewed as a "cold", "clinical" science to such an extent that the patient as a person is often forgotten?

Such a view may very well result in a negative feeling amongst students. It could also be that more attention ought to be given to the comments of those students who felt that there was no time to indulge in "nice things" to learn. Most students experienced "Early medical contact" as being enjoyable. Many also expressed the opinion that this course helped them to realize what they were at medical school for. It is interesting though that some had a notion that they might not have got out of the course what they could have because they did not have a theoretical background at the time. This notion may stem from an inbred assumption that one first has to have the facts before problems can be solved. It is well-known that this assumption is, at the most, a half truth. The purpose of "Early medical contact" is to give the students a background to acquire theoretical knowledge in a meaningful way.

2.3 PREPARING FOR THE PRIMARIES

It seems as though most of the students experienced Anatomy as a stumbling block. So much time was spent on Anatomy that the other subjects were to a large extent neglected. But even taking into consideration that students concentrated on Anatomy, it was generally felt that they were forced into rote learning due to the fact that there was so much information.One student expressed the feeling of many others when he said that "a parrot could also pass this".Others referred to the fact that they knew they would forget everything soon after they have written the paper and commented on remarks made by doctors about the lack of knowledge and understanding of Anatomy during their third year. It is worrying that students spend so much time on Anatomy and that they are in spite of this not able to remember what they have learnt a year later on. Another significant factor is that although students spent an incredible amount of time copying notes from boards in the dissection room, a substantial number in the end resorted to learning from the prescribed textbook only. It has already been mentioned that many students resorted to rote learning in Biochemistry as well.

One has to take note thereof that the students experienced the two subjects in which they had to resort to rote learning as a problem during their preparing for the primaries.

A great amount of anxiety about the primaries was common amongst the students. Could it be that this anxiety was a result of a situation in which they had to cope with an enormous amount of facts without always understanding what they were learning?

2.4 STUDENT COMMENTS ON THE SECOND YEAR

Although some students enjoyed the second year more than the first year, they still generally commented on the amount of isolated facts that often had to be learnt by rote. Many knew that things that had to be remembered for assessments would soon be forgotten. A significant number of students pointed out that there is very little problem solving situations in the second year at medical school.

It may be that some students enjoyed their second year more than the first because they have extrinsically been motivated by the fact that they have passed the first year. It is also possible that they have accepted the fact that lots of rote learning has to be done in order to survive at medical school. Could it be that they have decided to "join them if you can't beat them?"

In spite of the fact that some students indicated that there was no relation between the different system courses and that this made it more difficult to learn the work, it was generally felt that the system courses were, on the whole, acceptable. Neurology was singled out by many students as being a "bad" course. Some attributed not being able to understand the content to the fact that the course was not well structured at all.

The "Introductory Course to Clinical Medicine" was, according to most students, very enjoyable, and many said that it put what they have learnt into perspective. Others, however, pointed out that the course could have been at the wrong time because much time had to be spent on the other courses.

Although it seems as though some students developed a negative attitude about Sociology and mentioned something about the subject not being taught properly, many enjoyed both Psychology and Sociology. These two courses were not experienced as difficult subjects and a few students said it was good to enjoy something for a change. Could it be that these two subjects were experienced as "not very difficult" because of a sound relation between theory and reality? Again because of a tremendous workload, some students did not see their way open to indulge in either Psychology or Sociology.

It is once more evident that the students found the subjects where theory and practice were integrated easier to understand and probably as a result thereof also more enjoyable.

2.5 STUDENT COMMENTS ON THE THIRD YEAR

It is very interesting and extremely important to take note of the fact that although they worked so hard in their second year, students could not remember what they have learnt. Some said it was very demoralizing not to remember and many went so far as to say that the first two years were, to a large extent, irrevelant.

Almost all the students soon came to realize that the third year at medical school was "different" and that the facts started "sticking" because things could now be related to patients. One student made the very relevant remark that it may be wrong to start with the basic theory first. He actually said it would have been "a good idea to have the third year first and then do the more theoretical first and second years".

Many students enjoyed the third year because most things they have learnt now came together. One wonders, however, why students have to wait two years before they understand what they are learning. It is almost as if the third year makes one realize that the undergraduate courses, due to the lack of continuation between the first two and the third year, do not meet the requirements of an integrated curriculum.

