Students' Perceptions of Teaching in Relation to their Approaches to Studying

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To Steven

Declaration

I declare that this thesis has been composed by me, and that both the strategy for the analyses and the analyses themselves are my own work. The research instruments used to gather data were developed in collaboration with other members of the project teams to which this pogramme of research was attached, and some of the findings were interpreted in the light of other data collected as part of these wider projects.

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Abstract

This thesis reports a programme of research consisting of five factor analytic studies which explores students' perceptions of teaching in relation to their approaches to studying. It does so using a number of different versions of the *Approaches to Studying Inventory*, which were modified throughout each of the five studies, along with different types of course perceptions items. Other types of items, concerning the particular ways in which students used their private study time, and the reasons they had for studying in higher education, were also used in some of the analyses.

It was concluded that the types of course perceptions items generally used to obtain student feedback and evaluation on teaching and courses were not particularly useful in trying to establish empirical relationships with approaches to studying, probably due to the fact that they reflected rather general aspects of teaching and learning, and so suppressed individual differences in response.

In response to this finding, items were developed which asked students to reflect on which types of lecturer, examination, course and tutor they would prefer. Analysis of these items produced interesting and meaningful response patterns indicating that 'meaning orientation' was empirically associated with preferences for types of teaching likely to encourage a deep approach, while 'reproducing orientation' was related to preferences for contrasting types of teaching which were likely to promote a surface approach. Thus the types of teaching which students said they would prefer were related partly to their intentions in studying. The range of preferences to be found within a class makes it difficult to interpret student 'feedback' questionnaires.

The analyses using these new 'preference items' was carried forward in two ways - firstly to explore how more general orientations to higher education would fit in, and secondly to investigate the factor structures of failing students. Interesting patterns of response were apparent in both cases. In the former, it was found that students coming in to higher education with what were termed 'intrinsic' motives, endorsed deep approaches to studying and preferred types of teaching which would support this. These students would be the ones more likely to succeed, assuming the assessment procedures rewarded deep approaches to studying. In contrast, students entering higher education with 'extrinsic' motives, tended to have surface approaches to studying and preferred teaching which was compatible with their approach. These findings may be important in helping to identify those students at risk of failure at an early stage in their courses.

In investigating the factor structures of failing students, it was found that, in comparison to successful students, conceptually incoherent patterns of response were produced. These patterns may suggest that students who were failing were unable to identify the various types of teaching which would be compatible with, and therefore support, their approach to learning. It is suggested that this could have implications for the early identification of 'at risk' students.

The programme of research has made a contribution to understanding student learning by showing the ways in which motives and intentions influence the approach adopted, and the ways in which approaches in turn interact with perceptions of teaching and courses.

Preface

The research carried out for this thesis was supported by an ESRC linked studentship and was formally attached to a Scottish Office Education Department (SOED) project entitled *The Performance of Electrical Engineering Students in Scottish Higher Education* which began in October, 1987. The SOED commissioned the study primarily to investigate the relatively high non-completion rates of technology students in higher education which was causing some concern at a time when industry was experiencing a shortage of suitably qualified graduates.

The project was carried out in the Department of Education at the University of Edinburgh by a team comprising two directors, the equivalent of 1.5 research associates and secretarial support. The team decided to focus on electrical and electronic engineering courses as a particular example of technology courses for three main reasons:-

- time and resources would not permit a thorough survey of all technology students.
- maximum comparability between different courses from different institutions could be made if a relatively homogeneous group of students were studied.
- electrical and electronic engineering courses appeared to have a particular problem with non-completion.

The first year of the studentship was devoted exclusively to the Engineering Project which proved valuable for gaining a wealth of research experience as a result of watching and assisting in the development of the project from its origins, and seeing a small range of research methodologies and procedures being employed which would have been otherwise virtually impossible under the constraints of time, had the studentship been conducted as a solitary exercise. However, the linked studentship also had a disadvantage - namely that by being linked to a project, the type of research done, the composition of the sample, the methodology employed, and the order in which tasks were carried out, were all largely dictated and constrained by the nature of the engineering project. This meant that the programme of research reported in this thesis was not fully planned at the beginning, but that instead was rather exploratory and progressive in nature - the next step being dictated by the results of preceding stages, and the whole thesis stemming from selected analyses carried out for the purposes of the engineering project.

At the end of the first year, one aspect of the project which had proved to be particularly interesting, namely the relationships between students' perceptions of teaching and their approaches to studying, was selected and developed to form the basis of part of the work reported here. Although the work reported in Chapters Four and Five of this thesis used data gathered by questionnaire for the engineering project, the strategy for the analyses and the analyses themselves in this thesis were carried out solely by the author for the purposes of investigating the relationships between students' perceptions of teaching and their approaches to studying. Interviews were carried out by other members of the project team, and while they are not formally used or analysed here, they served as a valuable source of additional information in the light of which the statistical analyses could be interpreted. This work was then extended by exploring other means of investigating the relationships between students' perceptions of teaching and their approaches to studying in other university departments. The analyses reported in Chapter 7 again made use of data gathered from an SOED-funded project set up to investigate the *Transition from School to Higher Education in Scotland*, but again the strategy for the analyses reported here and the analyses themselves were the author's own work.

This thesis, resulting from a programme of research consisting of three main studies, is presented in the form of a research report. Reported sequentially, the studies aim to unfold the search for meaningful relationships between students' approaches to studying and their perceptions of teaching. There was never a single question or argument which was relentlessly pursued throughout to culminate in a grand thesis. Rather, there was an exploration of the inter-relationships of a restricted number of variables pertinent to teaching and learning in higher education.

Inherent in a programme of study of a number of years' duration, is the problem of keeping abreast of related research in other parts of the world. At the end of the first year of the studentship, the author became aware that Meyer in South Africa was carrying out similar work. Only his early relevant work is described in the literature review chapter, as it was by this stage too late for it to influence the main study to which the studentship was formally attached. However, reference to his work is made later in this thesis, in Chapters 6 and 8, where it did influence directly the research carried out.

Chapter 1
Introduction

Although higher education dates back several centuries, the use of systematic empirical research to examine aspects of it is relatively new. For many years, staff development was an unknown - improvements in teaching came about through a process of osmosis, using inspiration and application as its guides. Student learning too, was largely left to the individual concerned, and was assumed to occur through the exploration, expansion and elaboration of knowledge. Thus teaching and learning in higher education were not regarded as entities particularly interesting or worthy of study in their own right. Coupled with the fact that student learning has proved somewhat difficult to study in its natural setting for at least three reasons:-

1. well-defined learning tasks are generally not involved
2. most studying is carried out privately
3. it is difficult, if not impossible, to control many of the variables involved

it is perhaps not surprising that until relatively recently, there has been a gap in empirical research where student learning is concerned.

Teaching too has, until recently, largely escaped rigorous study. This may in part be due to a now out-dated model of teaching, regarding it merely as the delivery of knowledge which students could opt to receive. It has, perhaps, therefore not been seen as worthy or interesting as a focus for empirical research.

To compensate for this perceived lack of empirical research, models of the teaching/learning process exist in abundance in the literature which try to explain or make sense of the whole teaching/learning process. Traditional input-output models of student learning have long since been abandoned on the grounds of over-simplicity, and have been replaced by complex models which try to show the interactions of the many variables of higher education, but little empirical work exists to confirm or refute the components of these models, let alone the ways in which they inter-relate.

Today however, higher education is changing rapidly. This alone has encouraged considerably more research to be done within the teaching and learning domain, partly with a view to evaluating the implementations, but also to try to establish a

literature addressing itself to tried and tested innovations in teaching and learning. In 1992, three projects will report which have independently addressed the issue of improving the quality of student learning (Entwistle et al, Cryer, and Gibbs). It is very much hoped that this will herald the start of much greater importance being placed upon the values of good teaching, and particularly, the relationship between certain types of teaching and the quality of resulting student learning.

'Real-life' student learning, occurring in its natural setting, therefore seems to be worthy of empirical study in the light of other research carried out in higher education, in the hope that a fuller picture of the whole nature of the process of learning and studying in higher education may be further unfolded and consequently better understood.

To this end, the programme of research reported in this thesis attempts to bring together two previously separate areas of research - student approaches to studying (as measured by Entwistle's *Approaches to Studying Inventory*) and students' perceptions of teaching, to try to determine what relationships, if any, exist between them, and specifically how certain aspects of teaching may influence particular approaches to learning. Bringing together these two, and adding in some element of the reasons students give for entering higher education, may collectively provide a means of beginning to understand the learning environment within a particular department or discipline. The term 'learning environment' has been variously used in the literature, but is used here simply to mean the educational context and classroom 'atmosphere' within which learning takes place, and is intended to embrace all aspects of teaching (including laboratory work and tutorials where applicable), course content and organisation, and assessment procedures.

The literature suggests that there appear to be two main reasons for striving to understand the learning environment. First of all, it is vital for the institution, faculty or department to know the effects that various teaching and assessment policies or practices will have on the quality of student learning, rather than assume that the quality of student learning is determined solely by the attributes of individual students. Although there has by now been substantial research into the process of student learning, students' opinions of various teaching practices and types of courses, and the reasons that students have for embarking on a higher education course, there has been very little research into how these fit together. Some of this literature is presented in Chapter 3. Gaff and his colleagues (1976)

drew attention to this while attempting to define the learning environment in a Dutch university, stating that "although universities provide environments which are widely assumed to facilitate learning, there has been surprisingly little systematic analysis of the qualities of those environments and the ways in which they affect the learners" (p.285). Things do not seem to have changed much in the past 16 years.

Apart from the important implications for teaching, the second reason for trying to understand a learning environment is that it should also provide detailed information for prospective students. Research seems to suggest that the more knowledgeable students are about what a course will be like before they begin, the less likely they are to drop out or fail (Entwistle et al, 1989). Today, with the current financial squeeze on British higher education, it is very difficult for a student to find funding for a second course after having left the first one, so it seems imperative that the student makes the 'right choice' first time. From the department's point of view, a wasted place is created when a student drops out or fails, which remains unfilled for the duration of the course, resulting in a reduction in the number of qualified graduates.

Early attempts to observe the learning environment often used participant observation, but this tended to produce accounts of behaviour without capturing students' own perceptions to any great extent. Of the few more recent studies purporting in their title to measure the learning environment (eg. Wakeford, 1984; Dragonas & Kostakis, 1986), there appears to be a tendency to measure only students' opinions of certain aspects of the course, rather than embrace the many aspects of the teaching/learning process which it is argued are needed to map out the learning environment fully. It therefore would seem that while the learning environment should be an important entity to try to describe, both for the purposes of the student and for the purposes of the institution, attempts to do so have not been particularly successful because they have generally failed to take on board the importance of the two main parts of higher education simultaneously - teaching and learning. It is again argued that only when students' perceptions of teaching are studied in relation to their approaches to learning and then to their more general orientations to higher education can the learning environment in part be understood and departments will then be able to evaluate their teaching practices in relation to students' approaches to studying.

Aims of the thesis

The thesis aims to make, in the first instance, a contribution to the research on student learning by investigating the relationships between students' approaches to learning and their perceptions of teaching in higher education. It is hoped that this will contribute generally to a better understanding of the whole process of teaching and learning, and, by introducing the more general orientations to higher education, specifically to the research on attempts to understand the learning environment.

Research questions

1) Can empirical relationships be demonstrated between conventional students' ratings of teaching and student approaches to studying?
2) Does a better way of examining the relationships between teaching behaviours or practices and student learning exist?
3) How do more general orientations to higher education fit in with these relationships?

Chapter structure

Chapter 2 provides a review of the relevant literature, separated into three main sections. The first section reviews research on student learning and describes how this has progressed over the last twenty or so years, from seeking correlates of academic achievement, to examining the process of student learning, and then to developing ways of mapping out students' approaches to studying, using inventories. The second section reviews the voluminous literature addressing itself to student ratings of teaching and courses, but concentrates here mainly on studies which have aimed to identify those aspects of teaching which are of greatest importance to students, rather than on studies which have aimed to make one overall measure of teaching effectiveness. The third section reviews the relatively few recent studies which have begun to look at the effects of educational context on student learning. As this last body of literature proved to be small, it was deemed both necessary and interesting to go back to the literature embracing the two main components which were to be investigated in relation to each other - that concerned with students' approaches to learning and that with students' perceptions of teaching.

Chapter 3 describes the research design employed, and examines the detail of factor analysis, the multivariate data technique which is used extensively throughout the analysis of the data presented in Chapters 4 to 8. No discussion of the relative merits of various methodologies is provided, because the methodology employed was largely determined by the specifications of the engineering project to which this programme of research was linked.

Chapter 4 reports the pilot work carried out as part of the engineering project. This chapter describes the questionnaire which was developed to investigate the performance of electrical engineering students in Scottish higher education and examines the integrity of the *Approaches to Studying Inventory* which was modified to be more applicable to such students.

Chapter 5 reports the Main Engineering study which resulted from the pilot study described in Chapter 4. The analyses which are presented focus only on the central theme of this thesis - namely the search for relationships between students' perceptions of teaching and their approaches to studying, and do not report the other diverse analyses carried out to examine the performance of engineering students more generally (which may be found in the final report to the Scottish Office Education Department - *The Performance of Electrical Engineering Students in Scottish Higher Education* [Entwistle, Hounsell, Macaulay, Situnayake & Tait, 1989]). This chapter aims to identify how the course perceptions items could best be grouped into scales; to investigate how the course perceptions scales and inventory scales interrelate; and to examine how other study behaviour items fit in with the perceptions and approaches. In so doing, it aims to determine the appropriateness of traditional course perceptions items for studies of this type.

Chapter 6 reports the development of 'teaching preference items', designed to identify individual students' preferences for various types of lecture, examination, tutor and course. The piloting of a new questionnaire, incorporating these new preference items along with an abridged version of the inventory, traditional course perceptions items and study activities items with students from both an engineering department and a contrasting department (psychology) is then reported. This chapter aims to explore an alternative way of investigating the relationship between teaching and approaches to learning, using items which are perhaps more likely to highlight differences between individuals, than had the traditional course perceptions scales of the previous study. These traditional scales were also retained

so that the new items could be seen in relation to them, in addition to the approaches to studying orientations.

Chapter 7 reports the Transition from School to Higher Education study, the main study using these new preference items in conjunction with an abridged version of the *Approaches to Studying Inventory*, traditional course evaluation items and orientations to higher education. This chapter aims to confirm the findings and tentative conclusions of the previous chapter by using students from other disciplines and using larger samples, as it is argued that greater faith may be had in findings when they are able to be reproduced. The more general orientations to higher education were included in the later analyses so that it could be seen how another dimension of the whole teaching/learning process, namely the students' reasons for entering higher education, related to the students' approaches to studying, course perceptions and preferences for particular styles of lecturers, exams, tutors and courses.

Chapter 8 reports a short study which was carried out to explore the factor structures of failing students. During the period that the work was being undertaken for the thesis, there had been suggestions from the literature that low ability students, or those doing badly, tended to produce conceptually incoherent patterns of results. As some of the questionnaire data gathered had accompanying examination results, a good opportunity was provided for exploring this seemingly strange finding further.

Chapter 9 summarises the empirical findings of the previous four chapters and relates them to the previous literature. The practical utility of both the research instruments and the findings are considered. Finally, directions for possible future research are discussed, relating both directly to the programme of research reported here, and to the wider field of student learning in higher education.

Chapter 2
Literature Reviews

Introduction

The relationship between teaching methods and student learning and studying has proved difficult to examine empirically and has been somewhat neglected in the literature on research in higher education. To examine the learning environment within a particular class or department, it would seem to be necessary to study in some detail students' approaches to learning in relation to their perceptions of the teaching and courses which they experience, in order to capture the three way interaction between the student, the teacher and the course material which lies at the heart of higher education.

As a result, the following literature review consists of three main sections. The first looks at ways in which student learning has been studied in higher education and then describes how inventories have been developed to map out the study processes of students. The second part reviews some of the voluminous literature addressing itself to students' ratings of teaching and courses, and focuses in particular on studies which have aimed to tease out those aspects of the teaching process which are considered to be particularly salient to students. The third and final portion considers some of the somewhat sparse literature which has started the process of looking at the influences of the learning environment on student learning.

The way in which the literature review is presented below, to some extent mirrors the programme of work carried out and reported in this thesis. It was felt that before an inventory could be adapted for use in the SOED-funded projects, it would be desirable to strive to understand the theory underlying the original inventories on which a new one would be based. This then necessitated an initial trawl through some early empirical research studies. These are reported in summary, as some of the specific findings were felt to be of potential significance to the programme of research being conducted here. In order to devise a course perceptions questionnaire, the literature on students' ratings had first to be consulted, in order to identify the aspects of teaching and courses which were seen as important by students. Finally, the literature which has begun to examine the effects of the learning environment on student learning was also studied, as this was directly related to the present programme of research.

Part 1
Research on student learning in higher education

Introduction

Research on student learning in higher education in Britain is fairly new. Some of it has its roots in the growing realisation that much more may be involved in high academic attainment than just systematic hard work and using 'good' study methods. Indeed, comparisons of some of the study methods suggested in 'How to Study' manuals and programmes revealed that there was considerable disagreement about what constituted a 'good method', largely because there was little or no research to back up the recommendations being made, and because the importance of individual differences was somewhat neglected. Research therefore began by concentrating on **what** particular student characteristics and study behaviours consistently correlated with achievement, primarily in an attempt to predict academic success. It then moved on to look at **how** students studied, with a particular emphasis on the quality of learning taking place. Some of the literature associated with each of these two areas of research will be reviewed below, indicating how these findings have been brought together, and how inventories have been developed which aim to map out student learning in higher education. Finally, four such inventories, stemming from different theoretical perspectives, will be compared and contrasted.

1.1 Correlates of academic achievement

Motivation, personality and study methods

It has been recognised for many years that motivation, personality and study methods all influence academic performance. A study, conducted at higher education level, investigated the interrelationships of these three variables along with previous academic attainment, and the correlations of each with current academic performance. It was found that for university students, previous attainment, motivation and extraversion all correlated with current attainment (extraversion negatively), while in the college sample, performance was related to previous attainment, motivation and study methods (Entwistle and Entwistle, 1970). The importance of this study was in showing that other factors besides attainment at school correlate highly with subsequent performance, which is somewhat worrying considering that school attainment is used as the sole basis for

selection to higher education. Some perfectly able school pupils are presumably therefore denied the opportunity of studying in higher education, even though their low scores on extraversion, for example, might suggest that they would do well. It also pointed up the importance of looking beyond raw achievement scores to determine how students are getting on and how likely they are to progress. Although it might be argued that it is difficult to provide some form of intervention that will boost motivation, it is probably less difficult to argue in favour of providing help successfully in study methods. It seems from this study that many students already in higher education could be helped if more were known about their levels of motivation, their personality, and the types of study methods they adopt.

Further research on motivation

As motivation is defined as the process which arouses, sustains and regulates human behaviour, by definition it must play an important part in academic achievement. Motivation is generally believed to be an essential ingredient in any consideration of optimal learning and items describing motivation therefore feature in many study strategy questionnaires.

It was therefore considered important to the programme of research undertaken here to have a clear picture of the various types of motivation which have been identified along with their implications for subsequent academic success. Research into motivation had resulted from the observation that there was some confusion in the literature surrounding the term 'motivation', and it was suspected that it was being used to mean different things ranging from simple underlying drives to goal-orientated behaviours.

Further investigation identified three main types of motivation relevant to research on academic achievement - *goal-orientated motivation*, *need for achievement* and *academic motivation* (Entwistle et al, 1974). Goal-orientated motivation may be either extrinsic or intrinsic. Extrinsically goal-orientated students tend to be unsuccessful, typically giving reasons like 'parental pressure' for going to university. Intrinsically goal-orientated students, on the other hand, tend to have clearer goals and go to university to learn more about subjects which interest them. Need for achievement again has two contrasting forms - hope for success, originally thought to spur the student on and thus enhance performance, and fear of failure, originally thought to become an all-consuming fear which therefore

hindered performance. Subsequent research, however, revealed soon afterwards that both may act as positive forms of motivation to improve performance. This investigation of motivation concluded that "...quite distinct motivational patterns which lead to academic success for different types of student" had been found and that "some students are stable, confident and highly motivated by hope for success, while others are anxious, uncertain of themselves and haunted by fear of failure, and yet both groups are capable of high levels of academic performance." (p.393)

Organised study methods

Individual differences and subject specific demands ensure that no one set of study methods or pattern of study will be best for every student in higher education. Study habits develop as a reaction to educational experience and perceived educational requirements, and so depend to a large extent on students' abilities (past and present) to cope with the pace and difficulty of work. It is generally accepted that good study methods necessarily involve planned, organised and systematic study procedures, avoiding delay in starting tasks and assignments, seeking approval from the lecturer or tutor, and accepting the value of education (Brown and Holtzman, 1966). Within each of these general categories, however, extensive research has shown that there exists a multitude of idiosyncratic study methods, many of which lead to academic success. The ways in which students take lecture notes and deal with them subsequently; the use they make of books; the extent to which they utilise resources such as the library, the lecturer, tutor and fellow students; the amount of time they devote to private study and what they do during it, all vary both from individual to individual and from subject to subject. Thomas and Rowher (1986) developed a model of studying in which they proposed that the concept of studying could be subdivided into *cognitive transformational activities* and *self-management activities*, and argued that sound methods necessarily embraced both. The former included selection, comprehension, integration and cognitive monitoring of course material, while the latter covered time management, effort management, coping with distractions and anxiety, and volitional monitoring (establishing and striving for specific goals). These have tended to be the focus of study strategy workshops (see for example Weinstein, 1988).

From the extensive literature which exists on organised study methods, it can be concluded that two broad criteria for organised study are having a sense of goal-directedness and being in command of one's own studying. Taken together, these imply that 'metacognitive awareness' (self-monitoring) appears to be the key to

organised study, as it is only by being actively involved (in contrast to regarding learning and studying as external impositions) that students become aware not only of the particular preferred study strategies that they use, but also of the alternatives and the appropriateness of each to different situations, and so come to reflect more about each learning task on which they embark. Beyond these, various specific study methods are suggested in the literature, but closer inspection reveals that they are only appropriate for certain students within particular disciplines and that they tend to be rather prescriptive, therefore not accommodating individual differences. There is also a tendency in traditional study skills training to teach the skills as content. It is then little surprise that students have difficulty in transferring the recommended method to everyday learning tasks. If the above two criteria (metacognitive awareness and active learning) are not met, students appear to drift through courses having no particular study plan in mind, and studying becomes a fight to cope with the rigorous demands of higher education or alternatively students may become passive recipients of pre-digested knowledge rather than active learners.

Syllabus-boundness and freedom

As indicated in the previous section, if left to their own devices, students will adopt widely different study methods, depending on both previous experience and personal preference. *Syllabus-boundness* and *syllabus-freedom* were terms introduced by Hudson (1966) and then extended by Parlett (1970) to explain such differences, and in particular to draw a distinction between the types of studying related to convergent and divergent thinking. Syllabus-boundness can be equated with systematic and conscientious study habits, but also with anxiety and obsessiveness. It is typically seen in students following courses with substantial contact hours or a heavy workload (particularly science courses) which often do not permit students to spend much additional time reading about parts of the course they have particularly enjoyed. Syllabus-freedom, on the other hand, is characterised by independence in study, sometimes to the neglect of some aspects of the course. It is often seen in students following courses with few contact hours (particularly arts courses) and where reading around the subject is encouraged.

Although there appears to be a tendency for science students to be syllabus-bound, and arts students to be syllabus-free, it would seem that these tendencies generally develop as a reaction to particular circumstances. Syllabus-boundness and syllabus-freedom have therefore been regarded as important concepts for studies of

student learning in higher education. It was seen as important to this thesis to make clear this distinction, as the starting point of the research programme was a link with a project focussing on engineering students.

Summary

It is intuitively obvious, and has been empirically demonstrated, that personality, motivation, and organised study methods are vital components in any investigation of student learning and studying in higher education, as each is an important correlate of academic achievement. It has also become apparent over the years that there exists a complex interaction of these variables. The significance of these findings to this thesis is in showing that more than just previous academic attainment could be used to help predict subsequent performance, and that remedial help for 'at risk' students could embrace much more than course material by including, where necessary, quite specific help with selected study skills. It is perhaps little surprise that personality, motivation, and organised study methods have been widely incorporated in study habits questionnaires in recent years and hence have formed a central part of the instruments referred to throughout this thesis.

1.2 Learning processes

Introduction

Until about twenty years ago, the majority of research devoted to student learning and achievement employed quantitative methodology and much of it maintained a psychometric tradition. There then began a move towards attempting to explain, rather than merely describe, differences in student learning for which conventional quantitative methodology seemed inappropriate and so additional or alternative methods were sought. Interviews with students had been used by some (see *inter alia* Thompson, 1981; Becker et al, 1968; and Perry, 1970) which largely introduced qualitative methodology into student learning research. This was taken forward and developed by Marton and his colleagues in the late 1970s.

The work presented in this section forms the backbone of the study strategy inventories described in the following section. It is therefore reviewed in some detail.

Terminology

Literature addressing itself to the qualitative outcomes of learning has made considerable use of terms such as 'level', 'strategy' and 'style' and it would seem to be worthwhile indicating what these terms have come to mean and to offer definitions to aid readers in their understanding of this section of the literature review. 'Level' has been used here to describe qualitative differences in both the process of learning (deep or surface) and the outcome of learning (mentioning, describing, or conclusion-orientated) and indicates the level at which information processing occurs and at which the outcome appears. 'Level' has often been used synonymously with 'amount', as in 'level of intelligence', but should be regarded here as referring to a qualitative difference rather than a quantitative difference, as described above. 'Strategy' is used to describe the task specific approach adopted in response to specific task requirements so is generally referring to a deliberate, planned, and consciously engaged-in activity which may be thought of as being largely under the learner's control. 'Style', in contrast, is used to describe the general tendency to adopt a particular strategy.

Learning styles

Introduction

In Gothenburg, Sweden, a programme of research was carried out by Marton and his colleagues which started out with the aim of describing learning in terms of its content. Marton's work developed out of cognitive psychology traditions - aiming to interpret behaviour in terms of the knowledge or image of reality and taking the representation of knowledge as its central concern. It was felt that purely quantitative methodology could not provide the type of understanding which they were seeking so alternative procedures were explored.

Identifying qualitatively different levels in learning outcome and process

Students were asked to read passages of text under experimental conditions and then be prepared to answer questions, not only about the meaning of the text, but also about the process by which they read it. Using this procedure, Marton and Saljo (1976a) aimed to identify qualitatively different learning outcomes, and then tried to find ways in which students with different outcomes differed. Four levels of comprehension were distinguished, and it was found that the quality of answers remained very stable over time. Marton deduced that

> Different students obviously learn different things from one and the same text and their knowledge about various scientific principles, methods and ideas varies as regards *what is learned* instead of merely differing as regards *how much is learned*. (p.7)
>
> (Marton and Saljo, 1976a)

As qualitative differences had been identified in the learning outcome, it seemed probable that differences might also exist in the process of learning. From the interviews carried out with students to find out how they approached the task of reading the prose, they established that basically two different levels of processing existed - deep level and surface level. These terms originated by analogy with Craik and Lockhart's work (1972) addressing levels of information processing in which they reported that greater depth of processing implied a greater degree of semantic or cognitive analysis and thus a longer lasting, more elaborate and stronger memory trace. Although the terms were the same, Marton and Saljo were not working within an information processing framework. In their terms, deep level processing was primarily characterised by the intention to understand the content of the material to be learned, by attending to what was signified in the text, by attempting to relate the new information to previous knowledge and by interacting with the author's argument in order to see how conclusions had been reached and whether they were justified based on the evidence presented. Surface level processing on the other hand was characterised by an over-emphasis on "the sign rather than the signified" - directing attention towards the text itself and relying on memorising facts rather than seeing how they fitted together logically to form the main arguments of the paper.

Later interview studies found that the reason why certain students seemed to use particular approaches to learning was surprisingly simple - "that the students who did not get 'the point' failed to do so simply because they were not looking for it" (Marton and Saljo, 1984, p.39). The approach adopted was related *inter alia* to students' perceptions of course demands, nature of assessment, the pace at which material was presented, workload, enthusiasm of the lecturer (Entwistle and Ramsden, 1983), and also to the finding that in fact students understood learning to involve rather different things. The work relating to this last factor has subsequently been extended to identify six distinctively different *conceptions of learning* (Marton, Dall'Alba & Beaty, 1992). These are:-

- Learning as an increase in knowledge
- Learning as memorising
- Learning as making use of facts and procedures
- Learning as making sense
- Learning as transforming one's understanding
- Learning as changing as a person

Further work has shown that students' conceptions of learning are related to both the approach they will adopt and the outcome they will attain - students with any of the first three conceptions of learning, for example, are likely to adopt a surface approach and will consequently fail to understand the material with which they have been working (Van Rossum & Schenk, 1984). It has also been established that the approach adopted and examination performance are clearly related (Svensson, 1977), and that this could be explained by the fact that there is too much to learn in higher education to make surface levels of processing effective for continuing academic success.

Learning strategies

Whereas the research of Marton and his colleagues had grown out of the observation that students showed qualitative differences in learning outcomes, another programme of research led by Pask in England in the 1970s had begun with a quest to find out more about the types of strategies which learners adopt (Pask and Scott, 1971; 1972). Through a series of rather complex studies requiring students to learn transformation skills on a computerised teaching system, Pask identified two main learning strategies which were labelled serialist and holist and were described as follows :-

> Serialists learn, remember and recapitulate a body of information in terms of string-like cognitive structures where items are related by simple data links : formally, by 'low order relations'. Since serialists habitually assimilate lengthy sequences of data, they are intolerant of irrelevant information unless, as individuals, they are equipped with an unusually large memory capacity. Holists, on the other hand, learn, remember and recapitulate as a whole : formally, in terms of 'high order relations'.
>
> (Pask and Scott, 1972, p218)

Pask then explored the effects of teaching students in ways which either complemented (matched) or contrasted (mismatched) their preferred learning strategies, by teaching students identified as preferring serialist learning strategies with serialist teaching strategies, and holist with holist in the matched programmes, and serialist with holist and holist with serialist in the mismatched programmes. It was found that students learned effectively in matched programmes but managed to retain very little on mismatched programmes. In broad terms, holists appeared to run into difficulties by tending to over-generalise, making inferences, and introduce irrelevant material, while serialists were sometimes unable to understand fully what they had learned even though they had accumulated all necessary and relevant data. It would seem that this may have important consequences for normal classroom teaching.

Later work (Pask, 1976a) suggested that although the serialist/holist distinction could be exhibited in his experimental set-ups where, by design, learning had to take place, the terms holist and serialist were "insufficiently refined to account for learning in general" (1976b, p133). In the experimental situations, holism and serialism represented learning strategies, or responses to particular task requirements. However, in less formal situations, such as in classroom learning, where learning need not necessarily take place, some students would act like holists (comprehension learners), others would act like serialists (operation learners), and others would be almost equally likely to adopt either strategy (versatile learners). When there is a general tendency to adopt a particular learning strategy in a less formal learning situation, the strategy becomes known as a style. Pask stated the differences between comprehension and operation learning as follows:-

> The gist of this comprehension/operation distinction is as follows : comprehension learners readily pick up an overall picture of the subject matter, for example, redundancies in a taxonomic scheme or relations between distinguished classes and recognise clearly where information can be obtained. These individuals are able to build descriptions of topics and describe the relation between topics. Their cognitive repertoire includes effective, though distinctive, description building operations, although such learners may not be able to apply these operations to specific subject matter information (for example to classify specimens) until the procedures underlying the concepts in question are specifically taught. Left to their own devices, operation learners pick up rules, methods and details but are often unaware of how or why they fit together. They have, at most, a sparse mental picture of the material and their recall of the way they originally learned is guided by arbitrary number schemes or accidental features of the presentation. On the other hand, if an

operation learner is provided with a specific description (by external means) he assimilates procedures and builds concepts for isolated topics. His cognitive repertoire includes accessible or effective procedure building operations.

(Pask, 1976b, p133)

Further research into learning styles in a less formal and natural classroom-type learning task revealed that over-dependence on either comprehension learning or operation learning led to pathologies - *globetrotting* (misunderstanding valid analogies or using vacuous ones) and *improvidence* (failing to use valid analogies or to use a common principle) respectively.

General discussion and summary of learning processes research

The work of Marton and Pask and their respective colleagues has made a substantial contribution to a fuller understanding of learning styles and strategies. Starting out with the intention of seeking qualitative rather than quantitative differences in the learning outcome, Marton identified two broad levels of processing - deep level and surface level - as a result of a series of studies carried out under laboratory conditions. On the basis of these and other more recent studies, the defining features of deep approach and surface approach can be summarised as follows:

Deep approach	**Surface approach**
Intention to understand Vigorous interaction with content	Intention to complete task requirements
Relating new ideas to previous knowledge Relating concepts to everyday experience	Treating task as an external imposition Unreflectiveness about purpose or strategies
Relating evidence to conclusions Examining the logic of the argument	Focus on discrete elements without integration Failure to distinguish principles from examples Memorising information needed for assessments

(adapted from Entwistle, undated)

This deep/surface dichotomy has been described as emphasising referential ('what') aspects of student learning. As understanding is generally taken to be one of the goals of higher education, it seems important to encourage students to use deep level processing when studying, perhaps by showing those who do not use it naturally how to become more active learners by raising their awareness of alternative learning styles, or by designing courses, teaching and examinations which encourage a deeper level of understanding of the course material. This theme of encouraging a deep approach will be returned to throughout the thesis, and some teaching methods will be studied empirically in this context.

Pask's work used a novel, albeit complex, series of studies to investigate study strategies which students might use when faced with a task, through which he identified two main strategies - holist and serialist, with related pathologies of globetrotting and improvidence respectively. Defining features of the two strategies and their pathologies are:-

Holist style	**Serialist style**
Prefers personal organisation and a broad view	Prefers step-by-step, tightly structured learning
Tries to build up own overview of topic	Focuses on the topic in isolation
Thrives on illustration, analogy and anecdote	Concentrates on details and evidence
Actively seeks connections between ideas	Adopts cautious logical stance, noting objections
Globetrotting	**Improvidence**
May fail to give sufficient attention to details	May fail to seek analogies or use own experience
May be over-ready to generalise/reach conclusions	May fail to make connections with related ideas

(adapted from Entwistle, undated)

Pask described how these strategies could also be used in natural learning, but chose to refer to them as comprehension and operation learning, to reflect a tendency to adopt them in general, rather than using them in response to the specific requirements of a task. This holist/serialist distinction has been described as emphasising organisational ('how') aspects of the informational content of the learning task.