2.6 REVISING FOR THE PART TWO EXAMINATIONS

Many students started off with elaborate timetables, but soon realized that they needed less time than before to learn everything. It was generally felt that everything made more sense and some commented on the fact that they could to a large extent answer examination questions from their clinical experience.

During the period in which the students started revising for the Part II examinations it became evident that they could all of the sudden learn in a much more "thinking" and meaningful way than before. It is almost as though the content which they have learnt before was experienced in a different way. From an educational point of view it can only be concluded that this more meaningful style in which they studied results from the fact that their clinical experience cast more light on these things which they found difficult to come to grips with earlier on.

2.7 STUDENT COMMENTS ON THE ELECTIVE

In spite of the fact that the elective should confirm the notion that the practical clinical situation greatly influences the quality of student learning, it is clear that much depends on the institution(s) and region(s) in which the students work during this period. It is unfortunate that a substantial number of students felt that they did not really learn much. There were others,though, who commented favourably on their elective and stated that it helped them to understand better and to become more confident. Some also referred to the elective as being a meaningful continuation of the third year at medical school.

3. CONCLUSION

The most important conclusion that can be drawn from the student interviews regarding the undergraduate curriculum of the medical school at the University of Southampton, is that the course does not form an integrated whole. The third year is not a continuation of the first two years and students experience much of the work that they have "done" during years one and two as irrevelant for the third year. It is furthermore important to note that the "different" way in which students learn in their clinical year (third year) enables them to remember the relevant facts easier. During the first two years students are forced to resort to rote learning because of an overcrowded curriculum made up out of facts which are often learnt in isolation from the clinical situation and in the absence of a structure which can be grasped by the students.

Right from the first year it becomes evident that students enjoy the courses where theory and practice are integrated more, and that they find it difficult to learn in a meaningful way where "basic theory" is presented in a segregated fashion or in other words divorced from the clinical context.

It seems as though serious attention ought to be given to the possibility of having a greater amount of contextual information at the beginning of the undergraduate course.

4. FINAL REMARK

It is felt that the data gathered by means of the interviews has to be, however valuable, verified by supportive data.

DA MEERKOTTER
DEPUTY-DEAN : FACULTY OF EDUCATION
POTCHEFSTROOM UNIVERSITY FOR CHRISTIAN HIGHER EDUCATION

APPENDIX 7

COPY OF QUESTIONNAIRE:
A SURVEY ABOUT USING KNOWLEDGE IN THIRD YEAR.

Overleaf is a copy of the questionnaire used for the survey reported in Chapter 9. It has added to it for the purposes of this appendix figures indicating percentages, rank orders, etc.

Please leave Blank

1 2

A SURVEY ABOUT USING KNOWLEDGE IN THIRD YEAR

NAME (BLOCK letters)

N.B. This questionnaire will be totally confidential. Your name is merely for record purposes.

4 5 6

1. How much did you remember when you got onto 3rd year attachments?

I am interested in how much of what you were taught in the first two years you could remember when you got to your third year attachments. Let me describe a typical situation and then get your response. On a Medicine attachment your group might be taken to see a patient, one of you would give the history, another might do a physical examination etc. and then you would return to the seminar room to discuss the case. During this discussion you might be asked questions which require you to remember information you'd been taught in previous years.

(a) Generally could you answer these questions? (In this questionnaire the term "generally" means on most occasions)

Generally I could answer most questions (more than ¾ of the time)	5%	(1)	Tick
Generally I could answer quite a few questions (½ - ¾ of the time)	55.4%	(2)	One
Generally I could answer only a very few questions (¼ - ½ of the time)	38.6%	(3)	Box
Generally I could answer only very rarely (less than ¼ of the time)	1%	(4)	

8

(b) When you could answer questions, roughly how often did you get the answer right?

Generally more than half my answers were right	85.7%	(1)	Tick
Generally less than half my answers were right	13.3%	(2)	one
Generally my answers were wrong	1%	(3)	Box

10

2. Types of forgetting in 3rd year

The type of forgetting in this sort of situation seems to vary. People described to me different responses and I am interested to know if you experienced some or all of them. These were:-

(i) "Tip of the tongue": some people tole me that the answer was "on the tip of their tongue". They could remember the course, who gave the lecture, what day it was, and even what the weather was doing at the time! But still they couldn't remember the information required. But when the answer was given they'd say "Oh yes, of course, I knew that."

Did you experience this?