The constructs of Marton and Pask were initially identified independently, though an empirical relationship was later established. Conceptually, the constructs were seen to overlap. It was initially assumed that deep approach may be conceptually

related to comprehension learning, and surface approach to operation learning. Empirical studies (Entwistle and Ramsden, 1983) which set out to examine the relationships between Marton's and Pask's constructs, have found that Pask's two pathologies, globetrotting and improvidence, are positively related to each other. A positive correlation also exists between improvidence and operation learning, and between comprehension learning and deep approach. It was therefore clear that there was no straightforward one-to-one mapping between deep approach and comprehension learning, or between surface approach and operation learning.

1.3 Learning style and study strategy inventories

Introduction

During the 1970s and 80s some independent attempts were made to follow the ideas of trait psychology and apply them to studying in a natural setting. This was done by writing items to describe various everyday learning and studying activities and combining these items in an inventory. Although all four of the inventories to be discussed below have been developed with the common aim of finding out more about student learning and studying as an early step towards providing better study skills advice, the theoretical perspective from which these inventories has stemmed varies considerably, so too has the origin of the item pools. The first to be discussed was developed by Biggs in Australia and stemmed from a combination of information processing and research on student learning. The second inventory, by Schmeck in the United States, grew out of cognitive psychology traditions. Thirdly, Weinstein's inventory, constructed in the United States, originated from traditional research on study skills and cognitive psychology. Finally, the fourth was developed by Entwistle and his colleagues at Lancaster University, using research on student learning together with trait psychology. These four will be discussed in turn in varying amounts of detail. Biggs inventory is reviewed in some detail because of its similarity to that of Entwistle. Schmeck's inventory is also described in detail as its origins are somewhat different from Entwistle's and Biggs', yet the resulting dimensions are remarkably similar. This was felt to be both significant and important to the current research programme. Weinstein's inventory is presented in considerably less detail as the origins and focus of her work are rather different. It is, nevertheless, acknowledged as being an important

inventory which has, like the others, looked beyond study habits and skills to identify underlying dimensions in studying.

The proposal submitted for the SOED project *The Performance of Electrical Engineering Students in Scottish Higher Education* (to which this programme of research was originally attached), had specified that it would make use of a modified version of the Lancaster *Approaches to Studying Inventory* (ASI) to look at the ways in which students on such courses were studying. There was therefore no decision to be made in the choice of instrument, as far as the inventory was concerned. However, as the author had not been involved in the original development work in Lancaster in the 1970s, it was important that a full review of the literature be undertaken, relating to both the development of the inventory, and the ways in which it had subsequently been used by others. It also seemed important and interesting to look at some of the other learning style and study strategy inventories which had emerged. The ones which appeared to share most in common with the ASI are (hierarchically) those listed above - Biggs' *Study Process Questionnaire*, Schmeck's *Inventory of Learning Processes*, and, to a lesser extent, Weinstein's *Learning and Study Strategies Inventory*.

Biggs' inventory

Development of the inventory

Using research on student learning from mainstream educational psychology along with information processing ideas as his theoretical bases, Biggs drew on literature addressing itself to academic learning and studying to find characteristics which he believed should be represented in conceptual terms in his *Study Behaviour Questionnaire* (SBQ). He initially included tolerance of ambiguity, dogmatism, cognitive complexity, convergence/ divergence, study organisation and intrinsic motivation. Factor analysis (discussed as a statistical technique in Chapter 3) produced six interpretable factors - *study organisation* (which contained items typical of those in conventional study skills questionnaires and for which a high score would be thought to be typical of a 'good' student), *tolerance of ambiguity* (the ability to accept complexity and novelty in material), *cognitive simplicity* (coping at a low level by regarding even complex situations as simple ones and accepting things at face value), *intrinsic motivation* (interest and involvement in work), *dogmatism* (not questioning basic assumptions) and *independence of study*

behaviour (in arts, a characteristic of a student who was likely to succeed but a characteristic which appeared not to be so crucial to science students).

Biggs (1978) renamed the *Study Behaviour Questionnaire* as the *Study Process Questionnaire* (SPQ), believing that the term 'process' captured tactics, approaches, and strategies and allowed studying to be examined in isolation from presage and product variables. This was then factor analysed to produce a version showing a stable second-order structure comprising three orthogonal dimensions - *utilising*, *internalising* and *achieving* - each of which contained a motive (affective component) and a strategy (cognitive component).

1. Utilising	Two motives - pragmatic (eg qualification at end) and negative motive of avoiding failure. Study strategies surround avoiding failure but tend to be minimax. The student is syllabus-bound and uses reproducing strategies. (This parallels Marton's surface level learning and supports Fransson's finding that test-anxious students used surface level learning.)
2. Internalising	Intrinsic motive for personal fulfilment. Syllabus-free. Strategy used is wide reading, inter-relating of ideas. High complexity. (This parallels Marton's deep level learning.)
3. Achieving	Winning motive. Strategies are geared towards achieving high marks and include good organisation, time management, and a systematic approach (which relates to research on study skills and to need achievement theory). Good factual recall though poor level of complexity.

(Adapted from Biggs, 1979, p382)

To correspond with the categories identified by Marton, these three dimensions were later renamed surface approach, deep approach and achieving approach respectively (Biggs, 1987).

Schmeck Inventory

Independently, Schmeck and his colleagues (1977; 1978; 1979) were involved in developing the *Inventory of Learning Processes* (ILP) in the United States which was designed to assess individual differences in learning processes. The item pool was developed using key concepts from cognitive psychology, as designated in the literature from various theoretical points of view, and included three scales relating to memory (encoding, storage and retrieval), two to organisational processing

(clustering and subjective organisation), and two to elaborative processing (imagery and depth). This then represented a move away from most applied studies which have concentrated on personality, attitudinal and cognitive style measures, and in particular, differed considerably in origin from Biggs' inventory. Based on these concepts, an item pool was developed which operationalised these concepts in an academic environment. Other items relating only to academic activities were also included to reveal either new or related concepts.

Factor analysis extracted four factors worthy of retention, incorporating half of the original items. These were *synthesis-analysis* (comprising items stressing evaluation, organisation, discrimination and extrapolation), *study methods* (items concerning the use of systematic, traditional study techniques), *fact retention* (items describing a preference for factual information and retention of details) and *elaborative processing* (items stressing visualising, summarising, relating, encoding and applying information). These four factors constituted the final version of the *Inventory of Learning Processes.*

Later work (Schmeck et al, 1978) investigated how the inventory scales correlated with other established scales measuring critical thinking, academic motivation, academic curiosity, imagery and anxiety. Schmeck concluded that

> ...the individual who earns a high score in Synthesis-Analysis tends to be high on critical thinking ability and achievement motivation. The person also tends to be curious, efficient, mature, organized, stable, and low anxious. Furthermore, the negative relationship with anxiety supports the hypothesis that those who score high on Synthesis-Analysis pay attention to and are effective in dealing with semantic organization or structure and are concerned more with the meanings and implications of words than with the words themselves... The Study Methods scale was found to relate positively to the Scale of Academic Curiosity and negatively to the Critical Thinking Appraisal and to the scores produced by subtracting Achievement-via-Conformance from Achievement-via-Independence. Thus, it appears that the person who scores high on this scale tends to have a small amount of academic curiosity. Furthermore, he or she tends to be compliant, industrious, moderate, and quiet... The Fact Retention scale was not related to any of the other scales employed in the present studies... The Elaborative Processing scale was positively related to the Scale of Academic Curiosity, Betts Questionnaire Upon Mental Imagery, and the Imagery Rating Scale... The Elaborative Processing scale also relates positively to imagery ability. It is assumed that this scale generally assesses the extent to which the individual codes information in terms of personal experiences.
> (Schmeck et al, 1978, p.559-561)

Further studies found that synthesis-analysis, fact retention and elaborative processing were all positively related to achievement while study methods showed a small but significant negative relationship. As a result of the unexpected relationship between the study methods scale and academic achievement, the scale was redefined and named *methodical study* (Schmeck, 1983). This was believed to describe students having high achievement motivation in terms of working long hours and seeming, at a superficial level, to cover the course work yet who may not achieve results expected of this approach due to a lack of skill or ability necessary to execute deep or elaborative processing. 'Drill and practice' study techniques were typical of those adopting methodical study. The synthesis-analysis scale was renamed 'deep processing' to reflect Craik and Lockhart's deep-shallow continuum (1972) representing the degree of memory trace left as a by-product of information processing activities. 'Shallow processing' was defined to be where the physical stimulus was the sole object of attention, whereas 'deep processing' was defined to be where meanings and conceptual associations were processed. This differed from Marton's 'deep' which described intention and resulting approach when the student was asked to read, in that Schmeck's 'deep' was an information process of verbal classification and categorical comparison. Fact retention was later renamed *self-efficacy*, as it represented students who were striving to achieve high marks, spurred on by competition and also because it covered self-ratings of academic performance.

Weinstein inventory

Weinstein (1985,1988) developed a study strategy inventory called LASSI *(Learning and Study Strategies Inventory)* in the United States, for use as a diagnostic and monitoring tool to support study strategy workshops. It was reasoned that if specific study strategy deficiencies could be identified in students, remedial help could then be tailored to meet particular needs. It was therefore primarily designed to be a practical instrument, rather than for use in research studies. An item pool was created initially by surveying traditional study strategy manuals and programmes, and, with the help of expert judges, identifying categories which would then guide item creation and selection. As it was the intention to use the inventory to provide diagnostic information on a student's

strengths and weaknesses, only scales for which intervention would be possible were originally included. Scales stressing study pathologies and study organisation were emphasised. Other types of scales (for example on motivation and anxiety) were then also added, following the recommendations of other research being carried out in the same field (see for example, Schmeck above and Entwistle below). After considerable piloting and reformatting, the final version contained ten scales which were *anxiety, attitude, concentration, information processing, motivation, scheduling, selecting the main idea, self-testing, study aids,* and *test strategies*. No information is provided on the degree of intercorrelation of the scales.

Weinstein (1988) reported that the inventory had proved valuable in identifying specific areas of weakness in the students' study strategies which could then be the focus of the study skills workshops and learning-to-learn classes she ran. She also found that high scores on organised study methods and active learning processes were consistently predictive of academic success.

Weinstein's inventory departed from both Schmeck's and Biggs' in origin and purpose. It is therefore noteworthy that some similarities can be identified.

Entwistle Inventory

Using findings from mainstream educational psychology in general, and the research on correlates of academic achievement in particular, Entwistle and his colleagues (1979) reported work which had been carried out on developing the *Approaches to Studying Inventory* (ASI) to identify distinctive approaches to studying. Some scales had been developed during a series of studies carried out at Aberdeen and Lancaster Universities to study the process of student learning and to predict academic success. Two such scales were motivation and study methods which had been based on American scales but adapted to be more appropriate to the British system of education. In particular, the academic motivation scale was discarded and replaced by four motivation scales, each measuring a different form of motivation. Three of these - intrinsic motivation, achievement motivation and fear of failure - had been differentiated in a study reported by Entwistle and his colleagues (1974) in which cluster analysis had been used to identify three types of

successful student, each of which was found to have contrasting forms of motivation (described earlier). An additional motivation - extrinsic motivation - was also included as a scale to contrast intrinsic motivation. Scales were also formed from items written to capture Eysenck's personality dimensions (neuroticism and extraversion), Marton's and Pask's constructs (deep and surface, and comprehension and operation learning, respectively), Pask's learning pathologies (globetrotting and improvidence), Hudson's and Parlett's syllabus-boundness and syllabus-freedom, and Ramsden's strategic approach to assessment (see below).

Rationale for the inclusion of scales

Previous work carried out by Entwistle had shown that Eysenck's personality dimensions were correlates of academic achievement and that students of differing personality types might approach studying in contrasting ways. It therefore seemed appropriate to include extraversion and neuroticism as scales. Only those aspects of the dimensions most related to studying were included, so extraversion was represented by 'sociability' while neuroticism was not directly represented as it was believed that it would be similar, in the academic context, to the 'fear of failure' motivation scale.

Marton's constructs had been developed on the basis of extensive interviews carried out to find out how students had tackled reading an academic text under experimental conditions but had used a very small sample of students (most of whom were female social scientists) and had been analysed by researchers sharing common theoretical concerns. The exact purpose of the task had been kept deliberately vague to encourage students to use their 'natural approach' and it therefore seemed worthwhile investigating how these constructs could be represented as inventory items and how they would manifest themselves in the context of everyday studying. Pask's comprehension and operation learning styles had likewise been developed on the basis of experiments conducted with a small number of students, so were included in the inventory to confirm their existence for a more general population, in addition to investigating the interrelationships with Marton's constructs.

Development of the inventory

The pilot version of the questionnaire contained scales covering organised study methods, achievement motivation, fear of failure, negative attitudes to studying, syllabus-boundness, sociability, deep level processing, surface level processing,

comprehension learning, operation learning, strategic approach, intrinsic motivation, extrinsic motivation, internality and openness. Strategic approach had been identified by Ramsden (1979) during interviews with students regarding their approach to normal study, and described students who were primarily concerned with achieving the highest possible grades, using whatever means were necessary. The last four scales (intrinsic and extrinsic motivation, internality and openness) were included to mirror scales used by Biggs (as described above).

Internality and openness scales were then dropped from the inventory as initial factor analysis revealed that they did not add much definition to the first factor. Sociability was also dropped as it tended to exist in isolation as a separate factor. These were replaced by Pask's learning pathologies (globetrotting and improvidence). Deep approach was restricted to include only notions of an active, critical approach and the intention to understand, while the deep-level process elements of relating ideas and use of evidence were included as separate scales.

The final version of the ASI contained sixteen scales - deep approach, surface approach, strategic approach, comprehension learning, operation learning, globetrotting, improvidence, relating ideas, use of evidence, intrinsic motivation, extrinsic motivation, fear of failure, achievement motivation, negative attitudes to studying, disorganised study methods and syllabus-boundness - for which internal consistencies were found to be satisfactory on the whole. The inventory was completed by 2,208 students from 66 departments covering six different subjects and 54 higher education institutions in Britain.

Principal factor analysis, followed by oblique rotation, was carried out of the revised scales and suggested the existence of three major orientations to studying - *meaning*, *reproducing*, and *achieving*. *Meaning orientation* comprised deep approach, relating ideas, use of evidence, comprehension learning and intrinsic motivation, high scores on which reflected students who read widely and who were interested in the course content for itself. *Reproducing orientation* was made up of surface approach, syllabus-boundness, fear of failure and operation learning. High scores indicated students whose main aim was to memorise course material with little attempt to interact with the content. *Achieving orientation* consisted of strategic approach, extrinsic motivation and achievement motivation. High scores on this dimension described students who used whatever study methods they deemed necessary for achieving the highest possible grades. They were generally

well-organised and systematic in their private study, but tended to be more concerned with obtaining high marks than they were with the course content. A fourth, less clearly defined orientation was also identified - *non-academic orientation.* It comprised disorganised study methods and negative attitudes to studying. High scores included students who were at odds with the course, either because they had made the wrong choice, or because they were unable to adapt to the very different demands which higher education was placing on them and had consequently failed to develop appropriate study methods. Three of the orientations had an associated pathology - globetrotting with non-academic orientation, improvidence with reproducing orientation, and (implicitly) the sacrifice of understanding in order to achieve high marks with achieving orientation (Entwistle and Ramsden, 1983).

Subsequent work

Since its initial development, the *Approaches to Studying Inventory* has been completed by many different student populations in several countries and for various purposes. Some researchers have used it to try to predict academic achievement, some have used it to try to diagnose learning problems (particularly in subject areas where there is some professional or public concern about the training of students so that appropriate study skills training or intervention programmes may be developed), while others have used it simply to map out the study processes used by their students, so that they can compare or contrast the study processes used in their country, discipline or institution with those from others. This has been possible because of the large mixed initial sample which represented a cross-section of students in terms of age, sex, achievement, subject area, and institution. Some of the work reporting the use of the ASI to predict academic achievement, to diagnose learning problems and to carry out cross-cultural comparisons will now be discussed.

a) *Using the ASI to predict academic achievement*

A shorter version of the ASI containing only twelve, 6-item scales (omitting the two 'process' elements of deep level processing - relating ideas and use of evidence - and Pask's two pathologies - globetrotting and improvidence) was submitted to discriminant function analysis to 'predict' membership of two extreme ability groups (Entwistle et al, 1979). Prediction was correct for 83% of the low group and 75% of the high group, thus the inventory was deemed to be of reasonable predictive value for academic achievement. Kember and Harper (1987) reached a

similar conclusion having used the 64-item version to discriminate successfully between persistors and non-persistors and between high and low achieving students, finding that the surface approach, disorganised study habits and globetrotting scales were particularly predictive. Watkins (1987) found that ten out of the sixteen subscales correlated with achievement but that no one subscale correlated consistently with achievement across all groups used in his sample. Pask's learning styles did not appear to be significantly related to achievement. Collectively, the ten subscales produced a multiple correlation of .41 for the whole sample, .48 for arts students and .65 for science. At 'orientation' level (using his own definitions of orientations), Watkins found that his meaning and surface/disorganised factors correlated best with achievement. However, it has also been found (Ramsden and Entwistle, 1981; Watkins, 1982) that the deep approach scale is generally only weakly correlated with achievement (presumably because not all examinations require a demonstration that understanding of the course material has been achieved) and that instead, a much stronger (negative) correlation generally exists between a reproducing/non-academic factor (containing fear of failure, disorganised study methods, negative attitudes to studying and surface approach scales) and achievement. Ramsden and Entwistle (1981) reported finding a high correlation between the students' self-ratings of performance and organised study methods, positive attitudes, intrinsic motivation, deep approach and syllabus freedom, but acknowledged problems of tautology that exist when two sets of self-ratings are correlated.

Bringing together these findings, it would seem that the *Approaches to Studying Inventory* scales may be reasonably predictive of subsequent academic performance. The low correlations (generally between .3 and .6) often reported between IQ or school attainment and subsequent academic achievement have been thought to be due to the lack of variability of these measures in the relatively homogeneous student population. The ASI is specifically designed to allow for individual differences in studying at higher education level by measuring a number of different traits simultaneously, and has, as a result, often managed to obtain much higher correlations with subsequent performance. However, the extent to which approaches at school correlate with performance in higher education is not yet known, and it is not possible to identify approaches in higher education until at least mid-way through the first term. In spite of these caveats, it is still possible that a modified version of the inventory could play a valuable role in identifying students potentially at risk of failing in higher education (because of their

inappropriate study methods) and that these students could be provided with additional help and support sufficiently early in the year to avoid dropout.

b) *Using the ASI to diagnose learning problems*

The ASI has also been used to diagnose learning problems, again by correlating scales and orientations with known performance data and then using these findings on subsequent samples. For example, Newble and his colleagues (1988) used a modified version of the ASI to pinpoint specific study problems that medical students were facing. They found that all of the scales which correlated with performance did so negatively, and concluded that these scales could be used to identify students who were experiencing learning difficulties. These diagnostic scales appeared to be Pask's pathologies of globetrotting and improvidence, the surface approach scales and the disorganised studying scale. Again it was found that the deep approach scale did not correlate significantly with performance, possibly due, in this case, to the mainly objective type of assessment used. This modified version of the ASI had thus proved useful and effective in identifying learning problems.

c) *Cross-cultural comparisons of using the ASI*

Over the years, several versions of the ASI have been developed and used in many different educational contexts both within and outwith Britain. The original 64-item ASI was designed to be appropriate to all students in higher education, but has in fact been criticised as having many items relating to reading articles and books and writing essays thus making it more relevant to arts and social science students. As a result, the inventory has tended to be modified when researchers have been interested in a particular group of students, to make it more applicable to their discipline. Modified versions have been developed for use with, *inter alia,* medical students (Clarke, 1986; Newble et al, 1988) and secondary school children (Entwistle and Kozeki, 1985) and has been used in more or less its original form in countries such as South Africa (Meyer, 1988; Meyer and Parsons, 1989), Czechoslovakia (Mares,1989), Australia (Harper and Kember, 1989; Watkins, 1982; 1987), Nepal (Watkins et al, 1989), the Philippines (Watkins et al, 1981;1986), and Venezuela (Diaz, 1984 cited in Entwistle, 1988, p.33-34). In each of these studies, the researchers have attempted to confirm or deny the existence of the established factor structure.

Although the scales comprising each orientation vary slightly from one study to another, there is general consensus that a meaning orientation and a reproducing orientation are discernible in almost every case. Both Watkins (1982;1987) and Harper and Kember (1989) however, failed to obtain a factor solution containing a single reproducing orientation but instead found that this orientation split into two subcomponents which could be described as a surface/confusion factor and a surface/operation factor. The surface/confusion factor contained surface approach, fear of failure, improvidence, disorganised study methods, negative attitudes and globetrotting while the surface/operation factor comprised surface approach, strategic approach, operation learning, improvidence and achievement motivation and seemed to reflect Parlett's description of 'cue-seeking'. Meyer (1988) did support the existence of a single reproducing orientation which had merged to some extent with scales from the non-academic orientation for his sample. Both Meyer and Parsons (1989) and Harper and Kember (1989) have reviewed various studies which have attempted to produce a factor structure for the ASI and both have concluded that the meaning and reproducing orientations represent stable factors which may be interpreted in terms of the deep/surface dichotomy while the other factors produced are dependent on the area of study and the educational context. While this conclusion would appear to be borne out by the studies reviewed, it should also be interpreted with caution, as these researchers were not comparing identical situations. Clarke's study (1986) used a modified version of the inventory, all besides Entwistle used a specific rather than a mixed group of students, the number of factors extracted, the method of extraction and the type of rotation used varied from one study to another, often with little or no explanation as to why various decisions had been taken. In addition, the factor structure reported by Entwistle and Ramsden to which all these other factor solutions were compared, was not the only factor structure obtained by them (and did not claim to be), but rather was deemed to be the most stable, interpretable and conceptually meaningful of the factor solutions obtained when interpreted in the light of evidence from supporting interviews and background knowledge of the courses and institutions where the inventory data were gathered. The deep and surface approach inventory scales from the ASI were validated by Watkins (1987) against responses given by students in interviews about approaches to studying which were then categorised as deep or surface by the interviewer and an independent judge. From this study it was concluded that the inventory scales designed to measure the deep and surface approaches to learning were indeed valid.

General discussion of the Approaches to Studying Inventory

The *Approaches to Studying Inventory* has proved valuable in mapping out study processes used by students. In doing so, it bridges the gap between Marton and Saljo's interview analysis which operates at a micro-level to understand qualitative differences in learning process and outcome, and the macro-level surveys which measure learning outcome only in terms of grades.

The ASI has been variously criticised for making quantitative measures of qualitative differences, for being more applicable to arts and social science students yet used for science students also, for requiring students to reflect too generally on their studying as a whole, for being an 'uneasy mixture' of scales, and for its primary assumption that the traits which are represented in scales are stable enough to be measured (personal communications - various sources). Most of these criticisms can be more or less dismissed as a result of the considerable amount of subsequent work which has been done with the ASI since it was first developed. That it attempts to measure qualitative differences quantitatively is perhaps true at face value, but as the descriptions of these qualitative differences were rooted in in-depth interviews and can be substantiated thus, this criticism appears to have no bearing on the validity of the ASI as an instrument useful for mapping out students' learning processes. Furthermore, construct validity has been confirmed by Watkins (1987). Its unequal applicability to students of all disciplines has been rectified by the development of modified versions which are designed to be subject-specific. That students are asked to reflect generally on their approach to studying has presented a problem where students study a diverse range of subjects, but the ASI is seldom used for such general purposes, and usually requires students to reflect on their main subject of study which they appear to be able to do without much difficulty. That the inventory is comprised of an 'uneasy mixture' of scales appears to be something of a vacuous criticism. The scales unquestionably stem from many different origins, and do so because they are intended to map out the range of behaviours and attitudes which together enable studying to be better described.

The fundamental assumption of the inventory that the traits and constructs remain stable enough to be measured has surprisingly probably attracted least criticism. Several of them are known from the literature to be reasonably stable - these include personality and motivation, and Marton's and Pask's constructs have also been shown to represent general tendencies and to be reasonably stable over time.

Although few test-retest studies have been reported for the reliability of any of the versions of the inventory as a whole, those which have (Watkins, 1986; Clarke, 1986; Newble et al, 1988) have found the responses given to be satisfactorily stable over time (correlations between equivalent scale scores typically being around .7), confirming that the ASI is capable of mapping out approaches to studying for a particular group of students in general, rather than just recording their reactions to a specific task. This is not, of course, to say that students' approaches do not change over time, or vary to some extent across courses, but that the scores indicate a tendency to adopt one or other approach more strongly or more regularly than this. The 'consistency/stability versus versatility' debate will be discussed further, in the final section of the review which addresses the influence of academic contexts on students' approaches to learning.

It would therefore seem that each of the criticisms has been satisfactorily covered in the developments of the inventory in recent years and that the inventory has been successful in integrating a number of different scales into a single instrument which can be used to map out the study processes used in everyday studying. The cross-cultural comparison studies have shown that two factors, one representing the meaning orientation and the other representing the reproducing orientation, appear consistently, and Harper and Kember (1989) suggested that "given the variety of conditions and circumstances in which the questionnaire has been used, this consistency attests to the fundamental nature of these two factors", and further validates at least this portion of the inventory. The other two factors which had been identified by Entwistle and Ramsden (1983) and named the achieving orientation and non-academic orientation, appear to be dependent to some extent at least on the educational context, as their existence and composition varies from sample to sample.

Comparisons of the four inventories

The four inventories reviewed above have contributed individually and collectively to a fuller understanding of the process of student learning and studying in higher education. The main dimensions identified by each can be summarised as follows:-

Entwistle (ASI)	- meaning, reproducing, achieving and non-academic orientations
Biggs (SPQ)	- deep, surface and achieving approaches
Schmeck (ILP)	- deep processing, elaborative processing, methodical study and self-efficacy
Weinstein (LASSI)	- anxiety, attitude, concentration, information processing, motivation, scheduling, selecting the main idea, self-testing, study aids, and test strategies.

Although Biggs' and Entwistle's inventories showed striking conceptual similarities, it has not been possible to compare them empirically, as the instruments are too similar to have warranted any study using both (as far as the author is aware). The instruments differ in that Biggs had not included any scales measuring Pask's learning styles or pathologies, and thus Biggs' deep approach was not synonymous with meaning orientation (contrary to what was initially believed) as factor analysis of the ASI had revealed that the pathology of globetrotting formed part of the orientation.

Two studies have however examined empirically the similarities and differences between Entwistle's and Schmeck's four dimensions (Entwistle & Waterston, 1988; Speth and Brown, 1988). Analyses showed that substantial similarities existed between the main dimensions of the two inventories, despite their differing theoretical origins. In particular, it was found that Entwistle's surface approach was equivalent to the negative of Schmeck's deep approach, while Entwistle's deep approach could be equated with Schmeck's elaborative processing. In terms of unique characteristics, Entwistle's inventory included items on motivation and Schmeck's incorporated memory. Entwistle and Waterston (1988) suggested that the four dimensions could best be described as deep/elaborative, surface, strategic/competitive and organised.

Looking at the inventories in terms of descriptive or conceptual similarity, it appears that Weinstein's information processing shows similarities to Schmeck's elaborative processing. Self-testing and scheduling mirror elements of Schmeck's methodical study, and Biggs' achieving approach. Selecting the main idea shares features of Schmeck's deep processing and Biggs' deep approach scale. Other scales can also be identified in terms of items or scales comprising the two inventories mentioned above, and the ASI.

General conclusions on the development and use of inventories

The development and use of these four study strategies inventories has contributed substantially to a much fuller conceptual understanding of the way in which students approach studying in real life situations. They provide a useful method of mapping out the study processes of students by allowing a large number of students to be studied simultaneously without the great demands on time and resources made by, for example, interviews. Yet they allow for some of the individuality in response which is regarded as being the advantage of the interview over a more quantitative method of research. Inventories can also be used for a number of purposes as has been demonstrated in the above review. In the early phases of Entwistle's, Biggs' and Schmeck's inventories, the data gathered were subjected to many statistical tests to determine how the scales were interrelated, and whether they could be explained by a smaller set of conceptually different underlying latent dimensions. As a result of this, the second-order dimensions were identified, which led to new understanding being reached about students' approaches to studying. Once the factor structure of the inventories had been established, it was possible to use the inventories to compare students' approaches to learning across different educational contexts or to try to predict academic performance or to diagnose and monitor particular learning difficulties. It was this last function of the inventory with which Weinstein was primarily concerned.

The inventories have generally proved successful for cross-cultural comparisons and for diagnosing learning problems, but have been less successful in predicting academic performance. It is believed that this is attributable to the fact that academic achievement is partly (or indeed largely) a product of the assessment procedure used, and therefore the potential use of the inventory for predicting academic performance will be restricted by the method of assessment used to measure

performance. If multiple-choice examinations are given, for example, a positive correlation between performance and the deep approach would be unlikely, as such examinations more often encourage a reproductive method of learning, and so the positive correlation would tend to be with surface approach or reproducing orientation. The above two reasons help emphasise that it is essential to interpret any predictions with caution, and to relate them to the wider academic context at all times.

Part 2
Students' ratings of lecturers and courses

The previous section of literature review restricted itself to students' approaches to learning and studying. However, the programme of research reported in later chapters of this thesis set out to explore these approaches in relation to students' perceptions of teaching. There appears to be rather little literature which has looked at students' perceptions of teaching and courses in the context of researching student learning, and it was therefore necessary to turn to the voluminous literature investigating students' perceptions of teaching and courses for the purposes of feedback and evaluation, in order to identify the particular aspects of teaching which are important to students. This was necessary to provide a framework for devising a course perceptions questionnaire for use in the programme of research reported here. The literature on formative evaluation, focussing on the detail of the teaching process, proved to be considerably more useful to this programme of study, than did that of summative evaluation, which focuses on the teaching product as a whole. Literature written for one purpose was therefore used for another, and consequently only a small proportion of what was read was relevant to this thesis. However, it was not considered acceptable to consult only that part of each paper which listed the aspects of teaching identified as being particularly important to students, as the background, discussion, and wider context, would then be missed. As a result, some interesting and important incidental findings relevant to the wider teaching/learning context came to light.

This section of the review will look at the course perceptions factors derived from various studies which have used three different methods to identify them. First, studies which have factor analysed students' ratings to examine the dimensionality

of teaching will be discussed, then a large-scale study reporting the synthesis of over 200 studies aiming to identify 'The Superior College Teacher from the Students' View' will be described, and finally, studies reporting the use of classroom observation carried out by trained observers will be reviewed. These will then be brought together in a summary, and then the incidental findings will be discussed.

2.1 **Factoring**

Although it makes intuitive sense that student ratings of teaching and courses are multidimensional, there is uncertainty about how many dimensions exist in distinct and identifiable forms - estimates appear to range from two to about twenty. In course of reviewing some of the studies using factoring to determine the number and nature of dimensions, it became clear to the author that the considerable discrepancy could be attributed in part to whether first- or second-order factors were being reported. For example, Frey (1978) argued for there being two orthogonal second-order dimensions - *pedagogical skill* and *rapport*. Pedagogical skill was made up of five first-order factors - workload, advanced planning, class discussion, presentation clarity , and increased knowledge. Rapport also contained class discussion in addition to advanced planning, personal help and grade accuracy. Aleamoni and Spencer (1973), on the other hand, reported finding six first-order dimensions for their *Course Evaluation Questionnaire* (CEQ) - general course attitude, method of teaching, course content, interest and attention, the lecturer, and subject specific items, and although no details are reported in their study of the composition of these factors, it would seem likely that they would reduce to two or three main dimensions if submitted to second-order factoring, given that the correlations reported among the factors were high. Indeed, where the correlation between two factors is greater than the level of internal consistency of either, it follows that the two factors share common features and cannot each be considered unique. Further evidence for the probable reduction in dimensionality comes from the reported overall internal consistency of the ratings as being .98 (Aleamoni and Hexner, 1980). The way in which these two basic statistics (correlations and internal consistency) had been used to explore the dimensionality of the instrument was considered to be potentially particularly important in helping to develop a course perceptions questionnaire for use in this programme of research.

Another factor study extracted 4 second-order dimensions from 14 first-order factors (Deshpande et al, 1970). The four dimensions were *cognitive merit, affective merit, stimulation* and *stress*. *Cognitive merit* comprised structure, giving clear assessment information, content mastery, and lack of interaction and stressed "the behaviors of an instructor who is highly knowledgeable in his field and controlled and structured in his classroom presentation....(and) is systematic and equitable in his evaluation of student performance". *Affective merit* was made up of encouragement, rapport and individual assistance and had a negative loading on student-centred teaching styles indicating the "sources of satisfaction or pleasure a student derived from the instructor-student interpersonal relationship....(and) that student-centered teaching behaviors would not provide this sample of students with a pleasing instructor-student relationship, while teacher-centered behaviors would". (This seemingly strange result was explained by the fact that if teaching were student-centred, rather then teacher-centred, the teacher would have less contact with students, and students with high scores on 'affective merit' would prefer closer contact with the teacher). *Stimulation* included motivation, skill in teaching, use of teaching aids and (negatively) text adherence and reflected "making the students think for themselves, stimulating creative abilities, stressing high quality work, posing challenging problems....(and) indicated resourcefulness and originality on the part of the instructor which stimulated interest in the course material". *Stress* comprised workload, lack of clarity, and giving poor information about assessment, and represented aspects of teaching and assignments which were stressful to students (p. 298-299). Taken together, the cognitive merit and stimulation factors have components similar to those of Frey's pedagogical skill factor while affective merit is similar to Frey's rapport factor.

Marsh (1987, p.265) suggested that it was important to group items into scales by conceptual as well as empirical means, and that factor analysis should not be used alone to generate groupings of items. This fitted well with the author's views on how statistics should be used in research on teaching and learning (discussed more fully in Chapter 3). Marsh's well-known *Student's Evaluations of Educational Quality* (SEEQ) questionnaire (Marsh, 1982) was derived from items generated originally from student, graduate and staff interviews to determine what they regarded as important elements of teaching. As such, even at item level, the SEEQ was considered to be potentially both useful and interesting to the programme of research reported here. The final version of the questionnaire produced a stable nine-factor solution representing learning/value, enthusiasm, organisation, group

interaction, individual rapport, breadth of coverage, examinations/grading, assignments, and workload/difficulty.

Marsh (1986) compared SEEQ factors with the 21-item version of Frey's questionnaire (the Endeavor) and concluded that "there appears to be a one-to-one correspondence between the first five SEEQ factors and the first five Endeavor factors ...but the Organization/Clarity factor from SEEQ seems to combine the Organization/Planning and Presentation Clarity factors from Endeavor" (p.469). The pairs of factors which Marsh saw as being equivalent were:-

SEEQ	**Endeavor**
Group interaction	Class discussion
Learning/Value	Student accomplishment
Workload/Difficulty	Workload
Examinations/Grading	Grading/Examinations
Individual rapport	Personal attention

As these rating instruments, and the items and scales within them, had been developed independently of each other, it is interesting to find that there is considerable overlap in the factors identified as being important to good teaching. Marsh found that items from organisation/clarity (SEEQ), instructor enthusiasm (SEEQ) and presentation clarity (Endeavor) were cited most frequently by students as being 'most important'.