	(1)		(2)
YES	75.2%	NO	24.8%

12

Please Leave Blank

(ii) "It rings a bell": some people described the information they were trying to remember as "ringing a bell". They knew they'd been taught it, but couldn't necessarily remember which course or who'd taught them. But, again, when they were told the answer they'd say "Oh yes, I know that". 14

Did you experience this?

	(1)		(2)
YES	93.1%	NO	6.9%

(iii) "Bluff":some people attempted to give an answer but realised that they didn't know very much about it. However they attempted to "bluff" their way through it" 16

Did this happen to you?

	(1)		(2)
YES	43.6%	NO	56.4%

(iv) "Denial": some people told me that on occasions when they were asked questions they would be absolutely certain that they had never been taught it. They might say "There's no point in pursuing this one because we've never been taught that". Even when the answer was given, they'd say "That's interesting, no we've never been taught that!" Yet later they found it in their notes or on a hand out. 18

Did this happen to you?

	(1)		(2)
YES	53%	NO	47%

(v) "Refusal": On occasions people might know the answer but, for a variety of reasons, they'd refuse to give it". 20

Did this happen to you?

	(1)		(2)
YES	52.5%	NO	47.5%

(vi) "Sulking": Sometimes, again for a variety of reasons, people wouldn't even bother to try to think of the answer. They've described this to me as "sulking". 22

Did this happen to you?

	(1)		(2)
YES	25%	NO	75%

(vii) "Sorry I just don't know: sometimes, when they didn't know the answer, people would say "Sorry, I just don't know". 24

Did this happen to you?

	(1)		(2)
YES	93.1%	NO	6.9%

(viii) "Keeping quiet": some people said that they didn't answer because they didn't want to appear stupid. But quite often the answer would have been right. 26

Did this happen to you?

	(1)		(2)
YES	78.2%	NO	21.8%

(ix) Were there any other ways which, for you, characterise not answering questions on 3rd year attachments?

Please give details. 28

29

Please leave blank

3. Frequency of these types of forgetting

You may have ticked "yes" to some or all of the types of forgetting in question 2. Please now indicate which ones in your case were the commonest by giving a rank order to the list below. (So that 1 will be the most common and 8 will be the least common).

TYPE OF FORGETTING	RANK ORDER	
"Tip of tongue"	2 =	30
"Rings a bell	1	32
"Bluff"	6	34
"Denial"	7	36
"Refusal"	5	38
"Sulking	8	40
"Sorry I don't know"	4	42
"Keeping quiet"	2 =	44
Others		46

4. "Reading up cases" on third year attachments

During your attachments did you ever "read up on the cases you had seen? I'm interested in 2 things, whether you did or did not, and where you looked it up.

(i) I "read up" most of the cases I saw	26%	(1)	Tick	
I "read up" some of the cases I saw	46%	(2)	One	48
I "read up" a few of the cases I saw	28%	(3)	Box	

(ii) I "read up" the cases I saw in clinical textbooks. (only, 61%)	100%	Tick	50
I "read up" the cases I saw in basic science textbooks. (only, 1%)	19%	any or all	52
I "read up" the cases I saw in my notes (only, 0%)	27%	boxes	54

5. Links between the first two years and the third year

		(1)		(2)	
(i) As they are taught at the moment the first two years are irrelevant to the third year	YES	17%	NO	83%	56
(ii) As they are taught at the moment the first two years form a good basis for the third year	YES	62%	NO	38%	58
(iii) The first two years are irrelevant to the third year as it is at the moment	YES	11%	NO	89%	60
(iv) The first two years form a good basis for the third year as it is at the moment	YES	57%	NO	43%	62

End of Card 1

Please leave Blank

1 2

4 5 6

6. The functions of third year attachments

Here are some statements made to me about how third year attachments are at the moment and how they should be. Please give your opinions by ranking them in order of importance (1 = most important).

Third year attachments are:	At the moment	As they should be		
1. For learning history-taking	1	1	8	9
2. For learning physical examination	3	3	11	12
3. For learning how to clerk a patient	2	2	14	15
4. For learning how to diagnose	4	4	17	18
5. For learning clinical management	5	6	20	21
6. For learning the basic sciences	11	9	23	24
7. For learning how to apply basic sciences	6	5	26	27
8. For learning the behavioural sciences	7	8	29	30
9. For learning how to apply the behavioural sciences	10	7	32	33
10. For learning drug action	8	10	35	36
11. For learning drug prescribing	9	11	38	39
12. Other			41	42
13. Other			44	45
14. Other			47	48

Please leave Blank

7. Revising for the Intermediate Part II Examination

Some people described to me that when they were revising for the Intermediate Part II Examination a lot of what they'd been taught (especially in years one and two) now took on a significantly greater meaning than it had when they were first taught it. For others, revision was mostly a matter of "brushing up" on what they had previously learnt. Generally, what was your experience?

Generally, my revision was a matter of "brushing up" on what I had previously learnt.	8%	(1)	Tick one box
Generally, what I was revising meant more, but not so much that I would describe it as a "significantly greater meaning".	44%	(2)	
Generally, what I was revising now took on "a significantly greater meaning".	48%	(3)	50

8. How "big"was the Part II Examination?

Part II was the biggest exam I'd ever taken	59%	(1)	Tick One Box
Part II was no bigger than any other exam	28%	(2)	
Part II was not as big as other exams I'd taken	13%	(3)	52

Was it "horrendous" for you?

	(1)		(2)
YES	39%	NO	61%

54

I suffered physically: (please give details)

56

I suffered psychologically: (please give details

58

Did you need to consult a doctor during this time?

	(1)		(2)
YES	8%	NO	92%

60

End of Card

Please leave blank

1 2

4 5 6

9. When should Part II exams come?

Some people feel that the Intermediate Part II Examination should come at the end of Year 2, others believe that it is in the right place at the end of Year 3. Assuming that it's not going to be abolished altogether, when do you feel that it should come?

The Part II's should come at the end of Year 2	25%	(1)	Tick One Box	
The Part II's should come at the end of Year 3	75%	(2)		8

I have always felt this	57%	(1)	Tick One Box	
I have changed my opinion on this	43%	(2)*		10

*(Please indicate what made you change your opinion)

12 13

10. Effect of attachments on revising

A number of people told me that whilst they were revising for Part II's certain "clinical experiences" from third year attachments helped them to understand what they were revising. For some people this came about because of particular patients they had seen, but for others it was more general - their clinical experience helped them see that now there was a need to understand the underlying theory of it all. For others, third year clinical experiences had no influence on their revision. How was it for you?

Third year clinical experiences had no influence on my revision	10%	(1)	Tick One Box
Patients that I saw helped me with my revision	14%	(2)	
Attachments generally helped me with my revision (but not by having seen particular Patients)	21%	(3)	
Patients and attachments generally helped with my revision	55%	(4)	

15

Please leave Blank

11. <u>Did "it all come together" whilst revising for Part II's?</u>

Some people described to me that whilst revising for Part II's "it all began to come together". How was it for you?

It all came together before I started revising	2%	(1)		
It all came together as I was revising	26%	(2)	Tick	
Some things came together as I was revising	66%	(3)	One	
A few things came together as I was revising	5%	(4)	Box	17
Nothing came together as I was revising	1%	(5)		

12. <u>How permanent is the knowledge you acquired for Part II's?</u>

I'm interested in how permanent you feel the knowledge is that you acquired for Part II's. Do you feel that it's:

Quite definitely permanent	1%	(1)	Tick	
More permanent than what was learnt for other exams and assessments	67%	(2)	One	
Not at all permanent	32%	(3)	Box	19

How does this make you feel? Please describe.

21 22

Please leave Blank

13. Using Part II's knowledge on electives

Some people told me that, as far as their elective was concerned, the knowledge they had acquired proved to be quite useful. Others said that it didn't. Some said their elective was so "different" that Part II's knowledge didn't really apply. How was it for you?

Part II's knowledge was not needed on my elective	36%	(1)	Tick
Part II's knowledge was needed and it helped me on my elective.	52%	(2)	One
Part II's knowledge was needed but I couldn't remember much of it	11%	(3)	Box

24

14. Lunchtime Pathology Demonstrations

Finally, I am interested in your observations on the lunchtime Pathology demonstrations.

26

(a) Did you attend any in Year 3?

	(1)		(2)
YES*	90%	NO	10%

*If YES - roughly how often did you attend?

Every day	2%	(1)	
Twice a week	25%	(2)	Tick
Once a week	16%	(3)	
Twice a month	17%	(4)	One
Once a month	9%	(5)	Box
Only a few times	30%	(6)	

28

and, generally, did you find them:

Very useful	22%	(1)	Tick
Useful	60%	(2)	One
Not very useful	16%	(3)	
Not at all useful	1%	(4)	Box

30

Please leave Blank

(b) Have you attended any lunchtime Pathology Demonstrations this year?