Another study which has grouped items into scales using conceptual as well as empirical means is reported by De Neve and Janssen (1982). The resulting questionnaire contained five scales: validating behaviour (lecture material perceived to be relevant and useful), stimulating behaviour (lecturer interests students in subject), conversational behaviour (lecturer interacts with ideas and answers questions), directing behaviour (lecturer directs himself to realising objectives), structuring activities (lecturer tries to promote effective learning).

These five then reduced to three second-order dimensions - validating, activating and potentiating. Validating was as before, activating combined stimulating behaviour and conversational behaviour and potentiating combined directing behaviour and structuring activities. Broad similarities between these dimensions and those reported above are apparent.

This work has now been extended and empirical evidence found for nine factors conceptually identified (Janssen, 1990). These factors are inspiring, potentiating, activating, motivating, structuring, directing, relating, clarifying, and enunciating.

Literature using factoring to identify salient elements of the learning environment was important to the programme of research carried out here, not only in showing the elements that the author should consider for inclusion when constructing a new questionnaire, but also in suggesting that when a number of initial dimensions is submitted to second-order factoring, they typically reduce to just two or three. As it was the author's intention to factor analyse approaches to studying scales along with first-order course perceptions dimensions, this was borne in mind.

2.2 **Identifying the characteristics of the 'superior lecturer' by literature synthesis**

To determine the important aspects of the learning environment, Feldman (1976) used a somewhat different approach. Rather than determine relevant factors by means of factor analysis, he synthesised some 200 studies concerning students' evaluation of teaching in an attempt to identify the characteristics of "the superior college teacher from the students' view". He identified the following as being consistently cited across studies as important for effective teaching:-

Stimulation of interest
Enthusiasm for subject matter or for teaching
Knowledge of subject matter
Lecturer's intellectual expansiveness and intelligence
Preparation for, and organisation of course
Usefulness and relevance of course content
Value and relevance of assignments
Clarity and understandableness of course material
Clarity of course objectives and requirements
Intellectual challenge provided by course
Fairness of grading and impartiality
Nature, quality and frequency of feedback
Concern for class level, pace and progress
Difficulty of course content and workload
Verbal presentation
Classroom management
Concern and respect for students
Availability and helpfulness to students
Encouragement of questions and discussion

Studies reviewed by Feldman fell into three broad categories - those which asked students to describe the characteristics of the best lecturer(s) they had had; those which asked students to describe the characteristics of their ideal lecturer; and those which asked students to describe the characteristics important to good teaching. These three broad categories were then each subdivided into two - those which gave the student free reign to respond and those which asked the student to select responses from a pre-defined list. The large number of studies reviewed (>200), along with the variety of types of studies and types of response set, suggests that the above list may well be virtually exhaustive with regard to the most important elements in effective teaching, as perceived by students. It is also noteworthy that this list, although derived through different means, covers all of the main dimensions identified in the studies reviewed using factoring. As a result of both of the above, this study was considered to be useful here.

2.3 **Classroom observation by trained observers**

Trained observers have been used in a small number of studies to record the incidence of specific teaching behaviours (Cranton & Hillgartner, 1981; Murray, 1983; Erdle, Murray & Rushton,1985; Erdle & Murray, 1986). Typically, student ratings of the same lecturers were also gathered so that it might be possible to determine which teaching behaviours were characteristic of highly rated lecturers, and which therefore were seen as important by students.

Murray (1983) asked trained observers to sit in on lectures of staff known to receive either high, medium or low feedback ratings and to record the incidence of a number of specific teaching behaviours. Factor analysis of those behaviours found to differentiate between teaching abilities produced nine factors - clarity of explanation, enthusiasm, interaction with students, adhering to the topic, rapport, structuring and organisation, use of media, pace, and verbal presentation. Further related research found that the lecturer's personality was also regarded as important to students (Erdle, Murray & Rushton, 1985).

Once again, factors obtained using a different methodology showed striking similarities to those described above.

2.4 Summary and Discussion - Factors generally thought to be important for good teaching

Marsh (1987, p.259) suggested that one use of student ratings which has not been systematically examined is their role in research on teaching. Teaching may be regarded as consisting of three parts - input, process, and product. Input refers to what students and lecturers bring to the classroom; process to what students and lecturers do; and product to what students accomplish in terms of grades, attitudes or approaches to studying. Although each rating study reviewed has extracted a slightly different set of 'key factors', it would seem that the factors students see as being salient to good teaching fall mainly into the process variables category. From the studies reviewed here, and those drawn from the wider literature, it is encouraging to find a strong degree of consensus regarding what the key factors are, especially bearing in mind the differing methodologies employed to identify them. To summarise then, it would seem that 'good lecturers' are regarded as teachers who:-

Plan, organise and structure course material well.
Provide good explanations.
Indicate the relevance and importance of various topics.
Emphasise key concepts and provide good examples.
Pitch the material at an appropriate level.
Present material at an appropriate pace.
Speak audibly and write legibly.
Make delivery as varied as possible (for example by varying speed and tone of voice, by using visual aids)
Provide good handouts.
Stimulate interest in the subject.
Promote discussion and interact with students.
Provide encouragement and support for students.
Make themselves available to help students.
Are interested, enthusiastic and knowledgeable about the subject.
Are interested in their students.
Are fair in assessment and grading.
Provide constructive feedback on assignments.
Provide help and advice on private study.

In addition to these process variables, it is now clear from the work of Erdle and his colleagues (1985, mentioned above) that input variables such as lecturer personality also play a significant role in the factors influencing good teaching and should also be taken into account. Product variables of one type or another on the other hand, are not themselves factors of good teaching but rather are frequently regarded as proof that effective teaching is being conducted in the classroom.

2.5 **Incidental findings from studies on validity**

Some of the discussion from papers investigating the validity of student ratings was considered to be relevant to the purposes for which student ratings were explored for this thesis, particularly where significant positive correlations between ratings and performance were taken to imply that ratings are measuring what they were intended to measure. The rationale behind this, is that effective teaching should operationally define good student learning which will, in turn, be reflected by high examination marks (Cohen and Berger,1970; Frey, 1973; Braskamp, Caulley & Costin, 1979; De Neve & Janssen, 1982; Marsh, 1982; Erdle, Murray & Rushton, 1985; Cranton & Smith, 1986).

Others have argued that this need not be so as it neglects the fact that exams frequently challenge the student to go beyond what is taught (Donald, 1985), and that much of the studying done by students in higher education is done privately, and private study plays a central rather than merely an auxiliary role in the teaching-learning process (Hounsell, 1984).

If a relationship exists between student ratings and achievement at individual level, this implies that students of differing ability levels view teaching in contrasting ways. If this is the case, that what one student might regard as 'good' another might regard as 'bad' then the whole notion of students being invaluable as assessors must be challenged. Marsh (1987) did acknowledge that different subgroups of students do exist within a class but did not appear to think it presented any threat to the reliability or validity of ratings, if considered at class level:-

> "If identifiable subgroups of students within a class give systematically different responses, then this may constitute a source of bias to the ratings. However this is unlikely. First of all, a wide variety of individual student characteristics have been found to have little affect on student ratings. Second, even if some such characteristics did influence individual student responses, it would have little effect on class-average responses so long as it evenly distributed across classes; even if students high on a particular characteristic gave systematically higher ratings, it would only make a difference in classes that had a disproportionately high or low number of such students".
>
> (Marsh, 1987, p.281)

Thus Marsh advocated the use of class-average responses over individual student responses so that student idiosyncrasies could be cancelled out and did so rather than acknowledge the possible implications of obtaining systematically different responses from identifiable subgroups of students. Further evidence for the existence of subjectivity in student ratings came from one study which found that "different students looking at the same instructor on the same item in the course disagreed to the extent that approximately 71% of the total variation in all the responses was traceable to this source" (see Hepworth and Oviatt, 1985, p.106). This again suggested that far from representing objective measures of the teaching style and behaviour, student ratings may be highly subjective.

2.6 **Discussion**

Murray (1987) found that student ratings could be predicted with considerable accuracy from observers' and graduates' ratings which suggests that ratings may be reasonably objective. But this conflicts with, for example, Gordon's finding (1978) that most of the total variation in all responses is attributable to the student and not to the lecturer, suggesting that ratings reflect the student's own opinion (cited in Hepworth et al, 1985). The resolution of this apparent conflict might simply be that both are correct. Consideration of the broad categories of items listed in the previous section and the items themselves (presented in, for example, Aigner and Thum, 1986; Bond et al, 1986; Braskamp et al, 1979; Braskamp et al 1981; Cranton and Hillgartner, 1981; De Neve and Janssen, 1982; Deshpande et al, 1970; Erdle and Murray, 1986; Kinicki et al, 1985; Marsh, 1982; Moses, 1986; Wilson, 1986) seems to reveal that there exists at least two types of items which are present in student rating questionnaires, one of which fits in with Gordon's findings and one with Murray's. The first type of item may be described as being 'personal experience' items and student reaction to these will necessarily be impressionistic. Standard deviations on these items tend to be relatively high as there can be great response variability even within a small class. Examples are -

We have a good relationship with the staff.
The course content is stimulating and challenging.
The quality of explanations is good.
Assessment is fair and feedback adequate.
Lectures are presented at an appropriate level.

It was this type of item to which Rotem and Glasman (1979) were referring in their review when they stated that "it appears that students do not enter a course with identical expectations and hence their testimonials about teaching performance are based on different and undefined reference points" (p.501).

The second type of item may be described as being 'evaluation' items and tend to be more objective in nature. Ratings on these items tend to reflect a class consensus of opinion and have correspondingly low standard deviations. Examples are -

The workload seems to be very heavy.
The rate at which material is presented is too great.
Course books are easy to get hold of.
There are plenty of handouts given.
There are a lot of contact hours.
Exams can be answered directly from notes.
Full lecture notes are dictated.
The course content is specified exactly.

The idea that different types of rating items appeared to exist, highlighting individual differences to varying extents, was considered to be important to the programme of research reported here.

2.7 Conclusions

A selective review of some of the literature on student ratings of teaching and courses has indicated aspects of teaching and courses seen as being important to students. However, the work reported in this thesis sets out to try to bring together students' approaches to studying and their *perceptions* of teaching in an attempt to examine the relationships between the two. Although the latter part of the review managed to identify salient elements from the vast literature on student feedback and evaluation, it was still acknowledged that students' ratings and their perceptions may be rather different things. Nevertheless, this section of the review has proved valuable to the author in three particular respects, by

1. indicating the most salient aspects of teaching from the students' points of view.
2. providing a background against which teaching and learning could further be explored.
3. confirming that it might prove fruitful to explore other methods of examining students' perceptions of teaching and courses, particularly in ways which encourage responses reflecting individual differences.

The review had also shown just how few recent studies had concentrated on exploring students' perceptions of teaching and in particular the effect that these perceptions had on approaches to studying. Nevertheless, some were identified which will now be discussed in this concluding section of this chapter.

Part 3
The influence of contextual variables on approaches to studying

Introduction and background

Although the initial studies carried out by Marton and Saljo showed that students had a natural tendency to adopt a particular approach to learning (either deep or surface), there has been considerable subsequent evidence to suggest that students may be influenced by contextual variables and be able to adapt their preferred approach accordingly. Based on a laboratory experiment, clear evidence was produced that perceived assessment demands influenced the approach adopted, and that 'natural deep' students could change to adopting a surface approach considerably more easily than 'natural surface' students could to a deep approach. Where a task was assessed using factual questions, a surface approach would be encouraged, whereas requiring a student to provide an overview of the text would encourage a deep approach (Marton and Saljo, 1976b). Lack of interest in the text, and high levels of anxiety tended to induce surface level processing, while deep level processing seemed to be "the natural impulse of the intrinsically motivated learner, unthreatened by expectations of a factual knowledge test" (Fransson, 1977, p.256).

An important piece of work which explored the effects of types of assessment in a natural classroom setting by interviewing students found that in addition to the deep approach to learning and surface approach to learning, a third approach existed

which was named 'the strategic approach to assessment' (Ramsden, 1979). Strategic students were those who were not primarily intent on either seeking to understand the course material or to memorise it, but were instead aiming to deal with the course material in any way which would ensure them the highest possible marks in subsequent examinations, and were therefore constantly engaged in a process of adapting their approaches to learning to fit the needs of a particular task. This work was important in showing very clearly the ways in which some students were influenced by perceived task requirements in a natural setting.

Ramsden's work was given considerable support by Laurillard (1979) who found that over half of her student sample used different learning strategies on different occasions, yet used a consistent strategy within each learning task. She concluded that "students cannot be characterised in terms of a dichotomised description of learning" because "they are responsive to the environment and their approach to learning is determined by their interpretation of that environment" (p.408). Saljo (1979) found that students were aware of this, as they were not able to categorise themselves in general terms as being either 'deep' or 'surface'. Almost all students in the group recognised elements of both in their studying. Svensson (1977), on the other hand, found that over two-thirds of the students in his sample used the same approach in normal studying as they had in the experimental situation, and argued that this was because preference was natural. Thomas and Bain too (1982) found that strategies were relatively consistent across different assessment situations. Although the class mean on the notional deep/surface continuum varied, the rank order of individuals on this notional scale within the class remained more or less the same.

The debate over 'consistency versus versatility' continues, and it is now clear that students' approaches to learning are influenced by a number of factors, such as their interest in the text, their level of anxiety and the (perceived) task requirements.

Investigating the effects of academic departments on students' approaches to learning

Some studies which had tried to investigate the effects of academic departments on students, had already been reported in the literature by the time Marton and Saljo were conducting their research programme, but these tended to measure the effect in terms of academic achievement, thereby focussing on the product, rather than the process of student learning (eg. Hartnett et al, 1977). Other studies have focussed

on different variables such as attitude, values, aspirations, vocational choice and personality.

The general finding that aspects of the learning environment could influence the approach to studying adopted, suggested that it was important to try to explore the academic context to understand student learning more fully, rather than focus on the attributes of individual students. With this in mind, Ramsden (1979) developed a 47-item *Course Perceptions Questionnaire* (CPQ) which was administered to students from a variety of departments. Factor analysis revealed eight factors - relationships with students, commitment to teaching, workload, formal teaching methods, vocational relevance, social climate, clear goals and standards, and freedom in learning - and showed that students from these contrasting departments perceived teaching and learning in different ways. Applied science students saw teaching as being rather formal but with having clear goals and standards; natural science students again regarded teaching as being formal, this time without clear goals and standards, though reported finding the course vocationally relevant; social science students saw teaching as informal, staff as friendly, but courses as having little vocational relevance; and arts students saw teaching as being little more than backup to private study and their courses as providing a good deal of choice within them. The CPQ was then administered to students along with the *Approaches to Studying Inventory* and factor analysis of the combined scales was carried out (Ramsden and Entwistle, 1981). Little overlap was found between the two sets of scales, but what was found made good sense. The reproducing orientation was associated with heavy workload; the achieving orientation with perceived clear goals and standards; the positive course evaluation factor with intrinsic motivation and use of evidence; and vocational relevance with extrinsic motivation. Further relationships were established between course perceptions and the ASI scales in interviews and at departmental rather than individual level (Entwistle and Ramsden, 1983). Interpreted in the light of the earlier study which had shown that students from different departments perceived teaching in different ways, this provided further support for academic departments influencing the ways in which students approached learning. Biggs (1976) had also drawn attention to the fact that students from different disciplines appeared to approach learning in contrasting ways, and it was this observation that prompted his work on student learning strategies. Watkins (1982; 1984) also observed that (in Australia) arts students and older students tended to use deep approaches to learning and also suggested that

where students are given more control over their own learning, they tend to adopt deeper approaches.

Since Ramsden's work clearly demonstrated that the learning environment would shape the learning approaches of students to some extent, the author felt that it was important to try to investigate further the particular features or aspects of teaching, courses and examinations which would influence students, and indeed, what particular outcome this would have in terms of the approach adopted.

Recent developments in exploring students' perceptions of teaching

Meyer and Parsons (1989) reported having failed to replicate any of the obtained relationships between the *Approaches to Studying Inventory* and the *Course Perceptions Questionnaire* besides that of the reproducing orientation with workload. As a result of this and Meyer's own work in staff development where the different ways in which students could perceive aspects of their learning environment had begun to be explored, Meyer sought to develop an alternative set of course perception items which might prove useful in identifying further relationships between specific aspects of courses and approaches to studying. Earlier work (Meyer, 1988) had led to the development of 'awareness of context' items, which were factor analysed together with the ASI scales (also worded in terms of 'awareness of...'). It was found that "qualitatively different perceptions of learning context are associated with qualitatively different approaches to studying" (Meyer and Parsons, 1989, p.143). Further conceptual and empirical refinements have led to an eight-item *Qualitative Context Inventory* (QCI) comprising awareness of books (deep), assessment (deep/strategic), handouts/notes (deep), relationships (deep), relationships (surface), course content (surface), learning space (surface), along with the workload scale from Ramsden's CPQ (Meyer and Muller,1990). Using a statistical technique called unfolding analysis, it proved possible to plot the relationships between the QCI and ASI scales in a two or three dimensional 'space'. Unfolding analysis has certain perceived advantages over factor analysis, namely that its success does not depend on having a large sample; it allows for the possibility of a student not fitting in with the rest of the sample; and students can be plotted in the space in addition to the constructs (then resulting in a joint space) which reflects students' preferences. It was found that deep perception items clustered near the meaning orientation scales in the space, while the surface items and workload scale were more widely scattered in the space among the reproducing orientation scales which did not cluster as tightly as those of the meaning

orientation. Students who are 'outliers' (not occupying positions within the main construct clusters) may be deemed to be 'at risk', because they do not fit in to the general learning environment in which they find themselves. More recent work (Meyer, Parsons and Dunne, 1990b) has concluded that students who are located in the space close to both deep perceptions and meaning orientation scales experience academic success, while students who do not have a 'study orchestration' like this, tend to experience academic failure. Meyer therefore argued that it was the lack of an identifiable meaning orchestration, rather than the presence of a reproducing orchestration which appeared to be indicative of academic failure.

The idea of being able to make greatest sense of the relationships between students' approaches to learning and their perceptions of their environment in terms of implicit preferences seemed particularly promising and suggested an approach that subsequent research could perhaps take.

Summary and conclusions

Very little work has been done to date to investigate the relationships between students' perceptions of teaching and their approaches to studying, even though it has been apparent for a number of years that the learning environment will influence the ways in which students study. The initial work carried out by Ramsden and his colleagues failed to produce many such relationships empirically, although those that they did find made good sense and largely confirmed what had previously only held intuitive appeal. The most consistent relationship found was between the reproducing orientation and the perception that the workload was heavy and difficult.

Some debate has grown out of why no more relationships could be produced empirically, but this is largely academic. What would seem to be more important, would be to accept that it makes intuitive sense that students' perceptions of teaching will be related to their approaches to studying, and to seek other ways of exploring the relationship. Meyer's work took this line, and evidence seems to suggest that it does provide an alternative way of examining how students view their learning environment and how this relates to their approaches to studying and their level of academic success.

General conclusions

Because of the limited literature that exists to date on the relationships between students' perceptions of teaching and their approaches to studying, it was considered necessary to go back to each of these two separate bodies of research, to try to identify a way of bringing them closer together. It is as a result of this that they are reviewed in this chapter. The programme of research reported in this thesis largely grew out of the work of Ramsden at Lancaster University, but also made some use of the literature on students' ratings of teaching, to aid the development of early course perceptions items.

This chapter has provided the background to both the concepts and methods of measurement used in this area of research, and provides a justification for the research design which is now reported.

Chapter 3
Methodology and Summary of Research Stages

The research design used throughout the series of studies reported in this thesis was largely determined by the specifications of the initial project to which the studentship was formally attached. It therefore did not emanate from careful consideration of the relative merits of different methodologies or designs by the author.

This chapter will first describe briefly the general research design employed in the studies reported here. It will then present a summary of the research stages of the programme of research as a whole. Finally, one particular statistical technique - factor analysis - which was used in each of the studies will be described in some detail.

Research design

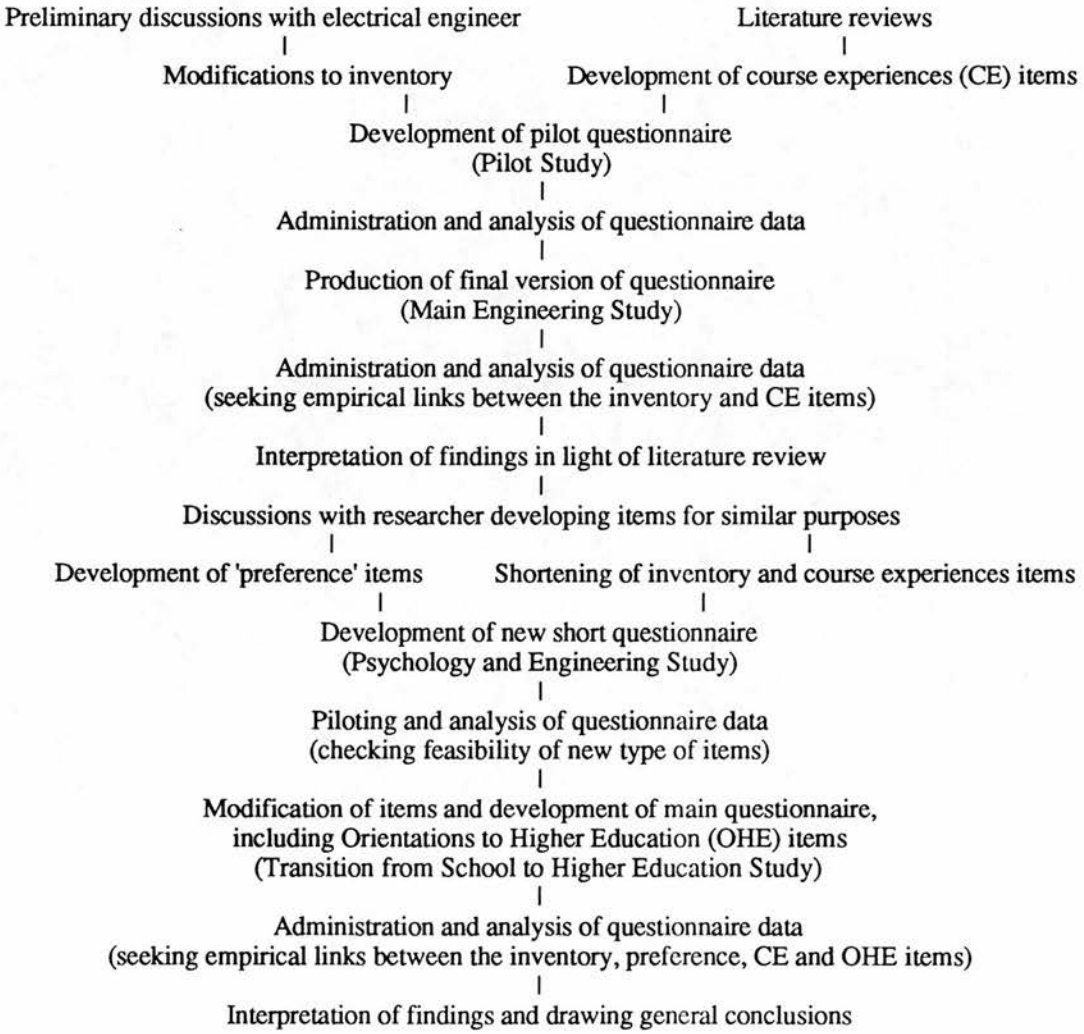
Due to the constraints of time and resources, and because of the relatively large number of students who were to be sampled in the Performance of Electrical Engineers in Scottish Higher Education project, it had been decided to use survey methodology and to gather most of the data by a questionnaire containing both a modified *Approaches to Studying Inventory* (ASI) and a Course Perceptions Questionnaire. Although the remit of the Engineering Project differed considerably from the theme of this thesis, it was possible to carry out selected analyses on the data gathered by questionnaire. Only university students comprised the group studied here, and only those parts of the questionnaire relevant to students' perceptions of teaching in relation to their approaches to studying were selected for statistical analysis.

To maximise comparability of findings, and to parallel the imposed research design of the Engineering Project, the Psychology and Engineering Study and the Transition from School to Higher Education Study again made use of questionnaires containing versions of the *Approaches to Studying Inventory* along with course perceptions items. This last study was again part of a much larger funded project with a rather different focus to that of this thesis, but again it proved possible to be selective in both the subsample of students, and in the sections of the questionnaire used in the analyses here.

It therefore proved possible to produce a coherent thesis from a series of studies by focussing on those aspects of the questionnaires relevant to exploring the relationship between students' perceptions of teaching and their approaches to studying. This entailed concentrating on the ASI and the course perceptions items as they evolved.

Summary and outline of research stages

The series of studies carried out to try to explore the relationships between students' perceptions of teaching and their approaches to studying could be described as being both exploratory and progressive. Only the initial pilot study and resulting main engineering study were planned in any detail before the studies began. Subsequent stages were developed as a result of the findings and conclusions drawn from the earlier studies. The schematic diagram below should therefore be regarded as a summary of the research stages, and should not be interpreted as being a plan of the entire research programme, devised before commencing.



The first stage of the programme of research was to set up discussions with Bob Kelly, a lecturer in the Department of Electrical Engineering at Edinburgh University, who had agreed to act in an informal advisory capacity to help modify the *Approaches to Studying Inventory* for engineering students. He also made invaluable suggestions regarding what should be covered in the wider engineering questionnaire. Concurrently, an extensive literature review was carried out, some of which looked at studies addressing the performance of engineers in Higher Education and indicated additional areas which should be included in the questionnaire. The bulk of the literature review, however, explored the theoretical and conceptual background to study strategy inventories, along with some inventories themselves, to provide the author with some necessary background to the studies subsequently undertaken. The part of the literature review concerning course experience questionnaires of one type or another proved useful in suggesting areas which should be covered in this section of the questionnaire. The second and third stages of the programme of research led directly from the first, and involved modifying the *Approaches to Studying Inventory* and devising the course perceptions items (and indeed the rest of the pilot questionnaire which is largely beyond the scope of this thesis). After the fourth stage - data collection and analysis - had been completed, a final version of the engineering questionnaire was produced, which was then administered and the data subsequently analysed. Part of the analysis carried out here, in the sixth research stage of the schematic diagram, began to explore empirically the relationship between students' perceptions of teaching and their approaches to studying. Findings were then interpreted in the light of the literature review, and ways forward were sought which were inspired partly by discussions with Erik Meyer who was engaged in similar research in South Africa. This led to the development of *preference items*, and to the Psychology and Engineering Study which explored the relationships between these new preference items, a subset of the course experience items used previously, and orientations to studying (as measured by an abridged form of the inventory). These constructs were then modified again, supplemented by items operationalising Orientations to Higher Education, and built in to a questionnaire investigating the Transition from School to Higher Educaton (as with the engineering study, the full questionnaire goes beyond the scope of this thesis). Data was then collected and analysed, and the findings from each individual study were brought together and considered in relation to each other and to the literature reviewed. General conclusions were then drawn.

Much of the detail is left to the relevant individual chapters, where sample sizes, composition and response rates are described. However, part of the research design common to all studies, is the use of one particular multivariate statistical technique - factor analysis. Because of its widespread use in this programme of research, and as a result of its inherent complexities, it is considered to be both relevant and important to provide some explanation of the issues arising and the corresponding decisions taken during its execution.

Factor analysis

Factor analysis is a data reduction technique, used "to provide a parsimonious description of the structure underlying a set of multivariate data" (Dillon and Goldstein, 1984). One of its basic assumptions is that variables may be combined linearly to confirm or detect the existence of a smaller number of conceptually meaningful underlying factors which can account for the correlations among observed variables. In outline then, factor analysis studies the interrelationships among variables to find a new (smaller) set of 'variables' which each reflect a latent underlying dimension. Each variable is deemed to be comprised of both a common part and a unique part. The common part (communality) is the part of each variable's total variance that is accounted for by the common factors while the unique part is the part of each variable's total variance which is unique to it.

Users of factor analysis are often criticised for going head-long into their analysis without due consideration for the various methods of extraction or rotation which could be used and which would be most appropriate, or to the various ways of deciding the most appropriate number of factors to extract to best explain the underlying structure of the data, or to the alternative ways that the final factors may be reported and interpreted. Although much of the confusion surrounding 'what should be used when' has undoubtedly arisen out of ignorance and a tendency to employ the easiest possible alternative, irrespective of appropriateness, there is also a sense in which it makes rather little difference which refinements are used. This results from one of the basic indeterminacies of factor analysis - namely that even though it follows that if the factor loadings were known, the correlations among variables could be uniquely determined, the converse of this is not true. It is therefore not possible to test the appropriateness of the factor model with the available data so researchers must be prepared to make "discretionary extrastatistical

decisions" (Kim and Mueller, 1978a,b) or use their conceptual understanding of the interactions of the variables to determine ultimately the 'goodness of fit' of the resulting factor pattern. Also, when different methods of extraction and rotation are compared in practice, it becomes apparent that there are generally only very slight differences in the numerical values obtained. Furthermore, many of the refinements in the statistical model used work to a degree of accuracy which ceases to be appropriate when individuals are being studied, so it again becomes essential for researchers to be prepared to make interpretative decisions in relation to the nature of the data when working with people rather than objects. These 'defences' aside, however, some attempt will be made to explain the rationale for the decisions taken before factor analysis was carried out for the purposes of this thesis. Discussion will focus, in turn, on the four main issues mentioned above - method of extraction, number of factors extracted, method of rotation, and nature of matrix reported.

Method of Extraction

Factor extraction involves extracting initial factors from the original variable correlation matrix. Many different methods of extraction exist, some of which are more appropriate than others for various types of data. Examples are alpha factoring, image factoring, principal axes, principal factor, least squares, minimum residual and maximum likelihood. Providing that communalities are in the region of one, all extraction methods will produce nearly identical results. However, from a theoretical rather than practical perspective, current thinking appears to be that the maximum likelihood method is "the only method for factor extraction that currently provides a sound statistical basis for testing the adequacy of the basic common factor-analytic model" (Dillon and Goldstein, 1984, p.73). The main aim of maximum likelihood extraction is to estimate the parameters which would most likely have yielded the observed data. It does this by taking arbitrary values and treating them as if they had been the observed values and then assessing the likelihood that these arbitrary values had been observed. Based on the outcome of this, communality estimates are then produced iteratively until such time that convergence indicates that the estimates match the observed values as far as possible. The factor estimates are independent of the scale of measurement so factor loadings for each variable are proportional to the standard deviation of the variable (this is seen to be an advantage over the principal factor method which is also commonly used). An additional feature of the maximum likelihood method which rendered it appropriate in this series of studies is its assumption that the

general form of the population distribution is known. This allows it to be used as a half-way measure between exploratory factor analysis (which searches the data for qualitative and quantitative distinctions with no theoretical hypotheses in mind) and confirmatory factor analysis (which tests hypotheses regarding the structure underlying the data). Although confirmatory factor analysis is merely an extension of the maximum likelihood method of exploratory factor analysis, strictly speaking it should only be used where specific prior knowledge is held regarding the variables measuring each common factor such that the researcher can impose some structure on the data with a reasonable degree of confidence. This cannot, of course, be done if the sample deviates from previously surveyed samples, nor if the variable set is not absolutely identical in every respect. It was therefore decided that although perhaps some hypotheses could be tested in the studies reported in this thesis (based on similar previous factor analytic studies), aspects of both the sample and the variables differed sufficiently from these previous studies to make confirmatory factor analysis inappropriate, and so a half-way type of factor analysis was deemed to be optimal.

As a result of these currently held views of the extraction alternatives, it was decided that maximum likelihood extraction would be used to analyse the data gathered in this series of studies.

Number of Factors Extracted

Determining the number of factors which best explains the underlying structure of the data can prove problematic. Under- and over-factoring can both produce distortions, although it is generally accepted that it is better to over-factor than under-factor. The major consequence of extracting an extra factor is to produce 'factor fission' where a relationship among a set of variables is missed and what should be one factor splits into two. The consequence of extracting too few factors, however is more serious, as the large amounts of variance existing beyond the point at which the researcher has terminated extraction are nevertheless important yet cannot go anywhere so, after rotation, the first factor will be distorted to some extent and subsequent factors will be increasingly distorted. Having said this, however, conventional methods of determining the number of factors present should only be used as guidelines, and it must be reiterated that the researcher must again be prepared ultimately to use a conceptual understanding of the data to determine the optimal number, based on interpretability.

There are four commonly used ways of determining statistically how many underlying factors best explain the observed data. These are - Kaiser-Guttman rule, scree test, percentage of variance extracted, and statistical test of significance. These will be discussed below.

1. *Kaiser-Guttman rule*

The Kaiser-Guttman rule states that all factors having eigenvalues greater than one should be extracted, where eigenvalues are the latent roots of the unrotated matrix and as such represent the sum of the squares of the loadings for each factor in the unrotated matrix. This extraction criterion stems from Kaiser's observation that the Alpha Coefficient of Homogeneity (ACH) ceased to be significant beyond the point where eigenvalues became less than one. (The ACH is a measure of the agreement of two factor scores from two random halves of the factor pattern weights, averaged over all possible halves.)

The Kaiser-Guttman rule is extremely simple to operate and as such has gained widespread popularity. However, it has been described as being "erratic in principle and wrong in practice" (Cattell, 1978), suggesting too many factors where the number of variables is large and too few where the number of variables is small due to the fact that after rotation the size of the factors is different from that of the unrotated matrix. It therefore serves as a quick and convenient early estimate of the approximate number of factors, but should always be used in conjunction with another method of estimation.

2. *Scree test*

The scree test involves plotting successive eigenvalues against number of factors and examining the resulting plot to determine the point at which all substantive factors have been extracted, and only the 'scree' (debris) remains. Empirical evidence suggests that this provides an extremely accurate estimate of the number of factors (Cattell, 1978), but it has been criticised nevertheless as being difficult for the unskilled interpreter to use. Plots sometimes produce more than one area of scree, but this ambiguity can readily be resolved by comparison with another method of estimation. In addition to examining the plot visually (adequate for most purposes), it is possible to calculate the gradient between successive pairs of neighbouring points, to determine exactly where the greatest change exists. This may be used if it is crucial to the study to extract an exact number of factors for which psychometric evidence exists.

3. *Percentage of variance extracted*

It is commonly assumed that a factor analysis has been more successful if it has maximised the percentage of total variance. This, in fact, is not the case. The percentage of variance accounted for rises as more and more factors are extracted up to the point of accounting for 100% variance if there were as many factors as variables. It is therefore possible to extract an artificially high amount of variance by simply extracting more factors, but this would be to the detriment of the basic premise of factor analysis which is primarily concerned with combining variables to detect underlying factors. The percentage of variance accounted for should therefore not be used to guide the researcher in deciding how many variables to extract (Cattell, 1978), - if the 'best' number of factors explains an unacceptably low amount of variance then this is probably due in part to the fact that many of the variables do not contribute to the underlying factors.

4. *Statistical test of significance*

In most types of factor extraction, it is possible either to fix the number of factors (conceptually) and calculate the communalities which fit that number, or to estimate the communalities and extract the number of factors corresponding to this, based on the fact that communalities and factor number are mutually determined. However, in the maximum likelihood method of extraction, it is possible to do these two together, by using iteration to converge on both at the same time. Having obtained a particular extraction, it then becomes a simple task to calculate chi-squared to test whether the number of factors is significant.

From the above discussion, it will be apparent that it is best to use more than one method of estimation at any given time in conjunction with some conceptual understanding of the likely ways in which variables will combine to form factors and the interpretability of the resulting factors. The Kaiser-Guttman rule provides a good initial guideline for the approximate number of factors. This estimate can then be sharpened using a scree plot, and after that number of factors has actually been extracted, a chi-squared test of significance can be carried out to test the appropriateness statistically, if the study warrants this degree of accuracy.

Although the percentage variance accounted for is sometimes used to guide a decision as to how many factors to extract, this is inappropriate and should not be used for these purposes.

For the analysis reported in this thesis, the Kaiser-Guttman rule and scree plot were used in each extraction, and as the maximum likelihood method of extraction was used, it was possible to examine the value of chi-squared. However, as the samples were comprised of people, rather than objects, it was known that the degree of response variability would be such that it would be inappropriate to get too absorbed in psychometric and statistical tests of the number of factors to extract, so a close watch was kept at all times on the interpretability of the factors being extracted, and so on each occasion a number of different extractions was considered, each having a different number of factors.

Method of Rotation

Factor rotation is carried out "to achieve the most parsimonious and interpretable factor model possible" (Nie et al, p.484). It is justified because although the correlations within the data fix the positions of the vectors, they do not fix the positions of the axes, so it is permissible to rotate the axes so that they pass through the clusters of factor loadings. This does not alter the original correlation matrix in any way. In general terms, there are two main types of rotation - orthogonal and oblique. Orthogonal rotation should only be used where the researcher has strong theoretical evidence that the factors are uncorrelated, as it orientates the axes at 90° to each other. However, it is considerably simpler both to carry out and to interpret orthogonal rotations so they are often used inappropriately. Cattell (1978, p.128) stated that "the sad fact for research is that constraint to an artificial orthogonality destroys both the correctness of the pattern discovered and its constancy from one research to another" and urged users of factor analysis to give more consideration to the method of rotation employed. Oblique rotation, in contrast, does not impose such a rigid configuration on the data, orientating the axes at the most appropriate angle which takes account of the correlations among factors. Even if factors are found to be uncorrelated after rotation has been carried out, the researcher using the oblique rotation can be sure that the orthogonality is due to the underlying nature of the factors and has not been imposed by the type of rotation used. Therefore, if there is no guiding theory or intuition to suggest whether the factors are correlated or not, the safer starting point is using the oblique rotation. If each variable loads

significantly on only one factor, and the intercorrelations among factors are insignificant, then and only then should orthogonal rotation be carried out.

Guided by the literature, it was believed that the factors produced in the studies reported here would in fact be correlated and so oblique rotation was carried out in the first instance. On all occasions, some variables loaded on more than one factor and the intercorrelation matrix of factors revealed that many of the factors were indeed correlated, so only oblique rotations are reported.

Nature of Matrix Reported

During factor analysis, two different matrices are produced - a factor structure matrix and a factor pattern matrix. Confusion often surrounds which should be reported. The factor structure matrix reports the correlations between the variables and the common factors whereas the factor pattern matrix reports the loadings of the factors on the variables derived from the correlations of factors with the variables when the correlations between factors themselves are taken into account. In orthogonal rotation, the factor and reference vectors are the same, so there is no difference between correlations and loadings and so the pattern and structure matrices are identical. It is partly because of this simplicity that many people use the less appropriate orthogonal rotation, as they do not have to decide whether to report the pattern or structure matrix, even though the two matrices are seldom vastly numerically different. In oblique rotation it is the pattern matrix which is regarded as "the most meaningful expression of the final outcome" (Cattell, 1978, p.178) and as such is generally reported and used for interpretation. It is therefore the pattern matrix which is presented throughout this thesis.

Interpretation of the extracted factors

In spite of these complexities inherent in the use and interpretation of factor analysis, substantial use was made of this multivariate data technique in this thesis to reduce the original set of variables to provide a dimensional structure for the data by indicating the common qualities present in the data. In interpreting the resulting factors, attention was paid not only to which variables loaded positively and negatively on each factor, but also to which variables did not load on each factor. In so doing, it was possible to examine the behaviour of all variables more closely, both within and between factors. Attention was also paid to variables which did not load on any factor within an extraction. Where a variable frequently failed to load significantly on any factor, it was evaluated critically in terms of its conceptual

importance, before a decision was made regarding whether or not it should be retained.

General conclusions

As part of the process of using statistical procedures, considerable time was invested in trying to understand the fundamentals of the particular statistical techniques used, and the wider issues of employing a quantitative method of analysis rather than qualitative method. In interpreting the results produced by statistical means, it was clear that care would have to be taken to minimise the criticisms which are frequently levelled at users of quantitative methods of analysis, by trying, at all times, to interpret findings in the light of their context and supporting theory, not least because central to the thesis is the belief that learning can only be fully understood within the context in which it takes place.

Chapter 4 reports the first of the empirical studies, the Pilot Study of the Main Engineering Study, to which the studentship was formally attached.

Chapter 4
The Pilot Study

Developing the questionnaire, modifying the Approaches to Studying Inventory, and examining the integrity of the modified inventory.

METHOD

Instruments

Development of the Questionnaire

It was decided that the information in this study would mainly be collected from students via a questionnaire as this would allow the maximum number of students to be studied with the minimum demands on time and resources. The literature review served to indicate relevant areas which should be included in the questionnaire, but as the literature on failure of engineering students came predominantly from North America, it proved valuable to enlist the help of a British lecturer in electrical and electronic engineering to vet the suitability of items. After considerable discussion, a questionnaire was eventually designed, and after a series of drafts, a final pilot version was produced. The resulting questionnaire consisted of five sections - Section A asked for background details such as age, school grades, and the reasons for choice of institution specifically and engineering in general. Section B was the *Experiences of Studying and Higher Education Inventory* (discussed below). Section C asked for more details on study activities such as where the student studied, how much time was spent studying in a typical week, and how that time was apportioned among various study activities. It also contained a question asking students for their self-perception of performance to date. Section D asked for information on perceptions, experiences and expectations of the course, based on Ramsden's eight dimensions of learning environments (1979) - relationships with students, commitment to teaching, workload, formal teaching methods, vocational relevance, social climate, clear goals and standards and freedom in learning. This was described more fully in Chapter 2. Section E gave students the opportunity to respond to open-ended questions addressing areas of interest and difficulty encountered on the course, and to reflect on the methods of teaching which they had found most effective.

To investigate students' approaches to studying in relation to their perceptions of teaching, the most relevant sections of the questionnaire were Section B, the Experiences of Studying and Higher Education Inventory (ESHEI), and Section D, *Experiences of the Course*. The rest of the questionnaire is described briefly above because it became apparent that much could be gained from drawing on additional information and responses provided by the students in other sections to explain what at first appeared to be anomalous findings. (The full Pilot Study questionnaire is not presented in this thesis as few changes were made to other sections besides the inventory in developing the Main Study questionnaire. The remaining sections can therefore be seen in the questionnaire reported in Appendix B).

Initial Development of the Inventory

The *Approaches to Studying Inventory* developed in Lancaster by Entwistle and his colleagues (1979, 1983) was used as the basis of the ESHEI. The ASI, and subsequent versions, were reviewed in Chapter 2. It had been developed as a population inventory, with a view to being more or less equally applicable to students of all disciplines, and it was felt that it might be better to adapt it to be more specific to the particular group of students of interest in the present study, namely electrical and electronic engineering students. Some of the original 16 scales were not considered to be appropriate or necessary for the current inventory, so were replaced by new scales which it was hoped would help to paint a fuller profile of the students being studied. The new inventory would still cover the two styles of learning (holist and serialist), three main approaches (deep, surface and strategic), four forms of motivation (intrinsic, vocational, fear of failure, and need for achievement), and a single study methods and attitudes scale (negative attitudes to studying). Thus ten of the original sixteen scales were retained. Two of the outcome components of deep approach, relating ideas and use of evidence, which had existed as separate scales in the original inventory were dropped as scales, and were subsumed under the new general deep approach scale which now included both process and outcome components. This was felt to be appropriate due to the fact the these two extra scales were measuring study habits which were perhaps more typical of arts students than science students, and although they would still be typical of science students to an extent, it would be sufficient to include them in the general deep approach scale. Pask's pathologies of improvidence and globetrotting, and Parlett's syllabus-boundness were also discarded because of the homogeneity of the current sample, and the unlikelihood that they would contribute much in mapping out the study processes of such a sample. Disorganised study

methods was also dropped, but was replaced by two scales - distractability and time management (which incorporated the organised element of Ramsden's strategic approach). New scales added also included two personality scales (extraversion and emotional instability) and a scale measuring academic self-confidence. Each of these three constructs had been identified in the literature as being correlates of academic achievement or at least as influencing how students studied.

Again the help of a lecturer in electrical engineering was sought, and the 'best' items from each scale of the original inventory (in terms of both their contribution to their original scale and their appropriateness to electrical engineering students) were supplemented by between one and three new items, written to complement the well-established conceptual meanings of the scales and to highlight what were believed to be some of the particular study strategies of electrical engineering students. Each resulting scale contained six items. It was also decided that eight 'engineering study skills' items would be included, at least in the pilot version, to see how they fitted in with the better established scales. Thus the final pilot version contained sixteen scales each containing six items with the exception of the 'engineering study skills' scale which had eight items. The scales, and a defining item from each, may be found in Table 4.1. The full scoring key for the inventory is shown in Appendix A1.

Sample

A total of 91 second year students from one university took part in the pilot study. These students were selected from one of the universities which had agreed to participate in the main study, but as first year students were to be used in the main study, second year students were asked to participate in the pilot study, to avoid using the same set of students on both occasions. The students completed the questionnaire during a normal lecture slot in the first week of their second term (January). On average, it took 40 minutes to complete so almost all students managed to complete it well within the allotted 50 minute lecture slot.

Table 4.1

Inventory scales, defining items, and Cronbach's alpha for the 5-item scales.

Scale	Alpha	Example
Academic self-confidence	.63	I don't have much difficulty in remembering facts or formulae.
Meaning orientation		
Deep approach	.59	I almost always set out to understand thoroughly the meaning of what we have to learn.
Holist style	.50	I usually try to play about with different ways of looking at an idea or problem.
Serialist style	.41	I generally prefer to tackle each part of a topic or problem in order, working out one step at a time.
Intrinsic motivation	.68	My main reason for being here is to learn more about subjects which really interest me.
Study skills	.56	I try to relate lab experiments to the lecture course.
Achieving orientation		
Strategic approach	.48	I always try to find out how the marks are allocated between different components of the course.
Need for achievement	.57	It's important to me to get better marks than my friends, if I possibly can.
Time management	.81	I organise my study time carefully to make best use of it.
Vocational motivation	.59	I generally choose courses more for for my career plans than from my current interests.
Reproducing orientation		
Surface approach	.61	I find I rely a lot on memorised definitions to explain what important terms mean.
Fear of failure	.74	I worry a good deal about whether I'll do well enough to stay on the course.
Non-academic orientation		
Distractability	.60	Personal relationships seem to distract me from my work.
Negative attitudes	.60	I find most of the work here awfully boring.
Personality scales		
Extraversion	-	I like to be in the swim of things: if there is anything going on, I like to be there.
Emotional instability	-	I often feel tired and miserable for no good reason.

RESULTS AND DISCUSSION

Piloting and Refinement of the Inventory

All statistical analysis was carried out using the SCSS software package (Nie et al, 1980) on Edinburgh University's mainframe computer. The first stage was to carry out item analysis of the 98 inventory items, correlating each item with each of the 16 scales to check that they did in fact correlate best with the scale with which they were believed to be conceptually associated. It was however discovered that two of the items, one from the deep approach scale and one from the new engineering study skills scale correlated more highly with the alternative scale, but it was a simple matter to exchange these two items, thereby enhancing the scales' internal consistencies and confirming the integrity of the scales. As the *Experiences of Studying and Higher Education Inventory* was a modified version of an inventory which had been fully trialled as it was being developed, it was decided that this level of item analysis would suffice at this stage, and that it was not necessary to carry out factor analysis of the inventory at item level. Analysis then moved on to scale level.

Maximum likelihood factor analysis of the sixteen scales was carried out and the oblique rotation was examined. The number of factors to be extracted was estimated initially using the Kaiser-Guttman rule, but as the maximum likelihood extraction was being used, it was possible to check the factors for their significance (see Chapter 3). Although these tests were both used to guide the number of factors extracted, ultimately a number of different extractions were compared and the solution which was believed to be most interpretable in the light of previous research and other data gathered in the study (for example the interview data) was reported.

The four factor solution, extracting 60% variance, obtained for the fifteen six-item and one eight-item scales fitted the necessary conditions best and is shown in Table 4.2. The factor structure showed considerable similarities to that obtained with the *Approaches to Studying Inventory*, with the first and third factors being immediately recognisable within the framework of the four study orientations. The first factor combined deep approach with intrinsic motivation and holist style and clearly represented the meaning orientation described by many previously. Extraversion, negative attitudes (negatively) and the new scale, engineering study skills, also loaded on the first factor. The third factor combined surface approach

Table 4.2

Factor analysis of the 16, 6-item inventory scales
Oblique rotation, Kaiser normalisation

	Factor 1	Factor 2	Factor 3	Factor 4
Academic self-confidence		.33		-.85
Approaches to learning				
Deep approach	.56	.33		
Surface approach		.47	.35	
Strategic approach		.51		
Styles of learning				
Holist style	.80			
Serialist style		.70		
Study methods and attitudes				
Time management		.49		-.37
Distractability				.99
Negative attitudes	-.36	-.33	.35	.30
Subject specific study skills	.33	.54		
Motivation				
Intrinsic motivation	.87			
Vocational motivation			.34	
Fear of failure			.76	
Need for achievement		.37		
Personality				
Extraversion	.32			.39
Emotional instability			.49	

Four factors explained 60% of total variance.
Loadings less than 0.3 have generally been omitted

with fear of failure, lack of self-confidence, emotional instability, negative attitudes and vocational motivation and represented the reproducing orientation. Initially, the second factor seemed rather difficult to interpret - combining scales which had previously defined the achieving orientation (strategic approach, time management and need for achievement) with scales more usually associated with the reproducing orientation (surface approach and serialist style) and also incorporating scales from the meaning orientation (deep approach and academic self-confidence). However, comments made by the students in the open-ended section of the questionnaire indicated that rote learning played a necessary and important part in achieving understanding for engineers who also had to rely heavily on serialist strategies to understand basic concepts in engineering. So, it seemed that characteristics previously associated with students scoring high scores on the reproducing orientation in other departments now had to be regarded as characteristics of students scoring high scores on the meaning orientation in engineering. With this insight into what was required for achieving understanding, the merging of the reproducing and achieving orientations with this particular sample became quite understandable. The fourth and final factor combined distractability, poor time management, negative attitudes and extraversion and represented the previously described (though less clearly defined) non-academic orientation. This initial factor analysis also proved useful in providing some insights into how the new scale, engineering study skills, fitted into the more established factor structure. It was found that the scale, as expected, described a characteristic of 'good engineering students', appearing not only in the meaning orientation factor but also in the reproducing/achieving orientation factor.

It was observed that the two personality scales which had been added (extraversion and emotional instability) did not cluster together under one factor but instead separated into two and it was suspected that they were detrimentally affecting the factor structure. It was felt that distractability and fear of failure probably covered these personality dimensions adequately anyway, particularly in light of the consistently similar loadings and positions within factors. After the removal of these two scales, factor analysis was again carried which revealed that their omission had tightened up the factor pattern, and that the main patterns of results could still be seen clearly. Again, the meaning orientation had been preserved, and the two surface/strategic factors had merged into one while the non-academic factor remained intact. It was therefore decided that these two scales had not added anything to the students' profiles, and in the interests of brevity, it seemed wise to

discard them, particularly in light of the discovery that some students had felt they were intrusive and irrelevant to an investigation of experiences of studying. As the factor pattern was not substantially altered, the new factor pattern produced by the remaining fourteen scales is not reproduced here.

It had been hoped that the pilot inventory could be shortened to include scales containing five rather than six items, so item analysis was then carried out again, using the new definitions of the deep approach and engineering study skills scales and the others as before. It was found that in the majority of scales, one and only one item emerged as the 'obvious choice' for being discarded, correlating sufficiently poorly with its scale total. Three of the original eight engineering study skills items were dropped for the same reason. After deciding which items should be discarded, Cronbach's alpha, a measure of internal scale consistency, was then calculated for each of the remaining 14, 5-item scales. Alpha values ranged from 0.41 to 0.81 with a median of 0.60 (all alpha values are presented in Table 4.1). Two scales, serialist style (alpha=0.41) and strategic approach (alpha=0.48) had alpha values below .50, which can be considered a reasonable minimum for five-item scales of this kind (by comparison with the values obtained previously for the personality subscales which were known to contain items which were highly interrelated and measured the same trait). In spite of the fact that two of the scales had relatively low levels of internal consistency, it was considered to be worthwhile retaining them, as their alpha measures did not imply that they were worthless, but rather that they should be used and interpreted with rather more caution than the others. Closer examination of the Cronbach's alpha analysis revealed some interesting findings. For seven of the remaining 14 inventory scales, the item which emerged as contributing most to the scale (or being the defining item in empirical terms) was found to be a new item, written in collaboration with the electrical engineering lecturer at the development phase of the questionnaire for the purposes of making the questionnaire more directly applicable to electrical engineering students. This confirmed above all else that the conceptual meaning of the scales was being preserved, even with the addition of entirely new items. A further three of the scales had modified items from the original inventory as their defining item, again showing that the modified items were fitting in as expected to the original scales. These particularly interesting findings further supported the decision that it was somewhat unnecessary to return to factor analysis of the inventory at item level, as it was becoming increasingly clear that the conceptual meanings of the scales were being preserved.

Factor analysis of the new five-item scales was then carried out, and three factors were extracted, accounting for 56% of the variance. This is presented in Table 4.3, this time in terms of the four main study orientations, with the academic self-confidence scale kept by itself, to prevent the tautology which may have resulted, had it been included in the meaning orientation. The factor structure that had emerged in the first analysis appeared to hold up reassuringly well. The meaning orientation had been preserved, comprising deep approach, holist style, intrinsic motivation, subject specific study skills and a negative loading on negative attitudes. The remaining three factors from the previous extraction had merged into two - representing a surface/strategic factor comprising surface approach, strategic approach, vocational motivation, fear of failure, deep approach, serialist style and a negative loading on academic self-confidence, and a surface/disorganised factor comprising distractability, fear of failure, negative attitudes and negative loadings on both need for achievement and time management. It was concluded that the shortening of the scales to five items each, and the omission of the two personality scales had not detrimentally affected the Experiences of Higher Education inventory in any way, but rather had served to enhance it by making it shorter and more acceptable to students. The omission of the two personality scales in particular had resulted in a three factor solution being interpretable and had also sharpened the definition of the engineering study skills scale somewhat, as the scale loaded highly on the meaning orientation factor.

Piloting 'Experiences of the Course' section

Due to time constraints imposed on the project, it was not possible to conduct extensive preliminary analyses on the course perceptions and experiences component of the questionnaire. In particular, time did not permit the analyses necessary to form scales from the many perceptions and experiences items with any degree of confidence. Instead it was decided to concentrate only on item analyses at this point, and to leave the more involved work for the Main Engineering Study. Frequency distributions, means and standard deviations were calculated for each item and it was noted that all items seemed to be 'working' - each item used all possible response categories to some extent, and no items were identified by the students as being meaningless. This section of the pilot questionnaire was thus retained intact for the Main Engineering Study.

Table 4.3

Factor analysis of the 14, 5-item inventory scales
Oblique rotation, Kaiser normalisation

	Factor 1	Factor 2	Factor 3
Academic self-confidence		-.42	-.50
Meaning orientation			
Deep approach	.58	.30	
Holist style	.78		
Serialist style		.56	
Intrinsic motivation	.87		
Subject specific study skills	.54		
Achieving orientation			
Strategic approach		.44	
Need for achievement			-.32
Time management			-.69
Vocational motivation		.49	
Reproducing orientation			
Surface approach		.58	
Fear of failure		.68	.33
Non-academic orientation			
Distractability			.62
Negative attitudes	-.43		.50

Three factors explained 56% of total variance.
Loadings less than 0.3 have generally been omitted.

SUMMARY AND CONCLUSIONS

Although the sample of students used in the pilot study was relatively small, numbering only 91, and all reported statistical analysis should therefore be interpreted with caution, repeated factor analyses carried out with slightly varying numbers of items, scales and extracted factors produced a relatively stable and identifiable factor structure, suggesting that the inventory could be used with some confidence with a larger sample. The addition of new items and the new scale seemed to have satisfactorily achieved the goal of making the original general student inventory more relevant for engineering students, and had revealed what may have previously been regarded as strange combinations of scales, which could be interpreted in light of responses given in other areas of the questionnaire and what was known about engineering course generally. Due to the constraints on time, it had not been possible to investigate the central theme of this thesis, namely the relationships between students' perceptions of teaching and their approaches to studying, or indeed the course perceptions items in much detail, although such analyses as time had permitted on the course experiences section suggested that these items were meaningful for students and could perhaps be useful in helping to describe their learning environment. The main contribution of the pilot study to the thesis therefore was a detailed examination of the inventory, which would be the main instrument used throughout to profile students' approaches to studying. This was considered essential, because it was anticipated that new instruments or types of items would be introduced at subsequent stages in the research programme to investigate other elements of the learning environment of students, such as their perceptions of teaching and their orientations to higher education, and so the most established instrument to be used should be thoroughly piloted in isolation from newer items or instruments to ensure that it was 'working' as anticipated.

Because the pilot study was considered to be successful in terms of suggesting that the modified inventory produced a relatively stable factor structure, and that the course perceptions items appeared to be meaningful to students, it was deemed appropriate to go ahead with the Main Engineering Study. This is reported in Chapter 5.

Chapter 5
The Main Engineering Study

Developing course perceptions scales and examining how these interrelate with the inventory scales and with other study activities items.

Introduction

Having established the factor structure of the inventory in the pilot study reported in the preceding chapter, the next major piece of analysis was exploring how the course perceptions items could best be grouped into meaningful scales and, how these scales would relate to the inventory scales. This chapter reports how this was carried out, describes the resulting course perceptions scales, explores the relationships between the inventory scales and the course perceptions scales, and goes on to investigate how specific study activities fitted in to this picture.

METHOD

Instruments

A lengthy questionnaire, very similar to that described in the Pilot Study (Chapter 4) was used (see Appendix B). This incorporated a revised and shortened version of the modified inventory which now contained 14 scales, each comprising 5 items. The scoring key for the inventory may be found in Appendix B1. Some items from Section C, the 'Study Activities' section were included in the analyses to be reported in this chapter. These items asked how much time students spent on various study activities such as rewriting lecture notes and practising past exam questions. Responses were made on a five-point scale, ranging from 5='a lot of time' to 1='no time'. An item asking students to estimate how many hours they spent on private study outwith scheduled classes in a typical week was also included. This was done with the aid of a grid designed previously to facilitate the estimate (Entwistle and Entwistle, 1970). The course perceptions section, comprising 55 items, was also used. The course perceptions items were drawn from five subsections of Section D, the 'Experiences of the Course' section of the questionnaire. These items had been based on, or drawn from, the literature addressing students' ratings of lecturers and courses (reported in Chapter 2), reworded where necessary to be applicable to students of electrical engineering.

Responses were again made on a five point scale ranging from 5='definitely agree' to 1='definitely disagree'. The first subsection, containing six items, asked students how good the support and advice had been from staff during the year. The second comprised 18 items and asked students to rate the extent to which they had experienced certain features of the course such as heavy workload and good industrial contacts. The third, consisting of 15 items, asked students to reflect on particular aspects of the teaching and assessment of the engineering component of their courses. The fourth and fifth sections, comprising 11 and 5 items, asked students about their experiences of engineering practicals and tutorials respectively.

Sample

Electrical and electronic engineering departments from two universities were invited, and agreed, to take part. The questionnaire was completed by first year students during a normal one-hour lecture slot and students who could be identified from class lists as being absent were contacted by post and asked to complete and return the questionnaire in their own time. A total of 255 questionnaires were returned, representing a response rate of 90%. 89% of students were male and 11% female which are typical percentages for electrical engineering.

RESULTS AND DISCUSSION

Further examination of the inventory

Although the factor structure of the inventory had been thoroughly examined in the pilot study with second year students, it was considered desirable to confirm that the findings held up when the inventory was used by first year students before further analyses could be carried out. The integrity of the scales was confirmed by Cronbach's alpha for this sample of students, and it was found that the coefficient ranged from 0.37 to 0.80 with a median value of 0.55 and with three of the scales - surface approach, strategic approach and serialist style - having values below 0.5. Although it was not altogether unexpected that the strategic approach and serialist style scales should have low Cronbach's alpha values, in the light of the values produced for them in the pilot study and indeed for the original *Approaches to Studying Inventory*, it was somewhat more surprising and worrying to find that the

surface approach should also have a low alpha value on this occasion, and again it was noted that the behaviour of this scale should be interpreted with caution in the subsequent analyses. Overall though, the alpha values were felt to be satisfactory.

Factor analysis of the inventory scales was again carried out and is reproduced in Table 5.1 from which it can be seen that the now familiar three factor pattern was again evident representing the meaning orientation, a surface/strategic factor and a surface/disorganised factor. As the factor structure of the inventory had been so tightly preserved throughout the analyses of the pilot study and with the new set of students in the current study, it was felt that it might be possible to reduce it to second-order scales, or study orientations. The broader term 'study orientation' had been used previously in place of 'approach' to include motives and preferences in addition to approaches. Using the results of the factor analyses obtained, and combining these with previous orientation definitions, it was decided that the fourteen scales could best be grouped as follows:-

Meaning orientation =	deep approach + holist style + serialist style + intrinsic motivation + subject specific study skills
Achieving orientation =	strategic approach + need for achievement + vocational motivation + time management
Reproducing orientation =	surface approach + fear of failure
Non-academic orientation =	distractability + negative attitudes

with the academic self-confidence scale kept as a scale on its own.

In this phase of the project it had also been possible to obtain performance data for the participating students, in the form of grades or percentages obtained for their end-of-year degree examinations. Although it proved somewhat difficult to standardise the marking schemes used by the two departments, it was possible to define performance in a number of ways. Firstly, it was a very simple matter to use the departments' own definitions of success and failure, and to divide the students into two groups depending on whether they had passed normally, or whether they were required to resit one or more of their examinations. Following on from this, it was decided to take the marking scheme which was implemented throughout one of the participating universities, and use it to subdivided the successful students into two categories which broadly reflected those who had marginal passes and those who had clear passes, based on the grades or percentages awarded by the

Table 5.1

Factor analysis of the 14, 5-item inventory scales
Oblique rotation, Kaiser normalisation

	Factor 1	Factor 2	Factor 3
Academic self-confidence			-.56
Meaning orientation			
Deep approach	.63		
Holist style	.69		
Serialist style	.44		
Intrinsic motivation	.94		
Subject specific study skills	.53		
Achieving orientation			
Strategic approach		.49	-.34
Need for achievement	.42		
Time management		.36	-.52
Vocational motivation		.53	
Reproducing orientation			
Surface approach		.59	
Fear of failure			.79
Non-academic orientation			
Distractability			.50
Negative attitudes	-.43		.44

Three factors explained 57% of total variance.
Loadings less than 0.3 have generally been omitted.

departments, thus creating an extra performance category. Due to the relatively small numbers of students who failed the course, it did not seem appropriate to divide the unsuccessful group further.

With the addition of the performance data, it was considered interesting to return to an examination of the inventory, this time to investigate which scales and orientations correlated with performance. It was found that seven of the fourteen scales correlated with performance at the 0.05 level, five positively and two negatively. Those correlating positively were academic self-confidence, time management, deep approach, strategic approach and need for achievement, while those correlating negatively were negative attitudes to studying and fear of failure. At orientation level it was found that both the meaning and achieving orientations correlated positively with performance, while the reproducing and non-academic orientations correlated negatively.

Previous studies which have sought correlations between inventory scales and performance (reviewed in Chapter 2) have failed to produce consistent results concerning which scales and orientations correlate with performance, presumably because of the wide variety of types of assessment procedure that are used. However, there was a suggestion from these other studies that scales correlating with performance did so negatively, and typically included surface approach, negative attitudes to studying and distractability, and the reproducing and non-academic orientations. From this it was tentatively concluded that it was the absence of poor study methods, rather than the presence of particularly good study methods and a meaning or achieving orientation which led to academic success in higher education. An explanation offered is that perhaps the wide variety of individual study methods adopted by successful students made their definition and assessment more difficult than identifying negative attitudes and dilatory activities. In addition, it had also seemed previously that weak students were more likely to endorse items phrased negatively than successful students were to endorse positive statements. This however, was not found here, where scales and orientations correlated both negatively and positively in the expected directions with the performance indicator.

As an interesting addition, discriminant function analysis was then carried out using the seven scales which had correlated with the performance indicator (academic self-confidence, time management, deep approach, strategic approach, need for

achievement, negative attitudes and fear of failure) to predict membership of two performance categories - pass and fail. It was found that the prediction was correct for 66% of the passing students and 72% of the failing students, from which it was concluded that the selected inventory scales had been moderately successful in predicting performance for this particular sample.

Course perceptions scale development

Factor analysis of all course perceptions items for the whole sample was carried out in the first instance using SPSS-X. The Kaiser-Guttman rule suggested extracting 17 factors (accounting for 64% variance) but as this 'solution' showed difficulty in converging, it was not considered any further. It was also suspected that a 17 factor solution of 55 items may be difficult to interpret. A considerable number of other solutions was then considered, on the basis of which it was possible to reduce the number of items to 33, by retaining only those items which consistently loaded significantly on at least one of the extracted factors ('significantly' was defined by convention to be above 0.3). It also began to be clear that factors reflecting heavy and difficult workload, relevant course content, well-organised practicals and good teaching (also incorporating notions of openness to students and good feedback) could be identified. The items which had made up what appeared to be a composite good teaching + openness to students + good feedback factor, were then factor analysed separately to see if it was possible to obtain empirical evidence for subdividing this large factor into three smaller and conceptually different ones. 'Good feedback' did break off from the main good teaching + openness to students grouping, providing some justification for considering this as a separate scale in future analyses. Guided by the literature, and by weak empirical evidence (namely that the seven good teaching items had the seven highest loadings on this composite factor, and the five openness to students had lower loadings), it was decided to consider this as a separate scale, at least in the initial analyses. The consistently lower loadings were taken to suggest an 'incipient' additional factor. Item analysis was then carried out by correlating each item with each scale and it was confirmed that in every case, items correlated most highly with the scale of which they were intended to be part. Cronbach's alpha was then calculated. This is shown below in Table 5.2.

Table 5.2
Course perception scales, Cronbach's alpha values, number of constituent items, and typical examples.

	Scale	*Alpha*	*No. items*	*Example*
1.	Good teaching	.82	7	Lecturers generally explain things clearly.
2.	Openness to students	.62	5	Staff ask us how they might improve the course.
3.	Good feedback	.67	7	Marked work is usually returned promptly.
4.	Well-organised practicals	.70	4	The instructions are clear and easy to follow.
5.	Relevant course content	.59	5	Emphasis on applications has been found.
6.	Heavy & difficult workload	.67	5	Difficult content (found).

(A full list of the items comprising each factor may be found in Table 5.3).

The intercorrelation matrix of these six scales was then examined and it was revealed that the openness to students scale had a (marginally) higher internal consistency value than its degree of correlation with any of the other five scales, providing some further empirical justification for retaining it as a separate scale.

In conclusion then, and after considerable exploratory analyses, it had eventually proved possible to reduce the total number of course perceptions items from the original 55 to 33 'valid' items, which were in turn reduced to 6 scales, each of which represented what the students, in terms of their pattern of responses, apparently regarded as being important aspects of the teaching or courses they experienced.

Identifying relationships between the *Experiences of Studying and Higher Education Inventory* scales and the course perceptions scales

Having established how the course perceptions items could best be grouped into manageable and conceptually meaningful scales, the next step in the analyses was to factor analyse these scales together with the 14 from the *Experiences of Studying and Higher Education Inventory* to try to identify patterns of relationships between the two sets of scales. Four factors, explaining 57% variance were extracted and are presented in Table 5.4. The factor structure for the inventory alone, obtained in the pilot study and confirmed for this sample in Table 5.1, could still clearly be seen, but the overlap with the new course perceptions scales was somewhat disappointing. Factor 1 combined all scales associated with the meaning orientation with need for achievement and positive attitudes to studying (as before), the only

Table 5.3

Composition of the course perceptions scales

Good teaching	Lecturers generally explain things clearly.	
	Lectures are generally well organised.	
	Most of the lecturers are enthusiastic about their subject	
	Lecturers are good at bringing things down to our level.	
	The applications of the lecture material are made clear.	
	Good advice given from lecturers about courses.	
	Most courses seem clearly structured.	
Openness to students	Good relationships with staff found.	
	We're encouraged to discuss work difficulties with staff.	
	Staff ask us how they might improve the course.	
	Tutors seem interested and helpful.	
	Good advice given on studying effectively.	
Good feedback	Marked write-ups are returned with helpful comments.	
	We are shown how to write up practicals effectively.	
	The practical marks seem to recognise effort.	
	We do enough tests etc to show how well we're doing.	
	Marked work is usually returned promptly.	
	Markers' comments are usually helpful and constructive.	
	The marks given generally seem to be fair.	
Well-organised practicals	The instructions are clear and easy to follow.	
	The point of each practical is usually clear.	
	Demonstrators are well prepared and helpful.	
	Good advice given on using apparatus in labs.	
Relevant course content	Interesting content found.	
	Emphasis on applications found.	
	Content professionally relevant.	
	Emphasis on management and professional skills found.	
	Good industrial contacts found.	
Heavy and difficult workload	Found:	Heavy workload.
		Difficult content.
		Ideas presented fast.
		A lot of lectures.
		Much time (spent) on maths itself

addition being the perception of there being a relevant course content. Factor 2 combined strategic approach, time management and surface approach and reflected the surface/strategic factor as before. Factor 3 combined fear of failure, distractability, negative attitudes, surface approach and vocational motivation with the perception of there being a heavy and difficult workload, and reflected the surface/disorganised factor as before. Factor 4, the final factor, consisted only of the course perceptions scales reflecting positive attitudes to teaching - good teaching, openness to students, good feedback, well-organised practicals and relevant course content.