	(1)		(2)
YES*	63%	NO	37%

32

*If YES, roughly how often have you attended?

Every day	3%	(1)	
Twice a week	10%	(2)	Tick
Once a week	14%	(3)	
Twice a month	24%	(4)	One
Once a month	6%	(5)	Box
Only a few times	42%	(6)	

34

and, generally, this year, do you find Pathology Demonstrations

Very useful	23%	(1)	Tick
Useful	61%	(2)	One
Not very useful	13%	(3)	Box
Not at all useful	3%	(4)	

36

THANK YOU FOR YOUR HELP. I AM MOST GRATEFUL.

(Please make sure you have written your name on the front of the questionnaire)

APPENDIX 8

COPY OF SHORT INVENTORY OF APPROACHES TO STUDYING.

Overleaf is a copy of the inventory used for the survey reported in Chapter 10. For the purposes of this appendix it is shown as two separate pages whereas in reality it was printed on both sides of a single sheet.

SHORT INVENTORY OF APPROACHES TO STUDYING

Please answer each item quickly giving your immediate response. Put a tick in the appropriate box to show your general approach to studying. Your answers will be completely confidential and used for educational research, not for Faculty records.

Colin Coles,
Medical Education,
Southampton Medical School,
United Kingdom

Please leave blank

Year of Course ____________________

31 35

TICK ONE BOX FOR EACH QUESTION

	Definitely Agree	Agree with Reservations	Disagree with Reservations	Definitely Disagree	
1. I find it easy to organise my study time effectively.					1
2. I try to relate ideas in one subject to those in others, whenever possible.					2
3. Although I have a fairly good general idea of many things, my knowledge of the details is rather weak.					3
4. I like to be told precisely what to do in essays or other set work.					4
5. The best way for me to understand what technical terms mean is to remember the text-book definitions.					5
6. It's important to me to do really well in the courses here.					6
7. I usually set out to understand thoroughly the meaning of what I am asked to read.					7
8. When I'm reading I try to memorise important facts which may come in useful later.					8
9. When I'm doing a piece of work, I try to bear in mind exactly what that particular lecturer seems to want.					9
10. I am usually cautious in drawing conclusions unless they are well supported by evidence.					10
11. My main reason for being here is so that I can learn more about the subjects which really interest me.					11
12. In trying to understand new ideas, I often try to relate them to real-life situations to which they might apply.					12

P.T.O.

	Definitely Agree	Agree with Reservations	Disagree with Reservations	Definitely Disagree	Please leave blank
13. I suppose I am more interested in the qualification I'll get than in the courses I'm taking.					13
14. I'm usually prompt at starting work in the evenings.					14
15. Although I generally remember facts and details, I find it difficult to fit them together into an overall picture.					15
16. I generally put a lot of effort into trying to understand things which initially seem difficult.					16
17. I often get criticised for introducing irrelevant ideas into essays or discussions.					17
18. Often I find I have to read things without having a chance to really understand them.					18
19. If conditions aren't right for me to study, I generally manage to do something to change them.					19
20. Problems fascinate me, particularly where you have to work through the material to reach a logical conclusion.					20
21. I often find myself questioning things that I hear in lectures or read in books.					21
22. I find it helpful to 'map out' a new topic for myself by seeing how the ideas fit together.					22
23. I tend to read very little beyond what's required for completing assignments.					23
24. It is important to me to do things better than my friends if I possibly can.					24
25. Tutors seem to want me to be more adventurous in making use of my own ideas.					25
26. I spend a good deal of my spare time in finding out more about interesting topics which have been discussed in classes.					26
27. I seem to be a bit too ready to jump to conclusions without waiting for all the evidence.					27
28. I find academic topics so interesting, I should like to continue with them after I finish this course.					28
29. I think it is important to look at problems rationally and logically without making intuitive jumps.					29
30. I find I have to concentrate on memorising a good deal of what we have to learn.					30

<u>THANK YOU FOR YOUR HELP</u>

APPENDIX 9

THE RELIABILITY OF THE SHORT INVENTORY

Introduction

The development and use of the Short Inventory of Approaches to Studying has been described in Chapter 4. It was decided to use it as part of a study of curriculum and learning in Southampton's medical school and in a comparative study using two other medical schools. However it became clear that in order to do so it was first necessary to check its reliability:

1. Under different conditions of presentation - instant or delayed completion.
2. When comparing test and re-test data.

Enquiries were made with the authors of the inventory concerning these points and it was found that no such study had been undertaken (Ramsden, 1983). As a consequence it was decided to undertake such a study in Southampton, and this is a brief report of that enquiry.