To some extent, it was surprising that greater overlap between the two sets of scales had not been found, especially considering that correlations between the two had been calculated and many correlations had been significant at the 0.05 level. However, when previous studies were considered, it was found that the factor pattern produced here had in fact managed to show empirically one new relationship which had previously only been intuitive - that between meaning orientation and relevant course content. This connection may, of course, be a product of this particular subject area which involves professional training. The relationship between the reproducing and non-academic orientations and heavy and difficult workload had been reported previously.

Factor analysis was carried out again, this time using the four second-order orientations to studying (meaning, achieving, reproducing and non-academic) and one separate scale (academic self-confidence) in place of the fourteen separate scales, along with the course perceptions scales, and it was confirmed that the patterns of relationships previously found had been preserved. As the patterns produced were so similar to those found in Table 5.4, they are not reproduced here. However, the Pearson product-moment correlation matrix containing the study orientations and course perceptions scales is shown below in Table 5.5. It should be noted that the correlations do not provide evidence of causality in the relationships between teaching and study orientations, though they do suggest that students with a predominant meaning orientation see the courses as providing good teaching while those with a non-academic orientation apparently see these same courses as being taught badly. However, the correlational analysis may obscure differential reactions in different component parts of the sample. The reactions may well be more course or lecturer specific than the overall relationships suggest.

Table 5.4

Factor analysis of the inventory and course perceptions scales
Oblique rotation, Kaiser normalisation

	Factor 1	Factor 2	Factor 3	Factor 4
Academic self-confidence			-.54	
Meaning orientation				
Deep approach	.60			
Holist style	.68			
Serialist style	.42			
Intrinsic motivation	.90			
Subject specific study skills	.50			
Achieving orientation				
Strategic approach		.61		
Need for achievement	.41			
Time management		.51		
Vocational motivation			.46	
Reproducing orientation				
Surface approach		.31	.49	
Fear of failure			.83	
Non-academic orientation				
Distractability			.38	
Negative attitudes	-.39		.48	
Course perceptions				
Good teaching				.76
Openness to students				.77
Good assessment				.70
Good practicals				.55
Relevant content	.45			.39
Heavy & difficult workload			.55	

Four factors explained 57% of total variance.
Loadings less than 0.3 have generally been omitted

Table 5.5

Correlations between the Approaches to Studying orientations and the course perceptions scales

COURSE PERCEPTIONS

	Meaning orientation	Achieving orientation	Reproducing orientation	Nonacademic orientation	Academic self-confidence
Good teaching	.29	.20	-.11	-.32	.27
Openness to students	.26	.18	.05	-.27	.16
Good assessment	.16	.20	-.02	-.20	.17
Good practicals	.28	.25	-.01	-.24	.29
Relevant content	.47	.21	.03	-.31	.25
Heavy workload	-.04	.20	.44	.17	-.34

APPROACHES TO STUDYING ORIENTATIONS/ SCALES

Correlations above 0.11 are significant at 0.05, and above 0.20 at 0.01.

Identifying relationships between orientations, perceptions and study activities

To try to find out which activities students spent most time on in relation to the study orientations and course perceptions, six relevant items from the questionnaire were then added in to the variable list before factor analysis was carried out again. These items had asked students how much time they had spent outwith timetabled classes on rewriting or reordering lecture notes, understanding lecture notes or handouts, using textbooks or journals, working on past exam questions, writing essays or assignments, and being stuck to the extent of not being able to get on. Students had also been asked to estimate how much time they spent in a typical week on private study and this was also included in the factor analysis. Four factors, explaining 53% variance were extracted and are presented in Table 5.6.

Factor 1 reflected students with high scores on the meaning and achieving orientations (now known from correlations with the performance indicator to be generally the more successful students) who were self-confident and perceived the course as being relevant (as before), and who worked long hours outwith timetabled classes. Factor 2 represented students with high scores on the reproducing and non-academic orientations (the less successful students) who lacked self-confidence, regarded the workload as being particularly heavy and

Table 5.6

Factor analysis of the study orientations and course perceptions scales with the study activities items
Oblique rotation, Kaiser normalisation

	Factor 1	Factor 2	Factor 3	Factor 4
Study orientations				
Meaning orientation	.71			
Achieving orientation	.64			
Reproducing orientation		.93		
Non-academic orientation		.52		
Academic self-confidence	.39	-.56		
Course perceptions				
Good teaching			.78	
Openness to students			.77	
Good assessment			.65	
Good practicals			.49	
Relevant content	.35		.36	
Heavy & difficult workload		.54		
Study activities				
Time spent on:-				
Total study outwith class	.44			.35
Rewriting lecture notes				
Understanding lecture notes				.67
Using textbooks/journals				.44
Past exam questions				
Writing essays/assignments				
Being stuck		.47		

Four factors explained 53% of total variance.
Loadings less than 0.3 have generally been omitted

difficult, and reported spending a lot of private study time being stuck and unable to get on. Factor 3 combined good teaching, openness to students, good feedback, well-organised practicals and relevant course content to reflect a positive evaluation of teaching factor. The fourth and final factor again represented students who spent a good deal of time on private study, particularly understanding lecture notes and handouts and using textbooks and journal. The items 'time spent on rewriting/reordering lecture notes' and 'working on past exam questions' failed to load significantly on any factor of any of the extractions attempted, and 'writing essays or assignments' only had a significant loading in the five factor solution which had also been inspected, but even here it existed in the final factor in isolation so did not contribute to an understanding of the relationships between study orientations, course perceptions and the particular study activities on which students spend time. Again, the weak relationships were somewhat disappointing, though the few relationships which had been revealed between the study activities, study orientations and course perceptions had been both interesting and understandable.

The means and standard deviations of each of these items and scales may be found in Table 5.7. Columns one and two give the means and standard deviations for the whole sample of 255 students, while columns three to six give the means and standard deviations for the highest and lowest attaining students respectively, along with an indication of where differences between the two subgroups are significant, based on Student's T-test. (The sample was split roughly into thirds, and the highest and lowest thirds compared). The inventory scales and study orientations which showed significant differences could have been predicted from the correlations between the inventory scales, study orientations and performance indicator which were reported towards the beginning of this chapter, although in this analysis serialist style also emerged as differentiating between the two groups. None of the course perceptions scales revealed any significant differences between the two groups. Only two of the study activities items, time spent using books and time spent being stuck, showed significant differences, and the former in fact revealed that it was the lower attaining students who spent significantly more time using textbooks than did the higher attaining students which was contrary to what had been expected. This was additionally somewhat difficult to interpret in the light of the factor analysis described above and presented in Table 5.6, which showed that spending time on private study in general, and understanding lecture notes and handouts and using textbooks and journals in particular, formed a separate factor, suggesting that using textbooks was a study activity more typical of high achieving

Table 5.7

Means and standard deviations of the items used in the factor analyses for the overall sample (n=255), the high achievers (n=71) and the low achievers (n=78)

Scale/Item	Mean	Std Dev	Mean	Std Dev	Mean	Std Dev	
	Overall sample (n=255)		High achievers (n=71)		Low achievers (n=78)		
Inventory scales •							
Academic self-confidence	15.9	3.4	17.6	3.0	14.7	2.8	**
Meaning orientation ••	85.2	12.8	87.9	13.2	83.0	13.0	**
Deep approach	16.4	3.1	17.0	3.1	15.8	3.0	*
Holist style	16.5	3.5	17.2	3.3	16.2	3.5	
Serialist style	18.4	3.2	19.3	3.2	17.9	3.0	*
Intrinsic motivation	16.0	3.9	16.2	4.0	15.8	4.2	
Study skills	17.9	3.2	18.3	3.5	17.3	3.3	
Achieving orientation ••	67.9	9.7	69.9	10.1	65.7	9.8	*
Strategic approach	18.0	3.0	18.6	2.8	17.4	3.0	*
Need for achievement	17.5	3.9	18.3	4.3	16.4	4.0	*
Time management	15.2	4.2	16.6	4.3	14.4	4.0	**
Reproducing orientation ••	33.4	6.6	30.4	6.6	30.8	6.9	**
Surface approach	18.2	2.8	18.0	3.0	18.2	2.5	
Vocational motivation	17.2	3.5	16.5	3.9	17.5	3.2	
Fear of failure	15.2	5.2	12.4	5.2	16.4	4.5	**
Non-academic orientation ••	29.9	7.0	27.5	6.7	30.8	6.9	**
Distractability	15.7	3.8	14.9	3.7	16.0	3.6	
Negative attitudes	14.1	4.4	12.6	4.4	14.8	4.3	**
Study activities •••							
Time spent on:-							
Total study outwith class	20.9hrs	9.3	21.0	8.9	19.9	8.4	
Rewriting lecture notes	2.3	1.1	2.1	1.0	2.3	1.1	
Understanding lecture notes	3.4	1.0	3.3	0.9	3.4	1.0	
Using textbooks/journals	2.7	0.9	2.5	0.9	2.9	0.9	**
Past exam questions	2.5	1.0	2.5	1.1	2.5	1.0	
Writing essays/assignments	3.0	1.2	3.1	1.1	2.9	1.2	
Being stuck	3.0	1.2	2.7	1.1	3.2	1.2	*
Course perceptions ••••							
Good teaching (7)	24.7	4.9	25.9	4.7	24.4	5.2	
Openness to students(5)	15.7	3.3	16.4	3.1	15.8	3.5	
Good assessment(7)	23.6	4.7	24.4	4.6	23.5	4.7	
Good practicals(4)	13.9	3.0	14.0	3.3	13.6	3.1	
Relevant content(5)	14.8	3.0	14.6	3.4	14.7	3.1	
Heavy & diff workload(5)	20.7	3.0	20.1	3.0	20.9	3.2	

• Inventory scales comprise five items, potential range 5-25.
•• Study orientations contain differing numbers of scales, as listed below each.
••• Study activities are single items, potential range 1-5, except 'total study', scored in hours.
•••• Course perceptions scales contain differing numbers of items, given in brackets.

* Differences in means of the high and low achieving groups significant at .05

** Differences in means of the high and low achieving groups significant at .01

students than low achieving students. In the absence of any other supporting evidence, the reasons for this inconsistency may only be speculated upon. It seems possible that the explanation may lie in the use to which books were being put - to overcome difficulties or misunderstandings (in the case of the lower attaining students) or to supplement lectures (in the case of the higher attaining students). There was also some evidence from both the open-ended sections of the questionnaire and from the interviews with students to suggest that engineers spent very little time reading in general, and devoted most of their private study to working on problems and writing lab reports. Thus reading may not have been regarded as a 'normal' study activity, but as something which was done only as a last resort in times of extreme difficulty or by the keenest of students.

It was interesting to note that, in general, the study activities items appeared to have relatively large standard deviations in comparison to the course perceptions and inventory scales, although it must be appreciated that it is extremely difficult to make direct comparisons between single items and scales of varying length. However, this might perhaps suggest that students were responding to these items in ways which were highlighting differences between individuals in a similar manner to which they were responding to inventory items, while the course perceptions scales were perhaps less sensitive to individual differences. It is possibly as a result of the ability of the study activities items to highlight individual differences, that they appeared to be compatible in empirical terms with the inventory scales.

SUMMARY AND CONCLUSIONS

The *Course Perceptions Questionnaire* which Ramsden had developed (1979, also described in Chapter 2), had failed to reveal many empirical relationships with the *Approaches to Studying Inventory*. As a result, this phase of the current research programme had returned to the literature addressing students' ratings of teaching and courses, and had produced a fairly extensive list of course perceptions items. After considerable refinements, it proved possible to identify the most salient items and to develop six course perceptions scales. The resulting scales reflected good teaching, openness to students, good assessment, good practicals, relevant content and heavy workload. The scales were developed using both empirical and

conceptual analyses at each stage, and even though the resulting measures of internal consistency could be considered to be satisfactory, the resulting course perceptions scales should not be regarded as constituting a sound psychometric instrument.

Although factor analysis revealed a disappointing lack of overlap between the *Experiences of Studying and Higher Education Inventory* and the course perceptions scales, this was not altogether unexpected. Previous studies of a similar type (eg. Ramsden and Entwistle, 1981) had reported finding empirical evidence only for the relationship between the reproducing orientation and the perception of the workload as being heavy and difficult for their overall sample, and had failed to explain why no corresponding course perception was empirically related to the meaning orientation. The factor analyses reported in this section, however, managed not only to show again this relationship between workload and the reproducing orientation, but also showed that perceiving the course to be relevant was related to the meaning orientation. That no further relationships were revealed between the two sets of scales, could further be explained by the fact that inspection of the intercorrelation matrix of the six scales (not reproduced here) suggested that they measured essentially only two dimensions - 'good' aspects of teaching (good teaching, openness to students, good assessment, good practicals, relevant content) and 'bad' aspects of teaching (heavy and difficult workload). This had been found previously (Entwistle, Kozeki and Tait, 1989) in a study using secondary school pupils, where again a simple two-factor solution was produced for a 17-scale inventory designed to measure school pupils' perceptions of school and teachers. Again in this case, the two factor solution appeared to reflect simply positive attitudes to teaching in one factor, and negative attitudes to teaching in the other. With this lack of complexity, it was not surprising to find a corresponding over-simplicity in the factor pattern produced when combining their approaches to studying inventory with the Perceptions of School and Teachers inventory, which in fact did little more than combine the factor patterns produced for the two separate inventories. It had been suggested that this simplicity might be due to the fact that these pupils were young (approximately 14 years old) and may therefore be unable to view teaching with anything other than a simple 'good versus bad' distinction. However, as a very similar situation was found for the engineering sample, it tended to suggest that the students' ages had little influence. This study with school children, Ramsden's study using his CPQ, and the current study reported in this chapter, had each developed separate course perceptions questionnaires, using

similar types of items though separate item pools and had each failed to reveal many significant relationships between students' perceptions of teaching and their approaches to studying and, taken together, this seemed to support the idea that an alternative way of measuring course perceptions may be required before more such relationships could be revealed empirically, given that the existence of such relationships is intuitive.

The main contribution of this stage of the research programme was to establish that the traditional style of course perceptions items was not particularly successful in revealing relationships between students' perceptions of teaching and their approaches to studying, due to their apparent inability to elicit responses highlighting individual differences, and therefore not being compatible with the inventory scales. Comparisons of the standard deviations of the study activities items and course perceptions scales revealed that those of the former were generally greater. The next logical step in trying to identify such relationships therefore seemed to be to develop new course perceptions items which would be more in line with the 'time spent on....' type of item in that they would ideally actively encourage students to respond in a way which would highlight individual differences.

Chapter 6
The Psychology and Engineering Study

The development and piloting of 'teaching preference items'

Introduction

As mentioned previously, the research reported in the preceding two chapters made use of data collected for the purposes of the Engineering Project which was studying the performance of electrical and electronic engineering students in general terms. However, the decision to investigate students' perceptions of teaching in relation to their approaches to studying was rather *ad hoc*, taken at the end of the first year of the project, and so the extent of the analyses that could be carried out specifically for the purposes of the research questions addressed in this thesis was consequently limited.

Once the particular area of investigation had been delineated, and the research questions addressed as fully as possible, given the constraints of the initial data, it then became important to explore alternative ways of investigating students' perceptions, and to try these out on students from other disciplines if possible. This second main phase of the research programme was guided in two ways, and support for the resulting types of items was gained from a third source. The former two were the findings reported in Chapter 5 and research carried out by Meyer in South Africa respectively, and support for the resulting items came from a study reported by Hattie and Watkins (1988). These three will be described below.

The initial analysis reported in Chapter 5 largely confirmed the empirical relationships which Ramsden and Entwistle had reported (1981). In addition though, the means and standard deviations of the specific study activities items had been studied in relation to the course perceptions scales. From this, it was tentatively concluded that the study activities items may have been encouraging students to react from personal experience and, in so doing, to highlight individual differences. There was already good evidence that students reacted to inventory items in a manner which highlighted individual differences, therefore it seemed possible that these two sets of items would be compatible in type and suitable for multivariate analyses. It was also tentatively concluded that course perceptions items were so general that they were tending to inhibit personal views, and that

these differences in response variance may be suppressing the relationships which would otherwise have been apparent in, for example, the patterns produced in factor analysis. This in turn suggested that new course perceptions items, phrased in such a way as to encourage personal preference, might prove superior in establishing relationships between students' perceptions of teaching and their approaches to studying. Further evidence for developing new items of this type came from a re-examination, at this stage, of the items described in the literature on students' ratings of teaching and courses which did in fact reveal that different types of item appeared to exist. Some items described very specific aspects of teaching and would almost certainly attract considerable response variance within a class, while others were very general and would be more likely to attract responses with low class variance, thereby reflecting near class consensus. It seemed possible that a course perceptions questionnaire which was comprised of the former type of items might forge empirical relationships between course perceptions and approaches to learning, as both types of variable would would allow for variations in terms of individual reactions or activities. Thus the way in which the research reported in the previous chapter unfolded, implicitly pointed up the importance of developing items which would reflect individual differences. This proved to be a valuable guideline for the next main stage in the research programme which is reported in this chapter.

The second source of influence was Meyer (in South Africa) who was also interested in the relationships between students' perceptions of teaching and their approaches to studying, with a view to being able to identify 'at risk' students (reviewed in Chapter 2). Meyer was dissatisfied with the very limited relationships which existed between the *Approaches to Studying Inventory* and Ramsden's *Course Perceptions Questionnaire* and as a result he had developed alternative course perceptions items (Meyer et al, 1988; 1990a; 1990b). He used items which asked students to rank their *awareness* of various aspects of their learning environment and then wrote them conceptually to reflect 'deep' or 'surface' perceptions of these components. The way in which these data were plotted along with the approaches to studying scales and with the students themselves, led Meyer to conclude that the spatial locations of the students relative to the other variables represented their *preferences* for certain aspects of their learning environment. For example, he argued that students who were located in the space close to both the meaning orientation scales and the awareness of the 'deep' qualities of books, could be said to *prefer* to use books in what he described as being a 'deep' way. The

idea of asking students to think more about what they would *prefer,* and thereby accentuating individual differences, seemed interesting, and also fitted the requirement of encouraging students to respond from personal experience, which had emerged as being important in the first phase of the research programme.

Further support for the development of the new teaching preference items was found in a paper by Hattie and Watkins (1988). They stated that

> "It seems reasonable to propose that a student's perception of the *actual* classroom environment will be related to the *particular* strategy that is adopted therein, whereas the perception of the *preferred* environment is likely to be related more strongly to the *usual* approach to learning - itself a function of the preferred learning style."
>
> (Hattie and Watkins, 1988, p.346)

This was similar to Pask's argument that strategy and style should be differentiated, as one represented a strategic response to a particular learning task while the other reflected a particular type of strategy. The proposal of Hattie and Watkins made good sense, fitting in with Meyer's suggestions and meeting the criterion of encouraging students to respond from personal experience. Although the new items had been developed by this stage, it was reassuring to note that similar conclusions had been drawn in connection with the effects that the wording of items could have, and that a similar wording to that adopted in this phase of the research programme had been decided upon in an independent study.

By considering the research reported in the first two points above, it was obvious that the traditional format of course perceptions items was not appropriate for the purposes for which they were intended in this study - namely to establish empirical relationships between students' perceptions of teaching and their approaches to studying. At the end of the first year of the studentship, it was decided that one of the goals of the subsequent research would be to try to develop a more appropriate set of items which would try to highlight individual differences in students' perceptions of teaching and courses.

The literature had implicitly suggested that it might be salutary to get students to reflect on what types of teaching and courses they *prefer*, working on the assumption that they will be exposed to a variety of different types of teaching, some of which they will favour over others.

METHOD

Instruments

Development of the questionnaire

To parallel the previous study, it was felt that a questionnaire would be the most appropriate way in which to gather data. It was decided that the questionnaire should contain a version of the *Approaches to Studying Inventory*, traditional course perceptions items and study activities items, in addition to the new teaching preference items. This would maximise the ability to see how the new items were working in relation to more established types of items. Each of these four sections will be discussed below. (The full questionnaire is shown as Appendix C).

The inventory

The *Experiences of Studying and Higher Education Inventory* that had been used in the Engineering project was abridged, and instead of having fourteen 5-item scales, it was decided that the four main study orientations were sufficiently well defined to present the inventory in terms of these four orientations and with the academic self-confidence scale kept as a separate dimension as before. The resulting inventory contained just 28 items, which comprised items from twelve of the original fourteen scales. The scoring key is shown in Appendix C1. Subject specific study skills and serialist style were excluded because they contained items which would be specific to engineering students, so would not be appropriate for use with a more general sample. For the remaining twelve scales, statistics such as Cronbach's alpha and item-scale correlations were used to determine which were the best and most defining items of that scale, and these were selected for the abridged version of the inventory, providing they described some feature of studying which would be appropriate to students from departments other than electrical engineering. However, after the inventory had been produced, it was decided with hindsight that it would not be appropriate to include the vocational motivation scale in the orientations and subsequent analyses, due to the fact that previous research had revealed that, like serialist style, this scale could have a significantly different meaning, depending on the discipline from which the sample was drawn, and that although it would have been appropriate to include it at scale level, it was not appropriate to force it into a particular orientation so that analyses could be carried out at this level. It was therefore decided that only the remaining eleven scales should constitute the four main study orientations. The resulting orientations were

comprised as follows:-

Meaning orientation=deep approach(3 items)+holist style(2)+intrinsic motivation(2)=7 items
Achieving orientation=time management(3)+strategic approach(2)+need for achievement(2)=7 items
Reproducing orientation=surface approach(3)+fear of failure(2)=5 items
Non-academic orientation=negative attitudes to studying(3)+distractability(2)=5 item

and, as mentioned, academic self-confidence was again left as an individual dimension.

Course perceptions section

The course perceptions items which had been used in the Engineering Project had been developed with a view to being maximally applicable to electrical and electronic engineering students. It was therefore wholly inappropriate to use these in this study, where students from another discipline would also be studied. A small set of course perceptions items was therefore developed, based on the five features of good teaching which Ramsden had identified through interview - level and structure of the course, pace of presentation and workload, lecturer's enthusiasm and ability to provide good explanations, openness to students, and availability and worth of recommended books. Two items were written for each of these five categories, yielding a course perceptions section of ten items, which could be considered as five pairs for the purposes of analysis.

Study activities section

As a result of the analysis involving the study activities items in the Engineering Project, which had suggested that these items might be useful in mapping out the study processes and behaviours of students further, it was decided to retain these intact in this study, in addition to, as before, the grid which helped students to estimate the total amount of time they spent outwith formal classes on private study. This section therefore contained seven items - total time spent on private study, on rewriting notes, on understanding notes, on reading books, on past exam questions, on writing essays, and on being stuck.

The development of preference items

From the literature on students' ratings of lecturers, it was found that students saw teaching as being divided into four main components - lectures, tutorials, examinations, and courses. Again by looking at this literature, certain different types of each of these four components could be identified which formed the basis of the new teaching preference items. The recent relevant literature (described above) had tentatively suggested that it might be appropriate to phrase items in terms of 'preferences for' these aspects of the main components. As a result, five items were written for each of the four components, two of which described preferences likely to be typical of students endorsing a deep approach to studying, two a surface approach to studying and one other which was not obviously associated with either. Students were asked to rate their preference for each of the five types of lecturer, examination, tutor and course on a five-point Likert scale, ranging from 5=definitely agree to 1=definitely disagree. The twenty items are listed in Table 6.1 along with an indication of the approach to studying with which they were intended to be associated.

Sample

148 first year psychology students and 123 first year electrical and electronic engineering students from one university were invited, and agreed, to take part in the study. The questionnaire took about 30 minutes to complete, and was filled in during a normal 50 minute lecture slot, giving even the slowest students a chance to complete it well within the allotted time. Due to uncertainties about how many students were registered on the two courses, the completion rate proved difficult to estimate, but was believed to be in the region of 65%. Psychology and engineering were chosen as contrasting disciplines - psychology students would tend to be less syllabus-bound and perhaps more reflective than engineering students, whose course content would be much more clearly defined and whose workload and contact hours would not permit much syllabus-freedom.

Table 6.1

Preference items

I generally prefer lecturers who	
- show us how what we're learning relates to the outside world	(deep)
- tell us exactly what to put down in our notes	(surface)
- show us what they themselves think about a subject	(deep)
- entertain us even if the content isn't particularly good	(surface)
- use a lot of overheads or slides	(?)
I generally prefer exams which	
- have questions requiring specific detailed answers	(?)
- give me an opportunity to show I've thought about a course for myself	(deep)
- can be answered directly from the material in our lecture notes	(surface)
- make it clear how much effort we're expected to put into each part of the question	(surface)
- have general questions which provide opportunities to follow a number of different lines	(deep)
I generally prefer tutors who	
- get us discussing ideas among ourselves	(deep)
- go over the lecture to make sure we haven't missed anything	(surface)
- show us very clearly what they think of our ideas	(deep)
- are friendly, even if they're not so good at explaining things	(surface)
- make things clear, even if they're rather critical of us	(?)
I generally prefer courses where	
- we're able to follow our own interests quite a lot	(deep)
- it's made very clear just which books we have to read	(surface)
- it's clear how important the various topics are for the exams	(surface)
- we're encouraged to read around the subject a lot	(deep)
- there's a good deal of detailed information to learn	(?)

RESULTS AND DISCUSSION

Analyses were carried out separately for the psychology and engineering students throughout. This meant that the engineering results could be compared with, and interpreted in light of, the findings of the main engineering study reported in Chapter 5, and also that, by keeping the analyses separate, any differences in the ways in which students studied in the two departments might be highlighted. As a result, it may then be possible to assess the effects that different departments were having on the ways in which students studied.

Initial analyses were carried out to confirm the integrity of the abridged inventory. Item analysis (correlating each item with each orientation) confirmed that, in every case, the items correlated most highly with the orientation with which they were conceptually associated. Cronbach's alpha was then calculated for each orientation and was, for the most part, found to be satisfactory - ranging from 0.41 to 0.75 for the psychology students and from 0.55 to 0.71 for the engineering students, with an overall median of 0.59. For the engineering sample, it had also been possible to collect performance data in the form of marks awarded in end-of-term examinations. (The first year results for psychology were difficult to obtain in any useful form due to the extensive use of exemptions). It was therefore possible, for the engineering sample only, to correlate the four study orientations and academic self-confidence scale with the performance indicator. It was found that the meaning orientation and academic self-confidence scale correlated significantly with performance at the 0.05 level and that the reproducing and non-academic orientations correlated negatively. However, in contrast to the previous study, the achieving orientation did not correlate significantly with performance at all.

Factor analysis and intercorrelations of the twenty preference items on their own confirmed that it was meaningful to consider them in terms of a deep and surface pair within each of the four main components of teaching, and that the extra item in each section did not seem to 'fit in'. It was therefore decided that the fifth item in each case should be discarded, and that subsequent analyses should incorporate the preference items as eight pairs representing preferences for deep and surface types of lecturer, examination, tutor and course. In the analyses to be presented, the following 'shorthand' will be used :

Deep lecturers -	preferences for lecturers who showed how what was being learned related to the outside world and showed students what they thought about a subject
Deep exams -	preferences for exams which gave students an opportunity to show they had thought about a course for themselves and had general questions which allowed a number of different lines to be followed
Deep tutors -	preferences for tutors who encouraged discussion among the tutorial group and who showed students what was thought of their ideas
Deep courses -	preferences for courses where students were able to follow their own interests and were encouraged to read around the subject
Surface lecturers -	preferences for lecturers who told students exactly what to put in their notes and entertained them even if the content was not so good
Surface exams -	preferences for exams which could be answered directly from lecture notes and where it was made clear how much effort was expected for each part
Surface tutors -	preferences for tutors who went over the lecture and were friendly even if not so good at explaining things
Surface courses -	preferences for courses where it was made clear which books had to be read and how important the various topics were for the exams

By examining the intercorrelation matrix of the ten course perceptions items, it was again confirmed that they could be meaningfully paired-up as anticipated to represent course perceptions of level and structure of the course, pace of presentation and workload, lecturer's enthusiasm and ability to provide good explanations, openness to students, and availability and worth of recommended books.

Table 6.2 presents the means and standard deviations for the four study orientations, the academic self-confidence scale, the five course perceptions pairs, seven study activities items and eight preference pairs. Columns one to four give the means and standard deviations for the psychology and engineering students respectively, while columns five to eight give the means and standard deviations for the passing and failing engineering students respectively, along with an indication of where differences between the two subgroups are significant, based on Student's T-test. As in the previous study, the standard deviations tended to suggest that the study activities items were encouraging greater response variability than were the course perceptions items, and that the new preference pairs were also encouraging greater response variability, so it appeared that they might have satisfied at least the first criterion which they were designed to satisfy. However, evidence for this was, once again, weak, as it was difficult to compare and contrast means and standard deviations of items and scales containing differing numbers of items. Due to the fact that the total engineering sample numbered only 123, it was not considered appropriate to select only the highest and lowest achieving students for comparison purposes. Instead, the sample was divided into those students who passed all examinations (n=80) and those who failed one or more (n=43). As would have been predicted from the correlations between the study orientations and

Table 6.2

Means and standard deviations of the study orientations, course perceptions, study activities items and preferences, for the engineering and psychology students, and for the passing and failing engineering students separately.

Scale/item	Psychology (n=148)		Engineering (n=123)		Eng. pass (n=80)		Eng. fail (n=43)		
	Mean	S.D.	Mean	S.D.	Mean	S.D.	Mean	S.D.	
Academic self-confidence(2)	5.5	1.7	6.5	2.0	4.1	2.0	2.3	1.6	**
Study orientations•									
Meaning orientation(7)	22.8	4.9	21.0	5.0	21.6	4.6	20.0	5.5	*
Achieving orientation(7)	21.8	4.0	21.5	4.3	21.7	4.1	21.2	4.7	
Reproducing orientation(5)	15.4	3.3	16.6	3.8	15.7	3.8	18.3	3.4	**
Non-academic orientation(5)	13.6	3.1	14.8	3.7	14.2	3.9	15.8	3.1	*
Course perceptions••									
Heavy & difficult workload	6.3	1.6	7.3	1.9	7.0	1.9	7.9	1.6	*
Good course level	6.2	1.7	6.7	1.7	6.9	1.8	6.5	1.6	
Good explanations given	6.5	1.5	6.7	1.6	6.9	1.5	6.3	1.6	*
Openness to students shown	5.5	1.7	6.2	1.5	6.4	1.4	6.0	1.6	*
Books available & helpful	7.2	1.4	7.3	1.8	7.2	1.8	7.4	1.8	
Study activities•••									
Time spent on:-									
Total study outwith class	22.3	9.2	16.7	7.6	16.7	6.7	16.6	8.9	
Rewriting lecture notes	2.4	1.2	2.3	1.1	2.2	1.1	2.6	1.2	
Understanding lecture notes	2.7	0.9	3.3	0.9	3.3	0.8	3.2	1.0	
Using textbooks/journals	3.6	1.0	2.5	0.9	2.5	0.9	2.6	0.9	
Past exam questions	1.2	0.5	2.3	1.1	2.4	1.0	2.2	1.2	
Writing essays/assignments	4.0	0.9	3.9	0.9	3.9	0.9	3.8	0.9	
Being stuck	2.0	1.0	3.3	1.2	3.0	1.1	4.0	1.1	**
Preferences••••									
Deep lecturers	8.0	1.4	7.7	1.4	7.6	1.4	8.0	1.4	
Surface lecturers	7.1	1.7	7.8	1.6	7.6	1.6	8.0	1.6	
Deep exams	7.1	1.7	6.6	1.7	6.6	1.7	6.7	1.8	
Surface exams	8.4	1.3	8.6	1.4	8.5	1.3	8.7	1.5	
Deep tutors	7.8	1.6	7.3	1.6	7.3	1.5	7.4	1.7	
Surface tutors	7.3	1.6	7.1	1.7	6.9	1.6	7.4	1.8	
Deep courses	7.3	1.5	7.0	1.6	6.9	1.4	7.3	1.9	
Surface courses	8.8	1.1	8.5	1.4	8.3	1.3	9.0	1.5	**

• Study orientations contain differing numbers of items, which are shown in brackets.
•• Course perceptions each contain 2 items, potential range 2-10.
••• Study activities are single items, potential range 1-5, except total study, scored in hours.
•••• Preferences each contain 2 items, potential range 2-10.

* Differences in means of the high and low achieving engineering groups significant at .05.
** Differences in means of the high and low achieving engineering groups significant at .01.

performance, the meaning, reproducing, and non-academic orientations and the academic self-confidence scale, all showed significant differences between the two subgroups. As in the previous study, spending time being stuck was again significantly different for the two groups and, in addition, three of the course perceptions, heavy and difficult workload, good explanations given, and openness to students, also showed significant differences in the expected directions (with the high achievers reporting spending less time being stuck, rating the workload as being less heavy and difficult, and rating the explanations given and openness shown more highly).

Having examined the three new or partially new sections of the questionnaire in isolation from each other, and having found each to be satisfactory, in terms of being meaningful to the students, the next stage in the analyses was to see how the various sections would interrelate, and in particular how the preference items would 'work'. It was decided that it would be best to start with the most established sets of items, and gradually introduce the newer ones, so that the point at which any new empirical relationships between students' perceptions of teaching and their approaches to learning could be seen would be easy to establish. To this end, the first factor analysis contained only the four study orientations, the academic self-confidence scale and the five course perceptions pairs. For both the psychology and engineering samples, only two significant factors were produced - one representing a positive evaluation of teaching, coupled with the achieving orientation (psychology) and meaning and achieving orientations (engineering), and the other representing a negative evaluation of teaching, coupled with the reproducing and non-academic orientations. This two factor result was very similar to one previously produced at school level (Entwistle, Kozeki & Tait, 1989).

The next factor analysis to be carried out contained the four study orientations, and academic self-confidence scale and five course perceptions pairs as above, and also included the study activities items. For the psychology sample, four significant factors explaining 48% variance were extracted, while for the engineering sample, only the three factor solution, explaining 45% variance, was interpretable. These factor patterns are reproduced side by side in Table 6.3. The factor patterns for the two groups are remarkably similar, considering their differing course content and structure, and the differences in pattern where they exist are generally interpretable in terms of the nature of the subject. However, in contrast to the equivalent analysis reported in Table 5.5 of the preceding chapter, much greater overlap was

Table 6.3

Factor analysis of the study orientations, course perceptions and 'time spent on' study activities. Oblique rotation, Kaiser normalisation

	Factor 1		Factor 2		Factor 3		Factor 4
	Psy	Eng	Psy	Eng	Psy	Eng	Psy
Academic self-confidence			-.63	-.72			
Study orientations							
Meaning orientation		.37					
Achieving orientation	.30	.70					
Reproducing orientation			.56	.74			
Non-academic orientation			.39	.61			
Course perceptions							
Heavy & difficult workload			.43	.38			.45
Good course level					.80	.57	
Good explanations given					.72	.97	
Openness to students shown							
Books available & helpful					.35		
Study activities							
Time spent on:-							
Total study outwith class	.40	.50					
Rewriting lecture notes	-.30			.30			.89
Understanding lecture notes		.49					.57
Using textbooks/journals	.62	.39					
Past exam questions	.33	.58					
Writing essays/assignments	.53	.37					
Being stuck			.59	.77			

Four factors explain 48% of total variance for psychology and three factors 45% for engineering.

Loadings less than .3 have generally been omitted.

found between the study orientations, course perceptions and study activities.

Factor 1 combined the achieving orientation with spending considerable time on various study activities in particular, and a lot of time on private study in general. For the engineering sample, the meaning orientation was also associated with this factor, as had been seen in the previous study. However, for the psychology sample, the meaning orientation not only failed to load on this factor, but in fact did not load significantly on any factor which is an unusual result and probably just an artefact of the particular sample. Factor 2 combined the reproducing and non-academic orientations with low self-esteem and an evaluation of the course as being difficult and presented too quickly, as well as spending a significant part of private study time being stuck and unable to continue. The engineering students also reported spending time rewriting their lecture notes, further suggesting that much of the private study time was spent unproductively. Factor 3 for both groups reflected a positive evaluation of the course which was not linked empirically either to study orientations or specific study activities. Finally, Factor 4, which was present for the psychology students only, reflected again an evaluation of the course as being difficult and presented too quickly but was in this case coupled with reports of spending time on understanding and rewriting notes.

It was somewhat surprising to find that perceiving the lecturers as showing openness towards students did not load significantly on any factor for either of the two groups of students. Despite this, though, it was decided to retain this course perception for future analysis, partly because of its conceptual appeal and also because it had proved to be prominent in the positive course perceptions factor in the previous study. The analysis reported here had once again shown the value of including items which required students to reflect closely on their own personal experiences of their course by asking them about the particular study activities that they engaged in to cope with their chosen course.

The next stage in the analysis was to carry out factor analysis again, this time including the new preference pairs along with the variables and scales as before. Five significant factors were extracted for the psychology sample and four for the engineering sample, accounting for 45% and 44% variance respectively. The factor patterns are reproduced side by side in Table 6.4.

Table 6.4
Factor analysis the study orientations, course perceptions, preferences and "time spent on" study activities items.
Oblique rotation, Kaiser normalisation.

	Factor 1		Factor 2		Factor 3		Factor 4		Factor 5
	Psy	Eng	Psy	Eng	Psy	Eng	Psy	Eng	Psy
Academic self-confidence			.32		-.65	-.69			
Study orientations									
Meaning orientation	.44	.30		.32					
Achieving orientation			.49	.78					
Reproducing orientation					.50	.73			
Non-academic orientation			-.43		.30	.56			
Course perceptions									
Heavy & difficult workload					.53	.38			
Good course level							.80	.52	
Good explanations given							.69	.99	
Openness to students shown									
Books available & helpful							.36	.35	
Study activities									
Time spent on:-									
Total study outwith class			.40	.45					
Rewriting lecture notes			.43						
Understanding lecture notes			.58	.52					
Using textbooks/journals			.30	.36					
Past exam questions				.56					
Writing essays/assignments				.32					
Being stuck					.58	.82			
Preferences for									
Deep lecturers	.48	.67							
Surface lecturers		.31							.62
Deep exams	.53	.44							
Surface exams									.66
Deep tutors	.52	.58							
Surface tutors						.46			.30
Deep courses	.67	.36							
Surface courses						.42			.58

Five factors explain 45% of total variance for psychology and four factors 44% for engineering.
Loadings less than 0.3 have generally been omitted.

For both the psychology and engineering samples, Factor 1 combined the meaning orientation with preferences for deep lecturers, examinations, tutors, and courses. Factor 2 for both groups combined the achieving orientation with various productive study activities including spending long hours engaged in private study. For the psychology students, the non-academic orientation also loaded negatively on this factor, while for the engineering students it was again the meaning orientation which was associated with the achieving factor. Factor 3 for both groups combined the reproducing and non-academic orientations with low self-confidence, spending time being stuck and finding the workload heavy and difficult. For the engineers, the reproducing/non-academic orientation was also associated with preferences for surface tutors and courses. For the psychologystudents, however, preferences for surface lecturers, exams, and courses came in a separate factor, reported in Table 6.4 as Factor 5. Factor 4 for both groups reflected a positive evaluation of the course, having loadings on good course level and structure, good explanations given and (for the psychologists only) course books being available and helpful.

It was felt that this analysis had revealed many interesting features. First of all, that despite the differences between psychology and engineering in course content and structure, very similar factor patterns were produced. In both cases, there were clearly identifiable meaning, achieving, reproducing/non-academic, and positive course evaluation factors. Secondly, the study activities items consistently combined with the achieving orientation, perhaps suggesting that students who were striving to be high achievers knew how to use various study activities to their best advantage, or were at least able to discriminate between productive and unproductive study activities.

These aside, the most interesting feature of the above analysis was seeing how the new preference pairs fitted in with the now more established scales and items and what, if anything, they contributed to the overall profile of the students being surveyed. The analysis had quite clearly shown that the preference items were meaningful to the students, and that they seemed to have little difficulty in reflecting on which types of lecturing, exams, tutors, and courses they preferred. More important than this, however, was the way in which these fitted in with the orientations to studying in particular. The meaning orientation was clearly associated with preferences for types of teaching likely to foster deep approaches, while there was a reasonably strong suggestion that the reproducing/ non-academic

orientation was associated with those likely to encourage surface approaches. Although the latter association was shown empirically for the engineering sample, it was not present for the psychologists, and when the (non-significant) five factor solution was examined for the engineers, it was found that the same pattern of the surface preferences forming a factor distinct from the reproducing/non-academic orientations could be seen.

SUMMARY AND CONCLUSIONS

The study reported in this chapter was intended to serve three main purposes. Firstly, it was intended to examine the possibility of reducing the inventory to four study orientations, rather than fourteen scales. Secondly, it was intended to confirm the relationships which had been found between the study orientations, course perceptions and study activities items for students from both engineering and another discipline. Thirdly, it was intended to try out new teaching preference items, which asked students to consider which types of lecturing, exams, tutors and courses they would like to see and to investigate how these fitted in with the other more established types of items. These will be discussed below.

Statistics such as Cronbach's alpha and item-scale correlations suggested that it was possible, without distorting the definition of the orientations, to reduce the fourteen scales of the *Experiences of Studying and Higher Education Inventory*. This resulted in a 28-item inventory being produced, defined in terms of the four main study orientations (meaning, achieving, reproducing and non-academic) with the academic self-confidence scale kept separately as before. The items were chosen to be suitable for a more general student sample. The considerable reduction in length was regarded as being valuable, as questionnaires designed for use with student samples need to be completed within 15 to 20 minutes, for feedback purposes at any rate. Analyses carried out during this phase of the programme of research produced patterns of results which compared favourably with the main findings reported in the previous chapter using the much longer inventory. It was thus concluded that the shortening of the inventory had been successful for the purposes of the present study.

The second intention had been to try to confirm the pattens of relationships which had emerged in the previous study between the study orientations, course

perceptions items and the study activities items. In general, it was concluded that the main factor structure had stood up to the test of being able to be reproduced sufficiently satisfactorily to suggest that the patterns being produced represented fundamental differences in the ways students perceived particular study activities (or at least fundamental differences in their abilities to discriminate between study activities which would hinder or enhance their general studying) rather than being a factor pattern obtained for just one idiosyncratic group of students.

The third purpose of the study was to explore the possibility of introducing a new type of item, phrased in terms of preferences for certain types of lecturer, exam, tutor and course, to see in the first instance if they would be meaningful to students, and secondly, if they would contribute anything to an investigation of the learning environment. It was concluded that they did appear to be meaningful to students completing the questionnaire, and that they did make a valuable contribution to an understanding of the learning environment generally. It was particularly interesting to find that there was a marked tendency for certain aspects of lecturing, exams, tutors and courses to combine with a particular study orientation, while other aspects would combine with another orientation. This suggested that students who endorsed different approaches to studying had contrasting views of what constituted good teaching (in its wider sense). The implications of this finding may be quite considerable. If different students have different perceptions of the same learning environment, then it would seem that if students are asked to rate their lecturers and courses, their responses would need to be interpreted with some caution (particularly where this information is subsequently used to guide major decisions about promotion or tenure of staff), as there is clearly no class consensus as to which types of lecturer, examination, course and tutor are preferable. The findings of this study suggest that preferences are inextricably bound up with orientations to studying.

The analyses had also been reasonably successful in identifying relationships between students' perceptions of teaching and their approaches to studying, by establishing a clear, and as far as could be determined, consistent link between the meaning and achieving orientations and preferences for deep lecturers, exams, tutors and courses and an equally clear, though less consistent link between the reproducing or non-academic orientations and preferences for surface types.

The main contribution of this study to the overall investigation of the relationships between students' perceptions of teaching and their approaches to studying, had been to suggest that an alternative type of course perceptions items might be more appropriate than the conventional broad-based general statements that are traditionally used in order to get students to rate their lecturers and courses, and that students who choose to study in different ways have contrasting preferences for different types of lecturer, exam, tutor and course. It was decided that the natural progression from this study was to try to reproduce the pattern of results from this study with a larger group of students, and with students from different disciplines, and to explore further the general learning environment of these students by incorporating another dimension - their reasons for choosing to study a higher education course.

Chapter 7
The Transition from School to Higher Education Study

Confirming earlier relationships between students' perceptions of teaching and their approaches to studying and exploring further the learning environment of students.

Introduction

During the analysis phase of the psychology and engineering study reported in Chapter 6, a questionnaire was being developed as part of another SOED-funded project, set up to investigate the transition from school to higher education. It was decided that one section of the questionnaire would address students' orientations to studying and to higher education more generally, and with their preferences for, and perceptions of, teaching and courses. As the analyses which are reported in the preceding three chapters of this thesis had been carried out so recently with university students at the same stage of their university course, it proved useful to use the analyses in part to guide the selection of items and scales which should be included in the relevant sections of the new questionnaire. This also gave the author an opportunity to use this new set of data to explore further the preference items with a different and larger group of students and to see how the orientations to higher education would fit in.

Orientations to Higher Education were identified by Taylor (see Gibbs et al, 1984) through interviews with students at Surrey University and the Open University. Four main orientations were identified - *vocational*, *academic*, *personal* and *social* - the first three of which could each be subdivided into extrinsic or intrinsic interest. The vocational orientation was primarily concerned with following a course with a view to getting a job afterwards. The vocational extrinsic subdivision regarded the qualification at the end of the course as being the key element for the purposes of enhancing job prospects either by promotion or by creating new opportunities, and students sometimes went to great lengths to investigate the minimum marks or level of pass which would be necessary to allow them to achieve their goal. The vocational intrinsic subdivision, on the other hand, saw training as being the most important aspect of the course, and students tended to work hard and perceived the course as being highly relevant. The academic orientation involved studying *per se*, with the academic extrinsic subdivision addressing itself to educational progression

(gaining a further qualification in the subject than had been gained previously), and the academic intrinsic subdivision involving intellectual interest, with students typically reading widely round the subject of particular interest, sometimes to the neglect of other parts of the course. The personal orientation was chiefly concerned with personal development or compensation for lost opportunities earlier in life. The personal extrinsic subdivision involved proving capabilities, and students tended to focus more on the grades and feedback they would receive than on the course content itself. The personal intrinsic subdivision was directed almost solely to self-improvement, virtually to the extent of the choice of course being immaterial. Students typically viewed the courses as being challenging and stimulating. The social orientation focussed on the social aspects that a higher education course or institution would offer, rather than on the course itself. By definition, interest was extrinsic. The social orientation could be identified even in the Open University students, for whom there was considerably less opportunity for social interaction. These students placed great emphasis on the importance of tutorials and summer school for meeting people and socialising, and were more interested with this aspect of the course than with the course content itself.

It was felt that it would be both important and interesting to include these four orientations to higher education (vocational, academic, personal and social) in the questionnaire which was to investigate the transition from school to higher education and it was also regarded as interesting for the more specific study of students' perceptions of teaching in relation to their approaches to studying which could now be extended by adding another aspect of motives.

METHOD

Instruments

A lengthy questionnaire was developed for the purposes of investigating the transition from school to higher education. However, only a minority addressed students' learning and studying directly, and it is only this which will be described here (the full questionnaire may be found in Appendix D and is described in the final report to the SOED [Wall et al, 1991]). The portion concerning students' learning experiences comprised four sections which dealt with the student's decision to go into higher education, approaches to studying, experiences of the subject, and teaching preferences. In the interests of brevity, it had been decided to

exclude the 'time spent on' study activities items used previously. This was because it was perhaps less relevant to an investigation of the transition from school to higher education, and it was necessary to exclude one section in order to be able to include the new section which would explore students' motives for going into higher education. The four sections which were relevant to the research questions addressed in this thesis will be discussed below.

Reasons for going into higher education

This section contained eight items which operationalised the main orientations to higher education described above. The items were written directly from the descriptions of the categories provided by Taylor. The eight items comprised one item each for intrinsic and extrinsic interests of the vocational, academic, and personal orientations together with the social orientation, and an additional item which indicated a lack of goal-directedness or any particular reason for going into higher education, and was intended to be characteristic of students who just drifted into higher education. A full list of these eight items may be found in Table 7.1, along with the educational orientation and interest with which they are associated.

Approaches to studying

Approaches to studying were again to be investigated by means of an inventory. The inventory was a slightly modified version of the abridged inventory described in the preceding chapter. It contained just 25 items and was again defined in terms of the four orientations to studying (meaning, achieving, reproducing, and non-academic) with the academic self-confidence scale again retained as an individual dimension. However, on this occasion, the grid which had been used previously to assist students in estimating how many hours of private study they did in a week, was replaced by a 5-item 'time' scale which asked students to agree or disagree (in the usual way) to statements designed to assess how much time was spent on private study during evenings, weekends, holidays and between classes. It was intended that when these five items were summed to form a scale, they would reflect the total time that students spent in private study. The remaining orientations were again shortened, so that the meaning, achieving and reproducing orientations each contained five items, the non-academic orientation three items, and the academic self-confidence scale, two items. This was achieved by removing the poorest items (as indicated by Cronbach's alpha from the previous study), and, where several items from the same orientation were equally poor, replacing them with items used in either the engineering study or in the original Lancaster study if

Table 7.1

Orientation to higher education items

1. The qualification at the end of the course should enable me to get a good job when I finish. (vocational extrinsic)

2. I was looking for a course which would help me develop knowledge and skills which would be useful to me later on. (vocational intrinsic)

3. Having done reasonably well at school, it seemed to be the natural progression to go into higher education. (academic extrinsic)

4. It will give me the opportunity to study the subject in depth and should provide interesting and stimulating courses. (academic intrinsic)

5. I wanted to prove to my own satisfaction that I could cope with a degree level course. (personal extrinsic)

6. I wanted to broaden my horizons, develop new insights, and face intellectual and personal challenges. (personal intrinsic)

7. The facilities for sport or social activities looked particularly attractive. (social)

8. I'm not sure why I decided to continue my education: it was perhaps a mixture of other people's expectations and no obvious alternative. (lack of goal-directedness, 'the drifter')

necessary. The balance of items within each orientation was maintained to ensure that the conceptual meaning of each orientation was being preserved as far as possible. The two vocational motivation items which had been intended to be part of the reproducing orientation in the abridged inventory were removed. This was because they had finally not been used in the composition of the reproducing orientation or in any subsequent analysis as it had become increasingly apparent that they did not necessarily form part of the reproducing orientation for all groups of students. It was therefore distorting the internal reliability of the reproducing orientation to force them to be part of that orientation for all samples. The scoring key for the inventory is shown in Appendix D1.

A summary of the composition of the resulting 25-item inventory is given below with the number of items from each original scale shown in brackets :-

Meaning orientation=deep approach(3)+holist style(1)+intrinsic motivation(1)=5 items
Achieving orientation=time management(2)+strategic approach(1)+need for achievement(2)=5 items
Reproducing orientation=surface approach(2)+fear of failure(2)+syllabus boundness(1)=5 items
Non-academic orientation=negative attitudes to studying(2)+distractability(1)=3 items
Academic self-confidence scale (2 items)
Time scale (5 items)

Experiences of the subject

The ten perceptions of teaching and courses items which had been used in the previous study were extended to 25 items. This was largely due to the nature of the project for which the questionnaire was designed. However, it was decided that to enhance comparability with the preceding study, only the ten items which had been used previously (as five pairs) would be used in the subsequent analyses.

Teaching preferences

Due to the apparent success of the preference items in the previous study in eliciting responses which highlighted individual differences between students, and in establishing relationships with the study orientations, it was decided to retain the items reflecting preferences for 'deep' and 'surface' types of lecturer, examination, tutor and course. These 16 preference items would again be analysed in terms of eight pairs.

Sample

117 chemistry students and 254 business studies students from two universities completed and returned the questionnaire during a normal 50-minute lecture slot during the second term of their first year at university. Due to the poor attendance at the lectures, students who had been absent were given a further opportunity to complete the questionnaire and return it to their tutors in sealed envelopes. This, however, did not attract many more completed questionnaires and the resulting overall completion rate was disappointing at 60% for chemistry and 46% for business studies.

RESULTS AND DISCUSSION

Analyses were carried out separately for the chemistry and business studies students throughout. This enabled similarities and differences between the subjects to emerge, and also provided an instant test for the ability of main findings to be reproduced, based on the premise that, if the two subjects are sufficiently different yet similar main findings are produced, it would seem likely that the findings are 'real', rather than being spuriously produced as an artefact of the students comprising the sample.

Initial analyses were carried out to investigate if the internal consistencies of the inventory orientations had been preserved following their modifications, and to confirm that the internal consistency of the new 'time' scale was satisfactory. Item analysis confirmed that, on every occasion, items correlated most highly with the orientation of which they were intended to be part. Cronbach's alpha was then calculated for each of the four orientations and the 'time' scale and was found to be satisfactory for scales of this length and type ranging from 0.50 to 0.66 for the study orientations for the chemistry students and from 0.52 to 0.63 for business studies, with an overall median of 0.55. The 'time' scale had fairly high alpha values of 0.65 and 0.66 for chemistry and business studies respectively.

Item analysis was also carried out for the orientations to higher education items by investigating the frequency distributions, means and standard deviations of responses. It was found that each response category had been used for every item. This suggested that the items were eliciting responses highlighting individual

differences, which in turn suggested that they would be suitable for the types of analysis for which they had been intended in this study. No item was identified by the students as being irrelevant or not meaningful.

It had again been possible to obtain performance data in this study, although again for only one of the two participating groups of students (chemistry). Although 114 chemistry students had completed the questionnaire, performance data was only available for 96 students (69 of whom passed the course and 27 of whom had one or more resits), as some students had already left the course, or had not sat the degree examinations. In Table 7.2, columns one to four show the means and standard deviations for all scales and items used in this study for business studies and chemistry respectively, while columns five to eight give the means and standard deviations for the high and low achieving chemistry students respectively, along with an indication of where differences in means between the two groups were significant. One of the most striking features of this table was the lack of significant differences between the high and low achieving chemistry students - only the achieving orientation and academic self-confidence scale showed significant differences. As anomalies often appear when sample sizes are small, these scales and items were also correlated with the performance indicator which confirmed that very few significant differences could be expected, but showed that in addition to the two already revealed, the reproducing orientation and perception of the workload as being heavy and difficult were also significant at 0.05 level.

After these initial analyses had been carried out and had been found to be satisfactory, the second phase of analysis was planned. It was considered to be important to try to reproduce the main pattern of findings from the psychology and engineering study, using the four study orientations, the academic self-confidence scale, course perceptions pairs, preference pairs and 'time' scale. Factor analysis of these variables was carried out and four factors were extracted for both chemistry and business studies explaining 49% and 47% of total variance respectively. The factor pattern is presented in Table 7.3.

Table 7.2

Means and standard deviations of the study orientations, course perceptions, study activities items, preferences and orientations to higher education for the business studies and chemistry students, and for the passing and failing chemistry students separately.

Scale/item	Business st (n=219)		Chemistry (n=114)		Chem pass (n=69)		Chem fail (n=27)		
	Mean	S.D.	Mean	S.D.	Mean	S.D.	Mean	S.D.	
Academic self-confidence(2)	5.3	1.7	5.1	1.8	5.1	1.9	4.1	1.7	*
Study orientations•									
Meaning orientation(5)	14.2	3.3	14.5	3.2	14.7	3.2	13.9	3.3	
Achieving orientation(5)	16.8	3.5	16.6	3.7	17.1	3.9	14.9	3.0	**
Reproducing orientation(5)	16.6	3.6	16.9	3.8	16.7	4.1	16.8	3.2	
Non-academic orientation(3)	8.0	2.6	7.6	2.5	7.4	2.3	8.4	2.7	
Course perceptions••									
Heavy & difficult workload	6.2	1.8	6.2	1.7	6.0	1.7	6.7	1.6	
Good course level	5.9	1.8	6.4	1.7	6.3	1.9	6.2	1.5	
Good explanations given	6.1	1.8	6.5	1.8	6.5	2.0	6.2	1.7	
Openness to students shown	5.0	1.7	6.7	1.6	6.6	1.5	6.7	1.8	
Books available & helpful	3.3	1.2	4.1	0.9	4.0	0.9	6.7	1.8	
Study activities									
Time spent on:-									
Private study outwith class(5)	15.0	4.3	14.8	4.3	14.7	4.4	15.3	3.9	
Preferences••									
Deep lecturers	7.6	1.4	7.5	1.6	7.7	1.6	7.4	1.7	
Surface lecturers	6.6	1.6	6.7	1.6	6.8	1.6	6.5	1.9	
Deep exams	7.0	1.7	6.8	1.7	6.8	1.5	6.7	1.8	
Surface exams	8.4	1.2	8.6	1.3	8.5	1.4	8.7	1.3	
Deep tutors	7.8	1.5	7.0	1.6	7.3	1.7	6.7	1.4	
Surface tutors	6.3	1.6	6.3	1.6	6.4	1.7	6.3	1.5	
Deep courses	6.6	1.5	6.6	1.6	6.7	1.7	6.5	1.4	
Surface courses	8.6	1.3	8.3	1.3	8.2	1.4	8.4	1.0	
Orientations to higher ed •••									
Vocational - extrinsic	4.5	0.7	4.2	1.0	4.2	1.1	4.2	0.9	
Vocational - intrinsic	3.8	1.0	3.3	1.1	3.2	1.1	3.0	1.1	
Academic - extrinsic	3.7	1.1	3.7	1.1	3.8	1.2	3.6	0.9	
Academic - intrinsic	2.9	1.0	3.0	1.2	3.0	1.3	2.9	1.0	
Personal - extrinsic	2.6	1.2	2.5	1.3	2.3	1.3	2.6	1.4	
Personal - intrinsic	2.9	1.2	2.7	1.2	2.7	1.3	2.5	1.1	
Social	2.7	1.3	2.2	1.2	2.3	1.3	2.0	1.1	
Lack of goal-directedness	2.1	1.2	2.3	1.4	2.3	1.5	2.3	1.3	

• Study orientations contain differing numbers of items, which are shown in brackets.
•• Course perceptions and preferences each contain 2 items, potential range 2-10.
••• Orientations to higher education are single items, potential range 1-5.

* Differences in means of the high and low achieving chemistry groups significant at .05.
** Differences in means of the high and low achieving chemistry groups significant at .01.

Table 7.3

Factor analysis of the study orientations, course perceptions and preferences
Oblique rotation, Kaiser normalisation

	Factor 1		Factor 2		Factor 3		Factor 4	
	Chem	BusSt	Chem	BusSt	Chem	BusSt	Chem	BusSt
Academic self-confidence			.38		-.40	-.65		
Study orientations								
Meaning orientation	.55	.52						
Achieving orientation			.70	.89				
Reproducing orientation					.67	.64		
Non-academic orientation			-.74	-.40		.30		
Course perceptions								
Heavy & difficult workload					.41	.42		-.43
Good course level							.99	.81
Good explanations given							.63	.78
Openness to students								.31
Books available & helpful								
Study activities								
Total time spent studying			.34	.55				
Preferences for								
Deep lecturers	.41							
Surface lecturers					.43	.48		
Deep exams	.48	.42						
Surface exams		-.36			.66	.48		
Deep tutors	.53	.37						
Surface tutors					.35			
Deep courses	.49	.60						
Surface courses					.67	.46		

Four factors explained 49% and 47% of total variance for chemistry and business studies respectively.
Loadings less than 0.3 have generally been omitted.

Factor 1 for both groups combined the meaning orientation with preferences for deep aspects of teaching, as had been found for both the psychology and engineering students in the previous study (reported in Factor 1 of Table 6.4). Factor 2 for both groups combined the achieving orientation with spending a good deal of time in private study and a negative loading on the non-academic orientation. This again showed the same general pattern that had been seen in Factor 2 of the equivalent analysis previously which had been supplemented with the other productive study activities items, phrased in terms of 'time spent on' various study activities. Factor 3 for both groups combined the reproducing orientation with low self-confidence, the perception of the workload as being heavy and difficult, and preferences for surface types of lecturing, examinations and courses (and tutors for chemistry only). This again reflected the general pattern found in Factor 3 of Table 6.4, except on this occasion the relationship between the reproducing orientation and preferences for surface aspects of teaching was very much stronger than it had been previously. Factor 4 for both groups reflected a positive evaluation of the course, again very similar to that seen in Factor 4 of Table 6.4.

From this factor analysis it could be deduced that the pattern of results obtained for the equivalent analysis using psychology and engineering students had stood up to the test of replicability reassuringly well which added weight to the findings. This was considered to be particularly important on this occasion, since the preference items had been developed conceptually, unlike the inventory items and course perceptions items which were originally derived from comments that students made in interviews when talking about their study methods, activities and attitudes and their perceptions of teaching and courses.

Having established that the study orientations, course perceptions and preferences had behaved as they had done previously despite their modifications and the different academic disciplines from which the sample was drawn, it was felt that the preference items could now be used with much the same confidence as the more established items and scales and that it would be appropriate to introduce the orientations to higher education items. Factor analysis was therefore carried out again, this time including the orientation to higher education items which were intended to examine the students' motives for going into higher education. Four factors were extracted for both chemistry and business studies accounting for 41% and 38% of variance respectively. The factor pattern is reproduced in Table 7.4.

Table 7.4

Factor analysis of study orientations, course perceptions, preferences and orientations to higher education
Oblique rotation, Kaiser normalisation

	Factor 1		Factor 2		Factor 3		Factor 4	
	Chem	BusSt	Chem	BusSt	Chem	BusSt	Chem	BusSt
Study orientations								
Meaning orientation	.50	.48						
Achieving orientation			.72	.83				
Reproducing orientation					.68	.61		
Non-academic orientation			-.74	-.40		.32		
Academic self-confidence			.44	.30	-.39	-.64		
Course perceptions								
Heavy & difficult workload					.41	.33	(-.28)	-.47
Good course level							.99	.78
Good explanations given			.34				.59	.78
Openness to students							(.26)	.32
Books available & helpful								
Study activities								
Total time spent studying			.38	.52				
Preferences for								
Deep lecturers	.42							
Surface lecturers					.43	.54		
Deep exams	.45	.48						
Surface exams				.30	.65	.48		
Deep tutors	.50	(.28)						
Surface tutors	.34				.34	.30		
Deep courses	.45	.60						
Surface courses					.65	.47		
Orientations to higher education								
Vocational - extrinsic					.31			
Vocational - intrinsic	.30	.35						
Academic - extrinsic								
Academic - intrinsic	.39	.55	.32					
Personal - extrinsic		.35						
Personal - intrinsic	.60	.48						
Social								
Lack of goal-directedness			-.48					

Four factors explained 41% and 38% of total variance for chemistry and business studies respectively.
Loadings less than 0.3 have generally been omitted.

Each of the four factors was immediately recognisable in terms of the factor pattern produced in Table 7.2. Again the meaning orientation combined with preferences for deep types of teaching; the achieving orientation with spending considerable time in private study and a negative loading on the non-academic orientation (and also here with academic self-confidence); the reproducing orientation with low self-confidence, the perception of the workload as being heavy and difficult and preferences for surface types of teaching; and again the positive course evaluation factor stood on its own. It was also found that the orientations to higher education items had combined with the above four factors in meaningful and interesting ways. The intrinsic interest subdivision of the vocational, academic and personal orientations to higher education all combined with the meaning orientation, reflecting students who chose to enter higher education to enhance their job or promotion prospects, to study further a subject in which they were interested, and to seek to improve themselves.

As these were their motives for deciding to pursue a higher education course, it was immediately understandable to find that they also preferred lecturers who showed them how what they were learning related to the outside world and showed them what they themselves thought about a subject, examinations which provided an opportunity to show that they had thought about a course for themselves and had general questions which provided opportunities to follow a number of different lines, tutors who encouraged discussion among the tutorial group and showed them very clearly what they thought of their ideas, and courses where they were able to follow their own interests quite a lot and where they were encouraged to read around the subject, all of which should encourage interest in the subject and provide a stimulating environment in which to learn. This finding was felt to be particularly important as it is the first time (as far as the author is aware) that an empirical relationship has been demonstrated between the orientations to studying and to higher education with a substantial sample, even though it has been assumed to occur from a conceptual analysis and has been indicated in interview studies.

It was perhaps surprising to find that the extrinsic interest subdivision of the four orientations to higher education had not combined with any of the four factors to any extent. There was a suggestion that they were empirically linked with the reproducing orientation which might have been expected, but empirical evidence for this was weak. When other factor solutions with differing numbers of extracted factors were examined, it was found that the same pattern of finding few, if any,

empirical links between the extrinsic interest component of the orientations and other items and sclaes. An interesting and meaningful finding which appeared in factor two (Table 7.4) for the chemistry students and fairly frequently in other extractions for both groups, was the negative relationship between the achieving orientation and lack of goal-directedness (drifting into higher education). This suggested that students who had high scores on the achieving orientation had made a positive decision to embark on a course in higher education, and had a clear goal in mind. This relationship appeared to make good sense.

To try to investigate further why the extrinsic part of the orientations to higher education did not combine with the anticipated orientation to studying to any significant degree, the extrinsic components of the vocational, academic, personal and social orientations were correlated with each orientation to studying (plus academic self-confidence) and then with each mini 'scale' or single inventory item as applicable. It was found that the academic extrinsic item "Having done reasonably well at school, it seemed to be the natural progression to go into higher education" did not correlate with any of the inventory items, and that the social orientation "The facilities for sport or social activities looked particularly attractive" correlated only with fear of failure (negatively). The other two extrinsic items (relating to the vocational and the personal orientations) correlated both with the achieving orientation (through need for achievement, strategic approach and time management) and the reproducing orientation (through surface approach and fear of failure). As a result of the ways in which the orientations to higher education items had correlated with the inventory items, the lack of strong empirical links between the two were now understandable, as the correlations with the achieving orientation and with the reproducing orientation had presumably led to a cancelling out of any overall effect.

Further careful examination of all the factor analyses obtained not only from the data in this study, but also from the the main engineering study and the engineering and psychology study, revealed what almost seemed like an anomaly. It was noted that the persistence of a positive evaluation of teaching factor was strange, when the other factors were suggesting that students who studied in contrasting ways had preferences for contrasting types of teaching and therefore presumably had differing ideas as to what constituted 'good teaching'. However, further investigation, thought and exploratory analyses suggested that it was the nature of the items that was causing this to happen. Where items elicited individual differences in their

responses, they would form factors with other conceptually related items, but where items required rather general responses, they would tend to hang together as a factor by themselves. This in turn suggested that it would not be particularly fruitful to continue to use conventional course perceptions items in factor analyses along with approaches to studying items.

SUMMARY AND CONCLUSIONS

Initial analyses, including the first factor analysis, confirmed that the modifications made to the inventory had not had any adverse affect, and more importantly, had not altered the conceptual meanings of the orientations. The factor analysis itself served to confirm the pattern of results which had been produced with equivalent items in the previous study with psychology and engineering students. This was considered to be very important for two reasons. Firstly, the ability to reproduce patterns of results with different samples is a crucial test of the reliability of an instrument, particularly where quantitative methodology is being employed due to the nature of statistical tests and their sensitivity to sample size. Secondly, in this particular case, the preference items which had been developed through conceptual means alone were again being used, so it was additionally important to confirm the relationships which had been found between them and the study orientations and experiences of teaching in the previous study.

As this stage of the analysis had been highly satisfactory in terms of confirming earlier findings, it was felt that the analyses could proceed with some confidence and the new orientations to higher education items were then introduced and it was found that they combined with the other orientations, scales and items, in meaningful ways, indicating that students who had high scores on the meaning orientation and had preferences for 'deep' aspects of teaching, also had high scores on the intrinsic interest component of each of the three main orientations to higher education (vocational, academic and personal). There was also some evidence (albeit weak) that the reproducing orientation and preferences for 'surface' aspects of teaching were linked empirically with the extrinsic interest component of the orientations to higher education. Students with high scores on the achieving orientation who reported spending considerable time engaged in private study also tended to have high negative scores on the orientations to higher education misfit item which was intended to reflect a lack of goal-directedness.

An incidental finding from the analyses carried out here was that the decision taken in the psychology and engineering study (reported in Chapter 6) to exclude the vocational motivation scale from the reproducing orientation when it was decided that subsequent analyses would be carried out at orientation level, had been wise, given that there was now evidence from the analyses carried out in this study to suggest that certain aspects of the vocational motivation scale (such as gaining skills and experience which would be useful later on) were more characteristic of intrinsically motivated students, and were related to the meaning orientation rather than the reproducing orientation.

It was felt that the few analyses carried out for this study had achieved the goal of confirming that the preference items could produce consistent, meaningful and interesting patterns of relationships when taken together with the orientations to studying and course perceptions items. Meaning orientation was associated with preferences for types of lecturer, examination, tutor and course likely to encourage deep approaches to studying. Reproducing orientation was associated with corresponding preferences for surface types of teaching, and the perception of the workload as being heavy and difficult. Achieving orientation was associated with spending considerable time engaged in private study. The positive evaluation of the course tended to exist as a factor on its own.