Sample and Method

One hundred and one students were assigned using random numbers to one of four groups according to the experimental design shown in Table Ap.9.1. Students in Groups 1.A.1 and 1.A.2. were asked at a lecture to complete and quickly return the inventory, whilst students in groups 1.B.1. and 1.B.2. received the inventory through the post, completed it at their leisure and returned it via an addressed envelope. Four days later the same students were retested as follows: groups 2.A.1. and 2.B.2. completed the inventory during a lecture whilst groups 2.B.1. and 2.A.2. did so via a mailing. Students had not been told that they would be retested. At the time of retesting students were asked to complete a short purpose-designed questionnaire (see Table Ap.9.2) which asked about their memory of previous answers.

Results

Replies were received from 97% of students when tested and 99% on re-test. Inventories were scored according to the procedures previously described and then analysed. Mean scores and standard deviations were produced for four dimensions which were held to be key ones for the present study - achievement motivation, reproducing, meaning, and comprehension learning. (Data for the other dimensions exist but were not analysed since computing was not available at this time and analysis had to be manual.) The results are shown in Table Ap.9.3 for the test/retest investigation and in Table Ap9.4 for the different modes of presentation. For comparison the means scores were grouped as indicated in accordance with the experimental design. Statistical analysis using a t-test showed no significant difference between any of the groupings.

The purpose-designed questionnaire showed that a small minority of students (24%) felt able to recall their previous response. 55% felt that most of their responses were likely to be the same. Sixty per cent of students felt very or fairly confident of this.

Conclusions

Under the conditions set by this experiment, the Short Inventory of Approaches to Studying may be said to be reliable, both in terms of its test/retest and under the two modes of presentation - instant or delayed. It is felt reasonable, then, to include evidence from its use in the present study.

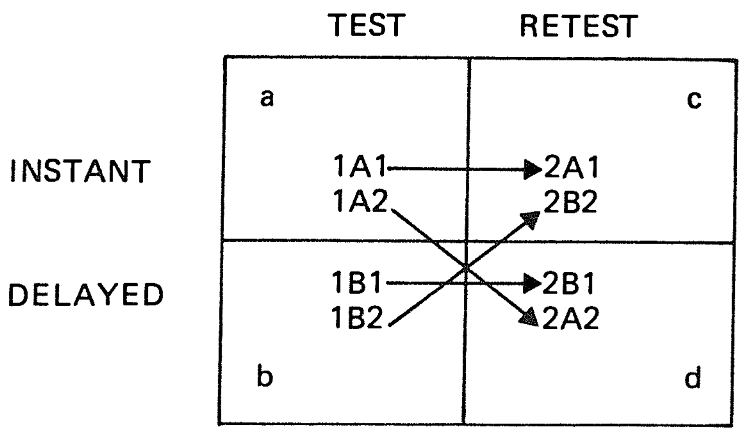


TABLE Ap. 9.1. Experimental Design

Questions	Results	
1. Did you feel that you were able to remember most of your previous answers?	Yes No Some	24% 63% 13%
2. Did you feel that most of your previous answers were the same as last time?	Yes No Don't Know	55% 29% 16%
3. How confident are you about this?	Quite Not very	60% 40%

TABLE Ap. 9.2. Questionnaire

DIMENSION		a (n=49)	b (n=49)	c (n=50)	d (n=50)	a+c (n=99)	b+d (n=99)
I	$\bar{x}$	13.8	12.8	12.9	13.8	13.5	13.3
	SD	3.80	4.62	4.53	4.41	3.98	4.52
II	$\bar{x}$	15.8	14.3	14.7	15.3	15.4	14.8
	SD	4.02	3.96	3.61	3.80	3.92	3.89
III	$\bar{x}$	14.7	14.9	15.0	14.4	14.8	14.7
	SD	3.50	3.61	3.61	4.40	3.50	4.02
IV	$\bar{x}$	8.7	8.6	8.1	8.1	8.4	8.5
	SD	2.05	2.11	2.10	2.91	2.09	2.34