In addition to confirming results obtained previously, this study had gone one step further in mapping out the general learning environment of students by introducing items which investigated the students' motives and decisions for studying a higher education course, and had shown that students who had intrinsic interest in the vocational, academic and personal orientations to higher education also tended to endorse the meaning orientation to studying and preferred types of teaching likely to foster a deep approach.

Chapter 8
Factor structures for failing students

Investigating the factor structures of students from different attainment groups

Introduction

The previous chapters had indicated that students with a reproducing orientation preferred teaching which supported that approach. Their approach and preference were therefore coherent. However, there were suggestions in the literature that among less able students (Biggs, 1985), or students who were doing particularly badly on their courses (Meyer et al, 1990b), these patterns might break down. The importance of this possibility - that failure might not just be a result of ineffective study processes, but also a misinterpretation of teaching purposes - suggested that additional analyses be carried out.

METHOD

As performance data had been collected for some of the student samples that had been used in this programme of research, it was possible to examine the question of the similarity of patterns of results for contrasting attainment groups in this penultimate chapter. The engineering students (n=123) from the Psychology and Engineering Study were selected for participation as there was performance data available for them, and because they had completed a form of the questionnaire containing the new preference items which would be additionally interesting.

RESULTS AND DISCUSSION

The engineering sample was separated into those students who had passed their examinations (over 40%, n=80), and those who had failed (under 40%, n=43). The first factor analysis to be carried out included only the four study orientations, the academic self-confidence scale, the 'time spent on' study activities items and the traditional course perceptions pairs. Factor analysis extracted four factors for both the high and low attainment groups, accounting for 53% and 57% respectively. The factor patterns are reproduced side by side in Table 8.1.

Table 8.1

Factor analysis of study orientations, course perceptions and study activities items for passing and failing engineering students separately.
Oblique rotation, Kaiser normalisation

	Factor 1		Factor 2		Factor 3		Factor 4	
	Pass (n=80)	Fail (n=43)	Pass	Fail	Pass	Fail	Pass	Fail
Study orientations								
Meaning orientation	.36	.53						
Achieving orientation	.51	.67	.58	(.26)				
Reproducing orientation					.73	.84		.39
Non-academic orientation					.62	.53		
Academic self-confidence	.34				-.65	-.53		
Course perceptions								
Heavy & difficult workload				.35	.36		-.32	
Good course level							.99	.61
Good explanations given							.60	.72
Openness to students shown	.64							
Books available & helpful								.58
Study activities								
Time spent on:-								
Total study outwith class			.36	.97				-.30
Rewriting lecture notes		.30			.31			
Understanding lecture notes		.58	.67					
Using textbooks/journals	.59	.53						
Past exam questions		.79	.39					
Writing essays/assignments	.30			.32				
Being stuck					.72	.50		

Four factors explained 53% and 57% of total variance for the passing and failing groups respectively.
Loadings less than 0.3 have generally been omitted.

Factor 1 for both the passing and failing students combined the meaning and achieving orientations with what might be generically described as 'productive study activities'. This factor was very similar to one produced for the overall sample and reported in Chapter 6. The passing group also showed a significant loading on self-confidence and regarded lecturers as showing openness to students. The failing group showed a slightly odd result in the additional loading of 'rewriting lecture notes' on this meaning/achieving factor, as this study activity is more often associated with the reproducing factor. Factor 2 for the passing students was clearly an achieving factor which again included productive study activities and spending a significant amount of time on private study, while for the failing students the factor was much less clearly defined or interpretable in general. The achieving orientation loading was low (at 0.26) and was combined with what appeared to be an arbitrary collection of variables - the perception of the workload as being heavy and difficult, and the report of spending many hours in private study in general, and on writing essays or assignments in particular. Factor 3 for both passing and failing students combined the reproducing and non-academic orientations with lack of self-confidence and spending a lot of private study time being stuck. The passing group also reported finding the workload heavy and difficult and spending time rewriting lecture notes. Factor 4 for both groups was primarily a positive course evaluation factor, but again for the failing group was combined with other constructs (reproducing orientation and not spending much time on private study) which made interpretation difficult.

Due to the fact that the passing and failing subgroups were both small (n=80 and 43 respectively), very little can be said with any conviction from the above results directly. While it would seem that the failing group are unable to distinguish between productive and unproductive study activities, or be influenced in their orientation to studying by their perceptions of the course, it is possible that these results are spurious because of the limited sample size. As the factor patterns of the passing and failing groups were different, it was felt that it would be interesting to continue this study by introducing the preference items into the variable list and carrying out factor analysis again, to see if these preferences were linked in similar ways to the study orientations for the two attainment groups. Factor analysis extracted five factors for the passing group and four for the failing groups, explaining 51% variance on each occasion. The factor patterns are reproduced side by side in Table 8.2.

Table 8.2

Factor analysis of study orientations, course perceptions, study activities items, and preferences for passing and failing engineering students separately.
Oblique rotation, Kaiser normalisation

	Factor 1		Factor 2		Factor 3		Factor 4		Factor 5
	Pass (n=80)	Fail (n=43)	Pass	Fail	Pass	Fail	Pass	Fail	Pass
Study orientations									
Meaning orientation	.37			.63					
Achieving orientation			.78	.77					
Reproducing orientation					.49	.54	.46	.65	
Non-academic orientation			-.37		.32	.66	.37		
Academic self-confidence						-.56	-.62		
Course perceptions									
Heavy & difficult workload					.32				
Good course level				.33		-.50		.37	.63
Good explanations given		-.58		(.29)				.41	.98
Openness to students shown				.30					
Books available & helpful				(.29)		-.40			
Study activities									
Time spent on:-									
Total study outwith class		.63		.31	-.35		.67		
Rewriting lecture notes							.41		
Understanding lecture notes			.33	.59			.43		
Using textbooks/journals			.35	.45					
Past exam questions			.57	.85					
Writing essays/assignments			.47						
Being stuck	-.30				.44	.61	.53		
Preferences for									
Deep lecturers	.63							.61	
Surface lecturers					.45			.45	
Deep exams	.36					.37		.51	
Surface exams		.58			.69			.36	
Deep tutors	.62							.65	
Surface tutors		-.38			.38	.39		.47	
Deep courses				.36		.34		.38	.33
Surface courses					.71			.54	

Five factors explained 51% of total variance for the passing group.
Four factors explained 51% of total variance for the failing group.
Loadings less than 0.3 have generally been omitted.

As had been found previously when the factor patterns of differing attainment groups were compared, quite different patterns of results were produced. The students who passed the course had separate meaning and achieving factors (Factors 1 and 2 respectively), the meaning orientation being associated with preferences for deep lecturers, exams and tutors, and the achieving orientation being associated primarily with productive study activities. For the students who failed, however, the meaning and achieving orientations had merged into one factor (Factor 2) and were combined with productive study activities, a positive evaluation of the course, and a preference for deep courses. Factor 1 for the failing group shared what has become one of the characteristic features of the achieving orientation, namely spending a good deal of time in private study, but also had loadings on a bizarre selection of other items - a negative loading on the course perception of there being good explanations given, a preference for surface exams, and a negative loading on the preference for surface tutors, rendering this factor entirely uninterpretable in conceptual terms. Factors 3 and 4 for both the passing and failing groups were reproducing/non-academic factors. For the passing students, Factor 3 combined the reproducing and non-academic orientations with spending time being stuck, perceiving the workload to be heavy and difficult and having preferences for surface lecturers, exams, tutors and courses, while for Factor 4 they were combined with low self-confidence and spending time rewriting lecture notes and being stuck. Spending time understanding lecture notes also loaded on this factor which is difficult to interpret. Factor 3 for the failing students combined the reproducing and non-academic orientations with low self-confidence, spending time being stuck, negative loadings on perceiving the course level to be appropriate and recommended books to be helpful, and having preferences for deep exams, deep courses and surface tutors. Factor 4 for the failing group combined the reproducing orientation with a bizarre and completely uninterpretable range of constructs - perceiving the course level to be appropriate and explanations to be good, and having preferences for both deep and surface lecturers, exams, tutors and courses. Factor 5, existing for the passing group only, reflected a positive course evaluation.

Before any attempt is made to try to interpret these factor patterns, it must be reiterated that the subsample size in each case was sufficiently small to make firm conclusions impossible, and that all the factor patterns can indicate are possible relationships which might exist and must be confirmed in the light of other evidence and the ability to reproduce them in the future. This aside, however, the most

general observation would seem to be that while the factor pattern produced for the passing students is, for the most part, both interpretable in itself and in the light of other factor extractions reported in previous chapters and elsewhere, the same cannot be said for the failing group, for which two of the four extracted factors (Factors 2 and 4) were completely uninterpretable both conceptually and with respect to any known previous extractions. The first possible explanation was that the students who were doing badly on the course would perhaps regard a questionnaire addressing study activities and methods as threatening, and would not fill it in to reflect their own study habits accurately, or alternatively would be so disillusioned with the course in general that they would not take seriously the task of completing the questionnaire. Although this was somewhat difficult to test rigourously, it was decided that a good guide to how seriously these students had filled in the questionnaire would be to examine the internal reliabilities of the four study orientations for the students of the failing group, and compare them to those of the passing group. In so doing, it was found that Cronbach's alpha compared favourably for each of the four orientations between the two groups. It was therefore concluded that as far as it was possible to prove, the bizarre pattern of results produced by the failing students could not be explained by a carelessness in response to the questionnaire items, which had led to randomness. It then became something of a challenge to try to find a rational explanation for the relationships obtained among the items and scales.

By comparing and contrasting the factor patterns produced in this short study, it began to seem that the explanation might lie in the weaker students' apparent lack of ability to discriminate between those aspects of their learning environment which would aid their progress and those which would be more likely to hinder it. When the preference items were introduced, the factor pattern produced for the failing students seemed to suggest that these students simply had no preferences for particular types of lecturer, exam, tutor or course, perhaps because they were unable to see how the different types would affect their everyday studying and ultimately their performance, or perhaps simply because they were already too detached from the whole teaching and learning process. It began to seem as if the higher ability students could discriminate between those aspects of their learning environment which were more or less outwith their control (the aspects of the course) and those which were well within their control (their own study habits and activities) and make 'sensible' judgements concerning which types of lecturing, exams, tutors and courses would be compatible with their preferred study

orientation while the lower attaining students could not. It was tentatively concluded that while higher attaining students perceived their learning environment in what might be described as an integrated or coherent way, recognising how various study activities and teaching methods could contribute to their performance, the lower attaining students seemed unable to do so, producing an uninterpretable, incoherent and 'unintegrated', pattern of results.

CONCLUSIONS

This study indicated that students from contrasting academic attainment groups produced different factor structures. It suggested that these students perceived their learning environment in different ways, but the reasons for the differences can only be speculative until data from other sources is available to confirm that this is not just an artefact of these particular engineering students. Even conjecture was limited here by the size of the subsamples and the corresponding lack of accuracy of the statistics which were used. However, this finding might also explain in part why other researchers working with the ASI have reported finding different factor structures. The breakdown of the factor structure represents discontinuity between approaches to studying and preferences for particular types of teaching, and although differences were seen here in the factor structure of contrasting attainment groups, it is possible that it is not lack of ability *per se* which causes the breakdown, but rather a lack of awareness of the purposes of teaching (which may in turn also be related to lower attainment). It is hoped that future research might be able to investigate this more thoroughly in a variety of ways with larger samples.

Chapter 9

Conclusions, implications and directions for future research

The research reported in this thesis sets out to bring together two previously separate bodies of research addressing students' approaches to studying on the one hand and students' ratings of teaching and courses on the other - so that the influences of teaching on learning can be examined and the learning environment of students better understood. It was felt that the latter would be beneficial both to departments, (in terms of knowing the effects that certain teaching practices, courses or types of examination might have) and to students, who may in time be able to receive fuller information about the learning environment into which they would be going so that they may be better prepared for what was to come (which should in turn reduce the non-completion rates of courses).

This concluding chapter will be divided into four main sections. The first section provides a summary of the main results, drawing attention to the points at which aspects of the literature review had related most directly to the programme of research reported here. In so doing, this section aims to map out the ways in which the questions addressed in this thesis were investigated and what conclusions were drawn at each stage, and how the next stage evolved in the light of the preceding one. The second section considers the utility of the research instruments, while the third discusses the contribution of the research to understanding student learning. The fourth and final section looks at directions in which future research emanating from the work described in this thesis might go.

1. Summary of the main results

The pilot study reported in Chapter 4 began by examining in some detail how the factor structure of the modified *Approaches to Studying Inventory* compared with factor structures previously obtained for different samples and with different versions of the inventory. The 'Research on Student Learning in Higher Education' section of the literature review had provided the author with a solid theoretical and conceptual background to the early research which had guided the development of the original ASI in the 1970s. As a result, it had been a relatively straightforward task to alter the original inventory to make it more appropriate for

students of electrical and electronic engineering, and to interpret subsequently the factor patterns produced in the light of what would have been expected conceptually. It proved possible to shorten the inventory slightly, and the resulting factor pattern obtained for the pilot study contained three factors representing the meaning orientation, a surface/strategic factor and a surface/disorganised factor which paralleled the factor structures produced by both Watkins (1982;1987) and Harper and Kember (1989). As the factor pattern made good sense conceptually for this particular group of students, and this general factor pattern had been reported by others previously, it was felt that the modified inventory could be used with some confidence in the next stage of the research programme.

The Main Engineering Study, reported in Chapter 5, which grew out of the pilot study, concentrated initially on forming course perceptions scales from the many items drawn from the literature on students' ratings of teaching and courses. The literature review had served to provide not only specific items which had been useful in eliciting student opinion, but also on occasion, information about how these items grouped together in factors and how these factors interrelated. From the review, the author had begun to suspect that different broad types of items may exist - some of which were rather general and tended to produce responses reflecting broad views, while others were much more specific and likely to reflect personal experience.

This element of the literature review proved particularly useful when problems arose in using factor analysis alone to try to combine the course perceptions items in scales, as it was possible to use the literature in conjunction with empirical findings to determine ways forward. It became apparent that it was mainly those items with larger variances (and hence presumably reflecting a relative degree of individual difference) which consistently loaded on factors. The resulting six scales contained just over half of the original items, but when these were factor analysed along with the modified inventory, it was found that very few relationships existed between the two sets of scales which, although disappointing, was similar to what Ramsden and Entwistle (1981) had found and Meyer and Parsons (1989) had subsequently confirmed. It had been hoped that a greater degree of overlap would be found here with the newly selected items chosen to reflect personal experience (although of course the variance may have been reduced overall when the items were grouped into scales, and analysis was carried out at scale level), and because part of the purpose of returning to the original literature on student ratings had been to broaden

the item base. This factor analysis was carried out to try to determine which particular course perceptions were typically associated with students obtaining high scores on each of the main study orientations. As far this was concerned, the study was not regarded as being particularly successful. It had managed to show empirically that the reproducing orientation was associated with perceiving the workload to be heavy and difficult (which had already been shown by Ramsden and others) and had also shown that the meaning orientation was associated with perceiving the course to be relevant.

An additional part of this study had looked at how much time students spent on various study activities during their private study time. There was a suggestion from the factor analysis of these items with the inventory scales and course perceptions scales that students who had high scores on the achieving orientation spent their study time productively, while those with high scores on the reproducing or non-academic orientations spent a significant proportion of their study time unproductively, typically reporting being stuck. This part of the analysis suggested that maybe more could be learned about the relationship between approaches to studying and perceptions of teaching by asking students to reflect on specific aspects of their own studying and on their *preferences* for types of teaching, rather than reflect on broad aspects of the course which may be sufficiently general as to be perceived to be much the same for all students within that particular class. It was concluded that although this study had not gone very far in establishing empirical links between students' perceptions of teaching and their approaches to studying, it had been successful in convincing the author that an alternative means of approaching the investigation should be sought, and that items which were highly descriptive of specific aspects of teaching might prove superior.

Following on from this, Chapter 6 described how new course experience items were developed, phrased in terms of preferences for various types of lecturer, examination, tutor and course. The factor analysis which was then carried out using these items, along with the approaches to studying orientations, study activities and traditional course perceptions items, revealed that students who had high scores on the meaning orientation had preferences for types of teaching which have been identified in the literature as promoting a deep approach to learning, students who had high scores on the reproducing orientation had preferences for corresponding surface types of teaching and perceived the workload as being heavy and difficult, and students who had high scores on the achieving orientation spent

time on productive study activities. The positive course evaluation factor tended to exist on its own. These relationships were immediately interpretable in terms of the heuristic model of the teaching-learning process in higher education proposed by Entwistle (1987).

The implications of this pattern of results may be quite important. First of all, it suggested that the reason that traditional course perceptions scales have failed to establish links with the study orientations may be due to the fact that the former tend to subdivide into two - those which could be attributed to good teaching or courses and those with bad. The 'bad' teaching scale in this case was 'heavy and difficult workload' which consistently loaded on the reproducing factor while the 'good' teaching scales were the remainder which clustered as a discrete factor representing a positive evaluation of teaching. It also became apparent that there were basic differences in the types of items and scales involved in the factor analysis, and that these differences may have been suppressing the multidimensionality of course perceptions. As there appears to be no greater complexity in these scales than a good/bad dichotomy, then it is perhaps not surprising that no more relationships were seen between them and the approaches to studying orientations. This in itself suggested that more specific course perceptions items were needed.

The second implication from the factor analysis was that if the meaning orientation were associated with preferences for deep types of teaching, and the reproducing orientation with preferences for surface, then it may be concluded that different students see different types of teaching as being 'desirable', depending on their approaches to studying. This in turn suggests that the interpretation of student ratings must take into account the intentions of the students, as it is clear that some students would indicate some aspects of teaching as being good (or at least preferable), while others would highlight different ones.

Chapter 7 reported a study which was conducted to try to confirm the general pattern of results obtained in the preceding chapter. This was done for two reasons. Firstly, the sample sizes had not been very large so some confirmation of the results was desirable (even though in the previous study two separate groups had participated and very similar patterns of results had been obtained). Secondly, the preference items were new, and had been developed by conceptual means alone, without any pre-piloting, so it was vital to confirm that the patterns of results that had been obtained could be reproduced. This study however, had an additional

purpose, as it also introduced items representing Taylor's Orientations to Higher Education to try to establish how students' motives for entering a higher education course were related to their orientations to studying and preferences for particular types of lecturer, examination, tutor and course. Factor analysis revealed that the intrinsic interest component of each of the three main orientations to higher education (vocational, academic and personal) was related to both the meaning orientation and preferences for deep types of teaching. There was also a suggestion (through very weak empirical evidence) that the extrinsic interest component of the orientations to higher education was related to the reproducing orientation, and it is possible that this might imply that some students with predominantly intrinsic interest do endorse extrinsic interests as well, but not vice versa. A relationship between extrinsic interest and reproducing orientation would seem to make good sense conceptually. It was concluded from the analyses carried out in Chapter 7 that the pattern of results obtained in the previous study could be reproduced and that the orientations to higher education had elicited meaningful and interesting relationships with both the orientations to studying and the teaching preferences.

The literature review had alerted the author to potential problems of considering motivation as a unitary construct and demonstrated that there were different types which could be identified in students in higher education. A review of the original ASI had further shown that the different forms of motivation were generally associated with particular study orientations. In Chapter 7, it was found that vocational motivation, which factor analysis in the pilot and main engineering studies had suggested was part of the surface/strategic factor, could be teased out, and the intrinsic component would in fact load on the meaning orientation. This sounded a note of caution in carrying out analyses using study orientations without first confirming that the orientations make good sense for the student sample to which they are being given.

Chapter 8 was carried out to explore the factor structures of failing students. Although the sample size was sufficiently small to necessitate any findings being interpreted with greater caution than usual, the patterns of responses produced in Chapter 8 did appear to support suggestions in the literature that the factor structure of the ASI tended to break down in the sample, implying a lack of coherence in the students' responses. This will be discussed further in section 4 which suggests ways in which the work reported in this thesis may be carried forward.

Chapters 4 to 8 thus aimed to illustrate the progression of the programme of research carried out to address the research questions posed in the introductory chapter. The programme began by examining the integrity of the approaches to studying inventory which was used in one form or another throughout. It then gradually (study by study) added in additional dimensions of the general learning environment and also used each study to confirm the pattern of results which had been found in the preceding study. This allowed the programme of research to progress with some confidence in that the results being obtained were 'real' and reproducable, and not just an artefact of the particular sample being studied or of the statistics being used. The utility of the research instruments and the contribution of this research to the understanding of student learning will be discussed more fully in the second and third sections of this chapter respectively.

2. The utility of the research instruments

It may be argued that it is impossible to assess the utility of any research instrument *per se*, and that it is necessary to consider it in terms of utility for a particular purpose. For each of the instruments used here, utility will be discussed first in terms of the purposes for which they were designed, and then other potential uses will be considered.

2.1 *The utility of the abridged inventory*

It was felt that the inventory had been shortened with some success for use in the Psychology and Engineering Study and the Transition from School to Higher Education Study by defining it in terms of the four main study orientations plus the separate academic self-confidence scale in place of the fourteen original 5-item scales. Initial statistical evidence, provided by item-scale correlations and Cronbach's alpha, and empirical evidence derived from the analysis of the data involving the inventory, both served to indicate that the conceptual meaning of the inventory had been preserved, and that, as far as could be assessed, little detail had been lost, given that the inventory was developed to be used in scale or orientation form, rather than in terms of individual items. It was felt that reducing the length of the inventory had been beneficial to the studies reported here, as it meant that it could be completed by students in considerably less time than was required by previous inventories. This was seen as advantageous, as it often proved difficult to

persuade lecturers to give up a whole 50-minute lecture slot to questionnaire completion, but was considerably easier to negotiate access to students for half of that period. Asking students to complete a questionnaire in their own time was not considered desirable as this invariably reduces the completion rate substantially.

The inventory in its reduced form was thus considered to have been both satisfactory and effective for the purposes of investigating the relationships between students' perceptions of teaching and their approaches to studying, as explored in this programme of work, and it was felt that it may continue to be of use in similar future studies. However, it is the author's view that the main advantage of the abridged form lay in the *process* of gathering data. It was recognised that this shorter form may not be particularly effective or useful in mapping out the study processes of students from, for example, different disciplines, cultures, countries or age-groups, as certain assumptions are made about the way in which the scales cluster together, and these assumptions may not be valid for very different student populations. Neither would it be likely to be effective for predicting students at risk of failure at orientation level, as there is insufficient potential detail in the data set. (However, it would still be possible to use subsets of *items* to develop 'rules' which could then be used to discriminate between high or low achieving students). As the inventory is now reduced to four orientations and one separate scale (effectively five variables) it is impossible for interesting and complex patterns of results to be produced, and a factor analysis of these five variables alone is most likely to produce a two factor solution - one representing 'good' students who are likely to be high achievers, and one representing 'poor' students who are likely to be low achievers. It is therefore argued that the utility of the abridged form of the inventory lies mainly with similar student samples when used in conjunction with other types of items and scales to help provide a snap-shot of reactions to the learning environment.

2.2 *The utility of the course perceptions items*

The many course perceptions items which were drawn from the literature on students' ratings of teaching and courses for use in the Engineering questionnaire, proved to be of limited use in investigating relationships between students' perceptions of teaching and their approaches to studying, as few such relationships were demonstrated empirically. As a result, when the next study (the Psychology and Engineering study) was planned, a different approach was used in developing the course perceptions items, and the five categories which Ramsden had identified

in interviews with students as being important elements of teaching were used as the basis of ten items which were subsequently written. These too failed to produce any new interesting results. It was therefore concluded that the course perceptions items, written in a general way to reflect broad aspects of teaching, were an ineffective means of establishing links between students' perceptions of teaching and their approaches to studying and their utility in this respect was therefore minimal. However, the utility of the first, larger set of items, in terms of providing feedback on teaching and courses in engineering departments may be somewhat greater, and this remains to be explored.

2.3 *The utility of the teaching preference items*

The preference items were developed in response to suggestions that items which referred to specific types of teaching may be superior in establishing relationships between students' perceptions of teaching and their approaches to studying, by highlighting individual differences between students in much the same way that the inventory was doing. Factor analysis with the orientations to studying demonstrated empirically that preferences for certain types of teaching were associated with particular orientations to studying. The preference items had therefore been successful in achieving what the thesis had in part set out to explore - students' perceptions of teaching in relation to their approaches to studying and their utility in future projects will again be to examine how they combine with other items relating to other aspects of the learning environment. These preference items cannot be regarded as an alternative to more conventional course perceptions items, for the purposes of providing feedback to lecturers on their teaching and courses. Instead, their utility is restricted to research aiming to determine the types of teaching and courses which would encourage students to endorse a particular orientation to studying.

2.4 *The utility of the orientations to higher education items*

The items reflecting students' orientations to higher education were introduced in the Transition from School to Higher Education Study to explore the ways in which students' motives for entering a higher education course were related to their orientations to studying and their preferences for particular types of lecturer, examination, tutor and course. For this purpose, the orientations to higher education items proved effective in establishing interrelationships among the various types of items and their utility in future research would be either to use them in isolation to get some feel for why particular students had opted to pursue a

particular higher education course, or to use them in a similar manner to that used here to establish how they were related to other aspects of the general teaching/learning process.

3. Contribution of the research to understanding student learning

It was felt that there had been five main general findings which should make some contribution to the investigation of students' perceptions of teaching in relation to their approaches to learning, and to the broader issue of trying to understand the teaching/learning process better by examining how various aspects of the learning environment fit together. The utility of these five main findings will be discussed.

The first finding was that course perceptions items, adapted from questionnaires which require students to rate their lecturers and courses, were not appropriate for establishing the relationships between specific aspects of teaching and orientations to studying. The reasons why this type of item should be inappropriate are still somewhat speculative, as there were few opportunities to explore this during the programme of research. However, it seems possible that the course perceptions items and scales, and approaches to studying scales, were incompatible, as the former failed to elicit responses highlighting individual differences, and appeared not to represent anything more complex than positive perceptions of teaching on the one hand, and negative perceptions on the other. Although this was something of a negative finding, and it had been suggested before as an explanation of previous unsuccessful attempts to identify relationships (for example, by Ramsden and Entwistle,1981; Meyer and Parsons, 1989), it is nevertheless considered to be important for future research by pointing up the importance of the way in which items are phrased and the compatibility of their psychometric properties with other items being used simultaneously.

The second finding was that the new teaching preference items proved to be a much more fruitful approach to the general question of how different types of teaching were related to particular orientations to studying. The utility of the findings that the meaning orientation was empirically linked to preferences for what were referred to as deep lecturers, exams, tutors and courses, and that the reproducing orientation was similarly linked to preferences for 'surface' lecturers, exams, tutors and courses, is that they provide information for lecturers about the influence that

certain teaching practices may have on the study orientations adopted by students, and as such may provide information which would be useful in staff and course development programmes.

The third finding followed directly from the second (above) and was that students who choose to study in different ways also have contrasting ideas of what types of lecturer, examination, tutor and course they would prefer. Therefore, particular types of teaching are only regarded as being good or desirable by some members of any class. This finding raises at least two issues. Firstly, it suggests that the interpretation of any feedback should consider the intentions of students, whose impression of what is good or satisfactory depends, to some extent at least, on their preferred approach to studying. The finding that different students perceive their learning environment in different ways reveals something which was not previously known, but which was emerging in various guises from different sources as the study progressed. Some of this work will be discussed in the final section 'Directions for future research'. The second issue raised by this finding, is that it is generally taken as a goal of higher education to develop understanding in students, and deep approaches to learning are therefore promoted. In some cases, the teaching policy of an institution may state that deep approaches should be encouraged in students, and teaching staff are shown ways in which this might best be done through staff development activities. However, it is clear from this third finding that there is a substantial proportion of students who do not want this - they prefer teaching of a type which is compatible with their surface approaches to learning. This would seem to present higher education generally, and staff development more specifically, with something of a dilemma. Is it reasonable to continue to encourage lecturers to teach in ways likely to promote deep approaches? Or might it be better to acknowledge that some students do not want this type of teaching and try to opt for a more flexible approach, if at all possible? How would such a flexible approach work, particularly in first year where students seem to need rather more highly structured teaching coupled with support to aid their transition from school?

The fourth finding was that students who obtained high scores on a particular study orientation and had corresponding preferences for particular aspects of teaching, also had different motives for studying a higher education course. The relationships implied that students who had intrinsic motives for entering higher education sought to understand their course material, which in turn suggested that

in courses where a demonstration of understanding was required to achieve examination success, students who had been vocationally, academically and personally intrinsically interested in the course before beginning it were more likely to succeed. The utility of these findings builds into a broader coherent pattern in which orientation leads to intention, intention to process, and process to outcome, with the learning environment provided by the course continuing to interact, changing the student's intentions to some extent. It would also seem to be possible to pinpoint those students who were most likely to do badly on the course, based on the known relationships between the orientations to higher education and the orientations to studying on the one hand, and the relationships between the orientations to studying and performance on the other (though of course this would assume that the assessment system was rewarding deeper approaches to learning). In addition, there would appear to be a related issue to that of the third finding: this finding showed that students who did not appear to want 'deep' types of teaching were entering higher education without any 'deep' motives This would again seem to present problems for higher education, which often seems to assume that students come in with 'deep' motives, and gears its teaching around this expectation.

The fifth finding was that some students could be identified who produced conceptually incoherent patterns of responses, particularly in relation to approaches to studying and preferences for different types of teaching. It is difficult to know what the utility of this finding is, or indeed what these patterns mean, as they appear to reflect a mismatch between action and intention. It may be that some students have difficulty in disentangling the purposes or functions of various types of teaching, and therefore cannot identify those which would be conceptually compatible with their preferred approach to studying. This may in turn be why this phenomenon is seen among failing students: it is possible that some of these students are failing because they cannot distinguish the types of teaching which would help them from those which would hinder them, and are therefore not utilising learning resources to potential. It is hoped that these conceptually incoherent patterns of responses will come to be better understood in time, though it seems already that they might provide one possible means of identifying students at risk. This possibility will be discussed further in the following section.

4. Directions for future research

From the programme of research itself, three immediately related directions for future research could be suggested. These will be outlined below, and then discussion will focus on other related research which is currently going on in the wider field of teaching and learning in higher education.

1. *Possible extensions to the programme of research*

a) *Further development of 'Preference' items*

It would be hoped that more of the conventional course perceptions items could, in time, be written in the 'preference' format, thereby allowing students to think about which types of teaching would be most compatible with their own ways of studying, and in turn providing valuable information for academic departments in higher education on the effects of specific types of teaching on learning.

b) *Determining the direction of causality between approaches to studying and perceptions of the learning environment*

Factor analysis itself can only suggest where relationships exist, but cannot identify any direction of causality. Path analysis, on the other hand, can be used to provide better evidence of causality on the established relationships from which it could be established whether, for example, having high scores on meaning orientation encouraged students to regard 'deep' types of teaching as being preferable, or whether preferring 'deep' types of teaching promoted deeper approaches to learning. This may then have implications for remedial programmes designed to raise students' metacognitive awarenesses of their own approaches to studying and perceptions of their own learning environments. It is, however, important to recognise that path analysis, like factor analysis, is correlational, so the possibility remains of there being a covarying variable 'responsible' for the observed relationships.

c) *Exploring interesting findings by other means*

Had time permitted, the author would have liked to explore further some of the findings produced by the factor analyses, and would have opted to do so in one-to-one interviews with selected students. A particular instance of this would have been in the study which explored Factor Structures of Failing Students, where conceptually incoherent patterns of responses were obtained for students who had

failed the class examination. These students numbered only 43, and as such should perhaps strictly speaking not have had their raw data subjected to statistical procedures such as factor analysis, which is known to be sensitive to sample size. It is therefore felt that some aspects of the programme of research could usefully be extended by conducting interviews with students showing atypical patterns of responses. Similar work has already been done mainly with black first year students in South Africa (Meyer et al, 1990b,c; Parsons & Meyer, 1990), where there is inevitably much greater heterogeneity of previous academic experience than is found in Britain. It would be interesting to carry out similar interviews here, to try to determine how it is that students can perceive their learning environment in such conceptually incoherent ways which appear to represent a mismatch between action and intention. This could be done by asking students to describe why they would prefer the various types of teaching they say they prefer, and to explore with them how this fits in with their intentions when studying.

2. *Current related work in the field*

Improving student learning

In the last couple of years, great interest has been generated in devising and documenting ways of improving student learning. While this thesis has not directly pursued this theme, it is considered to be significantly related to attempts to identify relationships between students' approaches to studying and their perceptions of teaching, on the grounds that the more that is known about the ways in which elements of the learning environment interact, the greater will be the opportunity to 'fine-tune' some aspects to improve student learning.

There are two extreme views on how this might best be achieved - one is that if teaching were improved, student learning would improve automatically, while the other is that students themselves control whether or not student learning improves. The first view would imply that resources be channelled into staff development, while the second would indicate the need for better provision of study skills support. These two views may be seen as related to the debate over whether students' approaches to learning are consistent across tasks and time, or whether they vary to accommodate particular tasks. From the research that has been done to identify influences on approaches to studying, it is by now clear that some influences, such as student goals and perceptions of course demands emanate from

within the student and depend on prior experience, while others, such as workload, pace of presentation and assessment procedures, come from the learning environment. Approaches will therefore necessarily show elements of both consistency and versatility, implying a need to improve student learning through both the teaching and study skills routes. However, this will depend to some extent on how 'improvement' is to be defined. For most purposes, it can be assumed that deeper approaches to studying are desirable, and that this is what should be promoted both through teaching and in the students directly.

On the teaching side, one project which will be published this year (Cryer, 1992) places great emphasis on the notion of teaching for active learning as a means to improving student learning. While this seems basically sound, there must be some caveats. There would seem to be a danger in active learning being seen as synonymous with deep approach, but it is important to realise that giving students activities does not guarantee that they will adopt deeper approaches to studying. A second project (Entwistle et al, 1992) has produced *Guidelines for Promoting Effective Learning in Higher Education*, which brings together a summary of research findings and teaching innovations in a concise and readable way. A third project (Gibbs, 1992) documents a series of case studies in which departments have made changes to their courses, in some cases minor, to try to enhance deep approaches to studying in their students. All these publications will contribute to encouraging more imaginative methods of teaching. Unfortunately, changes in one or more aspects of teaching are unlikely to ensure substantial shifts in approaches to learning. Only a co-ordinated and coherent set of changes affecting, for example, teaching, assignments, workload and assessment, could be expected to have a marked effect.