Key: I = Achievement Motivation   II = Reproducing
III = Meaning   IV = Comprehension Learning
$\bar{x}$ = Mean   SD = Standard Deviation
a-d = See Table Ap. 9.1

TABLE Ap. 9.3. Results of Test/Retest

DIMENSION		a (n=49)	c (n=50)	b (n=49)	d (n=50)	a+b (n=98)	c+d (n=100)
I	$\bar{x}$	13.8	12.9	12.8	13.8	13.3	13.4
	SD	3.80	4.53	4.62	4.41	4.22	4.28
II	$\bar{x}$	15.8	14.7	14.3	15.3	15.2	15.0
	SD	4.02	3.61	3.96	3.80	4.12	3.70
III	$\bar{x}$	14.7	15.0	14.9	14.4	14.7	14.7
	SD	3.50	3.61	3.61	4.40	3.52	4.01
IV	$\bar{x}$	8.7	8.1	8.6	8.1	8.6	8.3
	SD	2.05	2.10	2.11	2.91	2.08	2.34

Key: As Above

TABLE Ap. 9.4. Results of Instant/Delayed

APPENDIX 10

UNDERGRADUATE MEDICAL CURRICULA AND THE LEARNING THEY GENERATE

In Chapter 10 inventory data were presented from a comparative survey which was 'transverse', looking at students in various years. One weakness of that approach is that year groups might differ. Consequently, a 'longitudinal' survey was undertaken at the three medical schools by following up new entry students at the end of Year One. This provided additional data which were not available when the tables for Chapter 10 were being prepared. However, the new findings are important here because they parallel the transverse results, and add strength to the discussion because they are 'longitudinal'. A paper based on this latest survey was presented in September 1984, and is reprinted here, and has been published as an abstract (Coles, 1985).

Undergraduate Medical Curricula and the learning they generate.

(A paper presented at the ASME annual scientific meeting, Leicester, 28th. September 1984)

It's very clear from the literature that, early on in conventional medical schools, many students feel overloaded, some lose their motivation, find the course lacks relevance, show increased cynicism, and when they get into the clinics many seem unable to retrieve what they have learnt in the early years.

Two alternative curricular types have emerged: one largely retains the preclinical/clinical division but blurs the boundaries between the subject disciplines - the curriculum is horizontally integrated - and this is the most common UK innovation seen in Southampton with its systems courses. The other alternative is more vertically integrated eliminating the traditional separation betweem theory and its application, as seen in the problem based courses at McMaster and Maastricht.

But are either horizontally or vertically integrated curricula worthwhile alternatives? To judge this we first need to define what counts as worthwhileness - we need appropriate criteria. It has been suggested that a useful criterion might be to look at how students study. The reasoning is this: we now know that how we learn largely determines what we learn, and that the conditions under which we learn greatly influence the learning that occurs: to put it another way, there is a chain of causality from curricular experiences to learning outcomes, the visible effects of which are the ways a student studies. So, if different curricula are associated with differences in the ways students approach their studying then we may be in a position to judge one type of curriculum as being more appropriate than another: a 'more appropriate' curriculum being one that induces more 'desirable' approaches to studying. But what do we mean by 'more desirable'?

We know that if we learn by rote our learning is ephemeral - we quickly forget what we have learnt - probably because items of information remain unconnected. Indeed studies have shown that the more we set out to learn by memorising the less we will be able to retrieve later. But if we attach meaning to what we are learning, not only will we retain what we have learnt but we will build up concepts and principles, creating a rich and elaborate knowledge store which is much more likely to be retrieved later by a variety of information cues. Clearly it is this kind of elaborated and retrievable knowledge store that doctors need.

So, learning approaches could be said to be desirable if they are low on memorising and high on attaching meaning. But how can we tell if they are? Recently a suitable instrument has become available - Entwistle's Short Inventory of Approaches to Studying - a 30 item questionnaire which is easily administered, quickly completed and readily scored for computer analysis.

My research design was this: students at three medical schools - Southampton, a conventional school and a problem based school - completed this inventory on entry and again at the end of their first year. Although the inventory gives data on a number of approaches to studying I want to concentrate on just two - students' memorising or reproducing orientation, and their meaning scores.

Taking first the new entry data, the mean scores at the three medical school are remarkably comparable: a t-test on the means for reproducing and for meaning shows no significant differences (table 1). But what do the figures themselves mean? I found that compared with nurses and engineers on entry to their courses, medical students have substantially lower reproducing scores. Perhaps this is to be expected - medical students have the more successful A-levels, probably because they engaged less in memorising than 6th formers getting lower grades. We may be selecting medical students because they have highly desirable approaches to studying.

When I retested them at the end of year one, I found that a number of very interesting shifts had occured. First, at the conventional school, students' reproducing scores increased, the difference being significant at $p=0.017$, and there was a marked decrease in their meaning scores, the probability being less than 0.001 (table 2). The results in Southampton were similar, greatly increased reproducing scores and greatly decreased meaning scores (table 3). However, at the problem based school the reproducing and meaning scores remained about the same as on entry (table 4).

Now, these results are longitudinal but I also have transverse data from students in other years at the three schools, and these suggest a high level of consistency: the approches to studying which students have adopted by the end of year one continue with them for the next 3 or 4 years.

To recap:
1. On entry students at all three medical schools show the same low level of reproducing and high level of meaning in the way they approach their studying. They try to understand what they are learning and not to memorise.
2. But by the end of year one students in Southampton and at the conventional school show a marked increase in their reproducing score and a significntly decreased meaning orientation. Now they memorise and do not try to understand what they are learning.
3. Students at the problem based school show a maintained low level of reproducing and high level of meaning. They continue to study well.
4. These shifts remain consistent over subsequent years.

There seems, then, to be some relationship between curricular experiences and the way students study, but is this causal? Does a curriculum <u>make</u> students study in a particular way? To answer that we need to identify possible mechanisms. The psychology of learning seems clear on this: we are only able to learn something meaningfully if we can 'attach' it to something we already know, and this 'something' needs to be more general and inclusive than the new information. This is what Ausubel calls the role of an advance organiser or Mayer refers to as an assimilative context. The problem is that, in the conventional curriculum, students do not have a suitable assimilative context. They are merely presented with large amounts of theoretical information, for the most part in the absence of any clear understanding of the kinds of situations for which it is going to be needed. Indeed this is the whole philosophy of the preclinical arrangement - students have to get the basic facts learnt first before they can begin to apply them. So, they may have no alternative but to learn by rote. However, in the problem based school students *do seem able to learn well, but why? Is it, as* some suggest, because they are solving bio-medical problems? Probably not. There is not much psychological support for this view. It is much more likely that certain key features of the curriculum enable them to learn appropriately. Probably the mechanism is this:

1. The problem provides students with an appropriate assimilative context - a case study. It acts as an assimilative context because it is more general and more inclusive than the to-be-learnt information. But only incidentally is it a problem.

2. Students then, ostensibly to solve the problem, acquire new information which is relevant to the assimilative context which makes possible the third stage...

3. ...where students relate the new information and the assimilative context, as it happens in problem based learning through the act of problem solving.

So is problem based learning the answer? Certainly it may provide opportunities for meaningful learning but probably because problem solving shares the same educational basis as this three stage model. If so, given this model, we may be able to devise alternatives to the conventional curriculum without needing to re-invent problem based learning. Another vertically integrated scheme, such as New Mexico's Primary Care Curriculum, might achieve the same ends, though apparently through quite different means.

Where does this leave the conventional curriculum? It is clear from this study that students set out with quite acceptable, even enviable approaches to studying but that within a very short time they are made to adopt quite undesirable ones. It seems too that the horizontal *alternative is no different. I feel certain that the kinds of* educational changes we need must focus much more than at present on the vertically integrated model. But we must abandon the basic theory first philosophy, substituting for it a different kind of basis - one which enables students to meaningfully learn about the sciences and social sciences that underpin medical practice.

Colin Coles,
Medical Education,
Southampton.

	Reproducing	Meaning
Conventional	13.3.	16.1
Southampton	12.4	16.4
Problem-based	11.8	16.6

Table 1

Reproducing		Meaning	
Entry	Yr 1	Entry	Yr 1
13.3	14.3	16.1	13.2
$p = 0.017$		$p < 0.001$	

Conventional

Table 2

Reproducing		Meaning	
Entry	Yr 1	Entry	Yr 1
12.4	14.9	16.4	13.8
$p < 0.001$		$p < 0.001$	

Southampton

Table 3

Reproducing		Meaning	
Entry	Yr 1	Entry	Yr 1
11.8	11.0	16.6	16.1
no dif.		no dif.	

Problem-based

Table 4

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