On the student learning side, study skills classes and workshops have existed in most institutions for many years, though there is a growing realisation that they are often ineffective as students have difficulty in transferring general skills to meet their own needs. Much more work appears to be being done at faculty or departmental level, and there is some evidence of a recognised need to move away from prescriptive classes to those which allow students to explore possibilities and to be taught more about the theory underpinning study skills and student learning more generally. Research is, of course, also continuing into student learning, with a growing interest in the influences of students' *perceptions* of their learning environment. One study showed that, without changing the course itself, it was

sufficient to alter students' *perceptions* of a course to influence the approach adopted (Parsons and Meyer, 1990). A recent study (Eley, 1992), compared the approaches to studying and course perceptions of students studying contrasting courses simultaneously and concluded that

> The more a course unit was perceived as supportive of student learning, as having clearly defined goals and structure, as explicitly focussing on the mental processing in learning, as emphasising a capacity for independent learning, and as providing support for modes of learning and study typical of higher education, the more likely that deeper approaches to study would be reported

and that

> ...study approaches can vary within individual students sympathetically to those students' perceptions of variations in their teaching environments
>
> (Eley, 1992, p. 250)

Another study has suggested that students adopting different approaches to studying, perceive the same learning environment differently, and that while some students within a course are aware of aspects which have been innovatory or designed to enhance learning, others appear not to notice (Prosser et al, in preparation). These studies illustrate the importance of students' *perceptions* of their learning environment.

The whole notion of the importance of perceptions needs to be explored further. It was tentatively concluded in this thesis that the reason positive course perceptions scales were apt to cluster as a factor by themselves, rather than combine with study orientations, may have been because they tended to reflect only rather broad issues and did not capture individual differences. However, a very recent return to the data gathered for the Main Engineering Study produced (albeit weak) empirical evidence to suggest differences in the means of course perceptions scales between students endorsing either deep or surface approaches to learning. This finding questions the tentative conclusion made previously, but until such time as it is explored further, the apparent inconsistency cannot be resolved.

There is clearly great scope for much more work to be done with the general remit of improving student learning, from both the student learning and teaching perspectives , and perhaps most importantly, the articulation of the two. Further

research into the relationships between teaching and learning therefore seems imperative.

2. *Further inventory development*

It was something of a coincidence that Entwistle, Biggs and Schmeck all developed their original inventories around the same time. It is an even greater coincidence that all are either currently, or about to, reconceptualise their inventories, presumably in response to a considerable number of studies that have been done, both by themselves and others, which have implicitly suggested where refinements may be made, and also in order to meet new potential uses or needs. A revision of Entwistle's inventory (Entwistle and Tait, in preparation) has had two driving forces behind it - a response to 'alternative' factor structures or item selections which appear in the literature from time to time; and to meet the needs of trying to identify students at risk of failing in higher education. Each will be briefly discussed below.

Over the years since the ASI first appeared, a number of journal articles have been published which suggest a new structure for the inventory, or a different composition of scales or orientations, or offer a shorter and 'better' inventory overall. In most cases, the new version has invariably been devised on the basis of limited samples, typically using a relatively small number of students, who may even have been drawn from a single department. Those who claim to have improved the original inventory in this way, have clearly failed to note that the ASI was based on data analysis of 2208 students in higher education, drawn from 66 departments, and that the factor structure reported for the inventory was *not* the only one obtained, but was the one which was felt to reflect both the conceptual and empirical groupings of items into scales, and scales into orientations. There has also been a tendency, particularly when the inventory has been used with students from a particular discipline, to modify items to be appropriate. This is to be expected. However, as the years have gone on, it has became apparent that the inventory has 'evolved' in different ways, and there is some understandable concern that the conceptual meaning of some scales has not been as tightly preserved as it might have been. It has also become clear that it is not necessary to keep separate approaches and styles, which implies that an equally valid inventory could be developed with a simpler structure. A reconceptualisation of the inventory thus seemed appropriate.

The second reason for revising the ASI, has been to enable it to be used to identify students at risk of failing in higher education. It had been apparent in the Psychology and Engineering Study that the abridged version was not appropriate for such purposes, and that a longer inventory would be required. There is now considerable interest in higher education of identifying such students, particularly at a time when higher education is expanding rapidly and the heterogeneity of first year students is increasing through wider access, and a commitment to improving the student experience is growing. It has also been recognised for some years that the correlation between previous academic attainment and subsequent performance is not particularly high, but while the former is used in the majority of cases as the sole criterion for selection to higher education, it is salutary for faculties, departments and institutions to offer additional help to students to enable them to adapt to the rather different demands of higher education. Meyer has reported considerable success in identifying students at risk using a version of the original inventory along with additional course perceptions items, and is currently working on identifying different patterns of response which appear to be indicative of failure so that appropriate intervention can be offered. In Edinburgh too, some pilot work has been carried out of a similar nature (Entwistle et al, 1991). Software has been developed for the Apple Macintosh computer (Odor, 1991) to display graphically three main inventory dimensions (ability, organised study and reproducing), positioned at right angles to each other, which had been confirmed by factor analysis of a modified version of the ASI (not the revised version mentioned above). Individual students were then plotted against the three dimensions, according to their inventory scores. Rules were written to identify students at risk (based on cut-off values on the three dimensions), and class examination results were used to estimate the accuracy of prediction. Although the inventory was considered to be too short to allow accurate prediction, and much more development work was needed on the rules governing the 'at risk' students (ie the cut-off values), results obtained were promising. It is hoped that much more work can be done along this line and extended, like Meyer's, to identify different patterns of response which lead to failure, so that appropriate intervention or advice may be offered in time to prevent failure. There is also scope beyond identifying students at risk, by allowing any student to see where they lie, and to have their position interpreted for them along with appropriate study skills advice.

Conclusions

The programme of research reported in this thesis is believed to make a small, but potentially important, contribution to a better understanding of the relationships between students' approaches to studying and their perceptions of teaching, by beginning to tease out the different *types* of perceptions of teaching that exist. It has shown that while some perceptions are general and are shared by the majority of students within a particular class, others appear to be rather more individualistic and suggest that students may be perceiving the teaching they receive in rather different ways, even when sharing common experiences. It has also shown how empirical relationships between teaching and learning can best be seen when items share similar properties - in this case when they highlight individual differences. It is also clear that there is considerable scope for much more research in this and related areas. The author believes it would have been rather unsatisfying if the research undertaken was considered to have been completed by the end of the studentship, and is grateful that so many possibilities for ways forward have presented themselves in recent months. It would seem likely that the identification of students at risk, and the development of intervention 'packages' aimed at preventing failure, will be one substantial area of work which will be pursued in the immediate future. It would be hoped that such a project could combine further conceptual exploration of students' perceptions of teaching, with a practical utilisation of the findings thus far in identifying students at risk of failure by means of their response patterns to perceptions of teaching and courses and approaches to studying.

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Pilot Study - Scoring key for inventory

(Items marked by * were excluded after initial analyses)

Academic self-confidence

1. I feel I have a good command of the subjects I am studying.
17. I generally find the set problems easy to do.
33. I find it easy enough to see the principles that underlie the details presented in lectures.
49. I don't often have difficulty in making sense of new information or ideas.
65. I'm really pretty good at writing up practicals*
81. I don't have much difficulty in remembering facts or formulae.

Study methods and attitudes

Time management

2. I organise my study time carefully to make the best use of it.
18. I try to do at least a couple of hours work most evenings.
34. I'm pretty good at getting down to work whether it's during the day or in the evenings.
50. I try to fit in some of my own work between classes*
66. It's most unusual for me to be late in handing in work.
82. I generally find time to work out thoroughly the problems we're given.

Distractability

3. I am always ready to go out with friends in the evening.
19. I find it difficult to concentrate on work for any length of time.
35. Distractions make it difficult for me to do much effective work in the evenings.
51. I spend a lot of time involved in social or sporting activities*
67. Personal relationships seem to distract me from my work.
83. I find I am having to spend a good deal of time on the trivial aspects of everyday living.

Negative attitudes to studying

5. Often I find myself wondering whether the work I'm doing here is really worthwhile.
21. I'm not really sure why I decided to continue my education*
37. I certainly want to pass the exams, but I don't mind if I just scrape through.
53. I find most of the work here awfully boring.
69. I hate having to work in the evenings.
85. I can't see the relevance of much of what we're doing here.

Approaches to learning

Deep approach

6. I almost always set out to understand thoroughly the meaning of what we have to learn.
22. I try to relate lab experiments to the lecture course. (to Study Skills scale)
38. I generally put a lot of effort into trying to understand things which initially seem difficult.
54. I try to identify the physical principles involved before deciding how to solve a problem.
70. In lectures I try to think ahead to see how things might come together later on*
86. I try to relate things in the course to real-life situations.

Surface approach

7. I find I have to concentrate on actively memorising a good deal of what we have to learn.
23. I like to be given very precise instructions for carrying out laboratory experiments*
39. When given a problem, I look first for a formula which fits the data we've been given.
55. I find I tend to remember things best if I think about the order in which they were presented.
71. I find I rely a lot on memorised definitions to explain what important terms mean.
87. When I'm working on a problem, I find it best to look for examples which look a bit like it.

Strategic approach

8. I always try to find out how the marks are allocated between different components of the course.
24. I keep an eye on the syllabus and on previous exam papers to decide my own priorities in studying.
40. I make sure I've got the books I need, one way or the other*
56. I try to make the right impression by handing in work which looks good and is on time.
72. Before I begin studying, I weigh up what priority I should give to the various things I have to do.
88. I make sure I don't spend too long on any one bit of the syllabus.

Styles of learning

Holist style

9. I enjoy playing around with ideas of my own, even if they don't seem to get me very far.
25. Interesting problems I meet often set me off on long chains of thought.
41. When I'm explaining things, I like to use a lot of examples from my own experience.
57. In understanding something I rely a good deal on my intuition*
73. I like to get an overview of a topic before getting to grips with the details.
89. I usually try to play about with different ways of looking at an idea or problem.

Serialist style

10. I generally prefer to tackle each part of a topic or problem in order, working out one step at a time.
26. I prefer courses to be clearly structured and well organised, even if they're not all that interesting.
42. I prefer an explanation that is clear, concise, and well-ordered, even if it is really too brief*
58. In problems I find it difficult to 'switch tracks': I find it better to follow one track through first.
74. I need to understand the details of how something works before I'm happy to make use of it.
90. I prefer exam questions which require calculations rather than writing notes or an essay.

Motivation

Intrinsic motivation

11. My main reason for being here is to learn more about subjects which really interest me.
27. There are some topics in the course that I find really quite exciting.
43. Often I follow up interesting ideas mentioned in class.
59. I enjoy talking to other students about the work we're doing.
75. Sometimes I find myself thinking about ideas from the course when I'm doing other things.
91. I often find myself thinking that I could improve on the design of everyday things that I come across*

Vocational motivation

12. My main reason for being here is to get a good job afterwards.
28. In the course I look out for the things which will be useful in my career later on*
44. I generally choose courses more for my career plans than from my current interests.
60. I suppose I'm more interested in the qualification that I'll get than in the courses I'm taking.
76. I most enjoy the parts of the courses with the strongest professional element.
92. I like to see exactly how each part of the course is relevant to industry.

Fear of failure

13. I worry a good deal about whether I'll be able to understand the next part of the course*
29. I often seem to panic in an exam, making my mind go blank.
45. Pressure of work often makes me really miserable.
61. I feel that I'll never be able to do the work as well as other people.
77. Often I lie awake wondering how I can cope with the work I have to do.
93. I worry a good deal about whether I'll do well enough to stay on the course.

Need for achievement

14. It's important for me to feel that I'm doing really well on the courses here.
30. I enjoy competition: I find it stimulating.
46. It annoys me a good deal to get lower marks than I expect.
62. It's important to me to get better marks than my friends, if I possibly can.
78. I hate admitting that something's defeated me.
94. I like people to know when I'm doing well at something*

Personality

Extraversion

15. Either socially or in discussions, I'm often the one to break an uncomfortable silence.
31. I like to be in the swim of things, if there is anything going on, I like to be there.
47. I rarely feel self-conscious, even when I meet people for the first time.
63. I enjoy discussing my ideas with other people*
79. I easily get bored if there is nothing much going on.
95. Even when studying, I'm happier with people around.

Emotional instability

16. I tend to lose my temper rather easily.
32. I worry a lot about what might happen in the future*
48. I'm easily hurt if someone criticises me or my work.
64. I often feel tired and miserable for no good reason.
80. When things get me down, it takes a lot to cheer me up again.
96. I often go hot and cold worrying about something I've done or said.

Study skills

4. I generally try to take detailed notes on lectures.
20. I try to read through lecture notes from time to time well before the exam*
36. I usually reorganise and add to my lecture notes before setting out to learn them*
52. I try to memorise important definitions or formulae*
97. I like to use diagrams or graphs to help me understand mathematical relationships.
68. Often I try to work out examples or problems for myself to make sure I understand.
84. I usually check numerical answers to make sure they're plausible.
98. If I don't understand something, I go to see a member of staff about it*

UNIVERSITY OF EDINBURGH, DEPARTMENT OF EDUCATION AND TLA CENTRE

TECHNOLOGY STUDENTS IN SCOTTISH HIGHER EDUCATION

This project was set up in October 1987 to investigate students' progress on technology courses in central institutions and universities throughout Scotland. The main aim of the investigation will be to find out what students think of their courses - what aspects may be creating particular difficulty and what ways of teaching are found most helpful. We will also be asking how students generally go about their studies and how this relates, for example, to their school experience.

This information will be collected through questionnaires which will be administered to everyone in particular year-groups of certain courses, and through more in-depth interviews with a smaller number of students. Members of staff will also be interviewed about their experience of running and teaching technology courses.

Your department has agreed to take part in this project and we hope that you will help us by filling in this questionnaire. *All your answers will be kept strictly confidential to the research team:* no information about any individual student will be released under any circumstances. We need your name to be able to check on your subsequent progress but, to protect anonymity, names will be replaced by code numbers as soon as we receive the completed questionnaires.

This questionnaire has five parts. It asks you initially to provide background information, and then to indicate your experiences of studying and of higher education in general. It then asks you about your study habits and your experiences of the course. The final, open-ended section invites you to give your reactions to individual subjects and topics. Please work through the questionnaire as *quickly as you can* without discussing it with anyone. It is important that everyone answers <u>all</u> the questions and gives us their own views and experience.

We believe that the information you provide will be very useful to staff in finding out more about students' reactions to courses and how they go about studying. It should lead also to better and more specific advice being available to technology students about how to study effectively. We hope you will be prepared to help us with this project.

Prof Noel Entwistle ***Dr Dai Hounsell***

Questionnaire on

STUDENTS' EXPERIENCES OF TECHNOLOGY COURSES

A Background information

Please fill in details or **ring code numbers** as appropriate

1. *Surname* ..... *First Names* .....

2. *Sex* Male / Female (2 / 1) *Age* ..... *years*

3. *Institution* Edinburgh/ Napier / Paisley / RGIT / Strathclyde (5 / 4 / 3 / 2 / 1)

4. *Qualification sought* ... BEng / BSc / HND (3 / 2 / 1) *In what ?* .....

5. *What year of the course are you in ?* ..... year

6. *Qualifications obtained prior to entry* Please enter your grades in the grid below

Subject	O	Highers	SYS	A Level
Physics				
Maths				
English				
Grades in other subjects (Not 'O's)				

Other qualifications (please specify)

7. *Post-school experience*

a. At which stage did you leave school ?

After O Grade or O Level / Highers in S5 / Highers in S6 / SYS or A Level/ Other
4 5 6 7 8

b. Did you come here straight from school ? Yes / No
1

If not, where were you ?

Another college or university /work in engineering /other work / other
2 3 4 5

8. *Previous education*

On entry, how well prepared for this course did you feel in terms of

	Very/	Well /	Fairly /	Badly /	N/A
The way you were taught physics	5	4	3	2	1
The way you were taught electricity	5	4	3	2	1
The way you were taught maths	5	4	3	2	1
The way you were taught calculus	5	4	3	2	1
The way you were taught computing	5	4	3	2	1
Your knowledge of physics	5	4	3	2	1
Your knowledge of electricity	5	4	3	2	1
Your knowledge of maths	5	4	3	2	1
Your knowledge of calculus	5	4	3	2	1
Your knowledge of computing	5	4	3	2	1
Having acquired relevant study skills	5	4	3	2	1
Experience of working independently	5	4	3	2	1

Choice of higher education

a. How strongly were you encouraged to continue your education by

Mother Strongly / Fairly strongly / Somewhat / Hardly at all / Doesn't apply
5 4 3 2 1

Father Strongly / Fairly strongly / Somewhat / Hardly at all / Doesn't apply
5 4 3 2 1

b. How far did your parents or guardians continue their education ?

Mother Degree or dip / Highers or A / O / No cert / Not Sure
5 4 3 2 1

Father Degree or dip / Highers or A / O / No cert / Not Sure
5 4 3 2 1

c. How many of your friends continued their education beyond school ?

Most / Many / Some / Few / Very few
5 4 3 2 1

d. How strongly did these reasons affect your choice of this institution

	Very/Strong/Fairly/Slightly/Not at all				
Good reputation	5	4	3	2	1
Course flexibility allowing choice	5	4	3	2	1
Strong industrial links	5	4	3	2	1
Entry requirements	5	4	3	2	1
Good facilities	5	4	3	2	1
Friends going there	5	4	3	2	1
Good town to be in	5	4	3	2	1
Able to live at home	5	4	3	2	1
To get away from home	5	4	3	2	1

10. *Choice of engineering*

a. Did you choose electrical/electronic engineering as your main subject ?

Yes / No
2 1

b. How good was the school careers advice you got ?

Very / Good / Fair / Poor / Very poor
5 4 3 2 1

c. How strongly were you influenced in your choice of engineering by

	Very/Strong/Fairly/ Slightly/ Not at all				
Teachers	5	4	3	2	1
Family or friends	5	4	3	2	1
Leaflets or books	5	4	3	2	1
TV or video	5	4	3	2	1
Industrial visits	5	4	3	2	1

d. How sure were you about taking engineering ?

Very/ Sure / Fairly / Unsure/ Not at all
5 4 3 2 1

e. How important to you were these reasons for choosing engineering ?

	Very/Import/Fairly/Slightly/ Not at all				
Enjoyed similar things at school	5	4	3	2	1
Had hobbies related to it	5	4	3	2	1
Interested in the way things work	5	4	3	2	1
Thought work would be interesting	5	4	3	2	1
Practical rather than theoretical	5	4	3	2	1
Would enjoy designing things	5	4	3	2	1
Relevance to real-life problems	5	4	3	2	1
Fascinated by technology	5	4	3	2	1
Good job prospects	5	4	3	2	1
Relevant to careers in home area	5	4	3	2	1

B Experiences of studying and higher education

The following comments have been made by students in talking about their experiences of studying and of higher education in general. We should like to know to what extent you agree or disagree with what they have said. The statements are necessarily rather general. We realize that your feelings may vary from one part of the course to another, but here we are interested in your experience in relation to the *course as a whole* . This way of exploring individual experiences demands a large number of comments, covering a series of overlapping ideas.

Please go through the comments quickly indicating your immediate reaction by circling the appropriate code number. There are no 'right' or 'wrong' answers: we are interested in your own experiences and feelings about studying. **Circle** the code number to indicate your answer.

5 means that you definitely agree (√√);
4 means that you agree, but with reservations (√);
3 means that you are not sure or that it doesn't apply (?);
2 means that you tend to disagree (x);
1 means that you definitely disagree (xx).

		√√	√	?	x	xx
1.	I feel I have a good command of the subjects I am studying.	5	4	3	2	1
2.	I organize my study time carefully to make the best use of it.	5	4	3	2	1
3.	I am always ready to go out with friends in the evening.	5	4	3	2	1
4.	I always concentrate on trying to get a really full set of notes in lectures.	5	4	3	2	1
5.	Often I find myself wondering whether the work I'm doing here is really worthwhile.	5	4	3	2	1
6.	I always set out to understand thoroughly the meaning of what we have to learn.	5	4	3	2	1
7.	I find I have to concentrate hard on memorizing a good deal of what we have to learn.	5	4	3	2	1
8.	I always try to find out how marks are allocated between different components of the course.	5	4	3	2	1
9.	I enjoy playing around with ideas of my own, even if they don't seem to get me very far.	5	4	3	2	1
10.	I generally prefer to tackle each part of a topic or problem in order, working out one step at a time.	5	4	3	2	1
11.	My main reason for being here is to learn more about subjects which really interest me.	5	4	3	2	1
12.	I worry a good deal about whether I'll do well enough to stay on the course.	5	4	3	2	1
13.	I like to see exactly how each part of the course is relevant to industry.	5	4	3	2	1

		√√	√	?	x	xx
14.	It's important for me to feel that I'm doing really well on the courses here.	5	4	3	2	1
15.	I generally find the set problems easy to do.	5	4	3	2	1
16.	I try to do at least a couple of hours work most evenings.	5	4	3	2	1
17.	I find it difficult to concentrate on work for any length of time.	5	4	3	2	1
18.	I like to use diagrams or graphs to help me understand mathematical relationships.	5	4	3	2	1
19.	I can't see the relevance of much of what we're doing here.	5	4	3	2	1
20.	In lectures, I often find myself questioning what we're told, considering other interpretations.	5	4	3	2	1
21.	When I'm working on a problem, I find it best to look for examples which look a bit like it.	5	4	3	2	1
22.	I keep an eye on the syllabus and on previous exam papers to decide my own priorities in studying.	5	4	3	2	1
23.	Interesting problems I meet often set me off on long chains of thought.	5	4	3	2	1
24.	I prefer courses to be clearly structured and well organised, even if they're not all that interesting.	5	4	3	2	1
25.	There are some topics in the course that I find really quite exciting.	5	4	3	2	1
26.	I often seem to panic in an exam, making my mind go blank.	5	4	3	2	1
27.	My main reason for being here is to get a good job afterwards.	5	4	3	2	1
28.	I enjoy competition: I find it stimulating.	5	4	3	2	1
29.	I find it easy enough to see the principles that underlie the details presented in lectures.	5	4	3	2	1
30.	I'm pretty good at getting down to work whether its during the day or in the evenings.	5	4	3	2	1
31.	Distractions make it difficult for me to do much effective work in the evenings.	5	4	3	2	1
32.	Often I try to work out examples or problems for myself to make sure I understand.	5	4	3	2	1
3.	I certainly want to pass the exams, but I don't mind if I just scrape through.	5	4	3	2	1

		√√	√	?	x	xx
34.	I generally put a lot of effort into trying to understand things which initially seem difficult.	5	4	3	2	1
35.	When given a problem, I look first for a formula which fits the data we've been given.	5	4	3	2	1
36.	I make sure I don't spend too long on any one bit of the syllabus.	5	4	3	2	1
37.	When I'm explaining things, I like to use a lot of examples from my own experience.	5	4	3	2	1
38.	I prefer exam questions which require calculations rather than writing notes or an essay.	5	4	3	2	1
39.	Often I follow up interesting ideas mentioned in class.	5	4	3	2	1
40.	The pressure of work often gets me down and makes me feel really miserable.	5	4	3	2	1
41.	I generally choose courses more for my career plans than from my current interests.	5	4	3	2	1
42.	I get really annoyed if I'm given lower marks than I expect.	5	4	3	2	1
43.	I don't often have difficulty in making sense of new information or ideas.	5	4	3	2	1
44.	I generally find time to work out thoroughly the problems we're given.	5	4	3	2	1
45.	I find that I'm having to spend too much time on the necessities of everyday living.	5	4	3	2	1
46.	I usually check numerical answers to make sure they're plausible.	5	4	3	2	1
47.	I find most of the work here awfully boring.	5	4	3	2	1
48.	I try to identify the physical principles involved before deciding how to solve a problem.	5	4	3	2	1
49.	I find I tend to remember things best if I think about the order in which they were presented.	5	4	3	2	1
50.	I try to make the right impression by handing in work which looks good and is on time.	5	4	3	2	1
51.	I usually try to play about with different ways of looking at an idea or problem.	5	4	3	2	1
52.	In problems, I find it difficult to 'switch tracks': I find it better to follow one track through first.	5	4	3	2	1
53.	I enjoy discussing ideas from the course with other students.	5	4	3	2	1

		√√	√	?	x	xx
54.	I feel that I'll never be able to do the work as well as the other people on the course.	5	4	3	2	1
55.	I suppose I'm more interested in the qualification that I'll get than in the courses I'm taking.	5	4	3	2	1
56.	It's important to me to get better marks than my friends, if I possibly can.	5	4	3	2	1
57.	I don't have much difficulty in remembering facts or formulae.	5	4	3	2	1
58.	It's most unusual for me to be late in handing in work.	5	4	3	2	1
59.	Personal relationships seem to distract me from my work, one way or another.	5	4	3	2	1
60.	I try to see how the lab experiments relate to the lecture course.	5	4	3	2	1
61.	I hate having to work in the evenings.	5	4	3	2	1
62.	I try to relate things in the course to real-life situations, whenever I can.	5	4	3	2	1
63.	I find I rely a lot on memorized definitions to explain what important terms mean.	5	4	3	2	1
64.	Before I begin studying, I weigh up what priority I should give to the various things I have to do.	5	4	3	2	1
65.	I like to get an overview of a topic before getting to grips with the details.	5	4	3	2	1
66.	I need to understand the details of how a proof or formula works before I'm ready to make use of it.	5	4	3	2	1
67.	Sometimes I find myself thinking about ideas from the course when I'm doing other things.	5	4	3	2	1
68.	Often I lie awake wondering how I can cope with the work I have to do.	5	4	3	2	1
69.	I most enjoy the parts of the course with the strongest professional element.	5	4	3	2	1
70.	I really hate admitting that anything's defeated me.	5	4	3	2	1

Now please go straight on to the next section

C Study habits Again please **circle** the appropriate code number.

1. To what extent is money a problem for you in doing this course ?

Very serious/ Serious / Some / Little / Not at all
5 4 3 2 1

2. Where do you stay during term-time ?

Parents' or own home/ Digs / Flat / Halls of residence/ Other
5 4 3 2 1

3. Do you have somewhere where you can study without interruption ?

	Always	Generally	Sometimes	Not often	Not at all
Where you stay	5	4	3	2	1
At university/college	5	4	3	2	1

4. Outwith timetabled classes, where do you do most of your studying ?

Where you stay / Library/ Study Room/ Other
4 3 2 1

5. How easy is it to study there ?

Very / Easy / Fairly / Difficult / Very Difficult
5 4 3 2 1

6. How easy is it for you to get hold of the books that you need ?

Very / Easy / Fairly / Difficult / Very Difficult
5 4 3 2 1

7. What proportion of the timetabled classes do you generally attend ?

	All/Almost all		Miss several	Miss many	Miss most
Lectures	5	4	3	2	1
Tutorials/problem classes	5	4	3	2	1
Practicals/lab classes	5	4	3	2	1

8. How much time outwith timetabled classes have you spent in the course so far <u>on each of the following</u> ?

	A lot	Fair amount	Some	Little	None
Writing up practicals	5	4	3	2	1
Rewriting/reordering lecture notes	5	4	3	2	1
Understanding lecture notes/handouts	5	4	3	2	1
Using textbooks, journals, etc.	5	4	3	2	1
Working on examples/problems	5	4	3	2	1
Working on past exam questions	5	4	3	2	1
Working on projects	5	4	3	2	1
Writing essays or assignments	5	4	3	2	1
Being stuck and so unable to get on	5	4	3	2	1

9. How many hours do you spend on such work *outwith classes* ? Use the grid below to indicate the time you spent at different times *last week.* If last week was not typical alter the hours to give a better indication, but *please do not exaggerate.* Ring the number of hours in each part of the grid, even if it was '0'. Please enter and check the totals afterwards.

	Morning	Afternoon	Evening
Monday	0 1/2 1 2 3	0 1/2 1 2 3	0 1/2 1 2 3 4 5
Tuesday	0 1/2 1 2 3	0 1/2 1 2 3	0 1/2 1 2 3 4 5
Wednesday	0 1/2 1 2 3	0 1/2 1 2 3	0 1/2 1 2 3 4 5
Thursday	0 1/2 1 2 3	0 1/2 1 2 3	0 1/2 1 2 3 4 5
Friday	0 1/2 1 2 3	0 1/2 1 2 3	0 1/2 1 2 3 4 5
Saturday	0 1/2 1 2 3	0 1/2 1 2 3	0 1/2 1 2 3 4 5
Sunday	0 1/2 1 2 3	0 1/2 1 2 3	0 1/2 1 2 3 4 5

Total Hours Worked During Morning ..... hrs Afternoon ..... hrs Evening ..... hrs

Total for whole week ..... hrs

10. How satisfied are you in general with your own ways of studying ? In what ways, if any, would you want to improve them ? What specific help would you like ? From whom ?

Experiences of the Course

How well do you feel you have done so far on this course as a whole ?

Very well/ Quite Well / Average / Not so well / Badly
5 4 3 2 1

Have you ever repeated a year of the course ? Yes / No
1 2

Have you transferred at any time from another course or institution ?

No /Another institution /From degree /From HND /From HNC /From any other course
1 2 3 4 5 6

4. How good has the support and advice from staff been during this year ?

	Very	/ Good	/Fairly/	Not very	/None given
On studying effectively	5	4	3	2	1
On using the library	5	4	3	2	1
On using apparatus in labs	5	4	3	2	1
From year or personal tutors	5	4	3	2	1
From lecturers about courses	5	4	3	2	1
From demonstrators in labs	5	4	3	2	1

5. *Expectations and experiences*

To what extent have your experiences of the course <u>as a whole</u> coincided with the expectations you had when you decided to take it ? Please give your answers to the following comments using the same five responses:

definitely agree **5**, *agree with reservations* **4**, *unsure or doesn't apply* **3** *tend to disagree* **2** and *definitely disagree* **1**.

	What you have found √√	√	?	x	xx	**What you expected** √√	√	?	x	xx
Heavy workload	5	4	3	2	1	5	4	3	2	1
Ideas presented fast	5	4	3	2	1	5	4	3	2	1
Difficult content	5	4	3	2	1	5	4	3	2	1
Interesting content	5	4	3	2	1	5	4	3	2	1
Content professionally relevant	5	4	3	2	1	5	4	3	2	1
Content up-to-date	5	4	3	2	1	5	4	3	2	1
A lot of lectures	5	4	3	2	1	5	4	3	2	1
A lot of laboratory work	5	4	3	2	1	5	4	3	2	1
A lot of project/design work	5	4	3	2	1	5	4	3	2	1
A lot of tutorial classes	5	4	3	2	1	5	4	3	2	1
Emphasis on theory	5	4	3	2	1	5	4	3	2	1
Emphasis on applications	5	4	3	2	1	5	4	3	2	1
Much maths in eng. course	5	4	3	2	1	5	4	3	2	1
Much time on maths itself	5	4	3	2	1	5	4	3	2	1
Good industrial contacts	5	4	3	2	1	5	4	3	2	1
Good relationships with staff	5	4	3	2	1	5	4	3	2	1
Emphasis on management and professional skills	5	4	3	2	1	5	4	3	2	1
Emphasis on social and environmental issues	5	4	3	2	1	5	4	3	2	1

6. *Comparisons between main course components*

What differences do you see between the main components of your course in relation to how they are taught and assessed ? The main comparison is between engineering and maths, but choose one other area which you feel is different from those (eg. Management, computing). Please enter that third area here ..... Now for each comment decide to what extent it applies to each of these three areas and then write in the appropriate numbers to describe your experience, using the following codes as before:

definitely agree **5**, *agree with reservations* **4**, *unsure or doesn't apply* **3**
tend to disagree **2** and *definitely disagree* **1**.

	Eng	Maths	Other
Most courses seem clearly structured.	.....	.....	.....
The various parts of the course are well co-ordinated.	.....	.....	.....
Lecturers often seem to go too fast.	.....	.....	.....
Lecturers are good at bringing things down to our level	.....	.....	.....
Lectures are generally well organised.	.....	.....	.....
Lecturers generally explain things clearly.	.....	.....	.....
The applications of the lecture material are made clear.	.....	.....	.....
Lectures are mostly lively and varied.	.....	.....	.....
Most of the lecturers are enthusiastic about their subject.	.....	.....	.....
Staff ask us how they might improve the course.	.....	.....	.....
We're encouraged to discuss work difficulties with staff.	.....	.....	.....
We do enough tests etc. to show how well we're doing.	.....	.....	.....
Marked work is usually returned promptly.	.....	.....	.....
Markers' comments are usually helpful and constructive.	.....	.....	.....
The marks given generally seem to be fair.	.....	.....	.....

'. *Experience of engineering practicals*

Please use the five point scale as before.

	√√	√	?	x	xx
The equipment is well maintained and easy to use.	5	4	3	2	1
The instructions are clear and easy to follow.	5	4	3	2	1
The point of each practical is usually clear.	5	4	3	2	1
There is enough time to complete the work set.	5	4	3	2	1
Demonstrators are well prepared and helpful.	5	4	3	2	1
Most of the experiments are interesting.	5	4	3	2	1
Practicals are coordinated with the lecture course.	5	4	3	2	1
We are shown how to write up practicals effectively.	5	4	3	2	1
Marked write-ups are returned with helpful comments.	5	4	3	2	1
The practical marks seem to recognize effort.	5	4	3	2	1
The effort put into lab work is adequately rewarded in the overall assessment at the end of the year.	5	4	3	2	1

. *Experience of engineering tutorials/problem classes.*

Please use the five point scale as before.

	√√	√	?	x	xx
The class size is too big to be really useful.	5	4	3	2	1
Tutors seem interested and helpful.	5	4	3	2	1
Problems are generally at the right level for us.	5	4	3	2	1
Most of the explanations we're given are helpful.	5	4	3	2	1
There are opportunities to discuss the course content.	5	4	3	2	1

Finally, please turn over and fill in the open-ended part of the questionnaire

E Reactions to Individual Subjects and Topics

Please answer these questions as fully as you can in the time remaining.

1. Which have been the most interesting parts of the course so far ?
   What has made them particularly interesting for you ?

Subject or topic	*What made them interesting*

2. Which have been the most difficult parts of the course so far ?
   What has made them difficult for you ? Please be as specific as possible.

Subject or topic	*Specific difficulty*

3. Have any of the particular methods of teaching (lectures, tutorials, practicals) caused you any specific difficulties ?

Method of teaching	*Specific difficulty*

We are very grateful to you for completing this long questionnaire. Thank you

Main Engineering Study - Scoring key for inventory

Academic self-confidence

1. I feel I have a good command of the subjects I am studying.
15. I generally find the set problems easy to do.
29. I find it easy enough to see the principles that underlie the details presented in lectures.
43. I don't have much difficulty in making sense of new information or ideas.
57. I don't have much difficulty in remembering facts or formulae.

Study methods and attitudes

Time management

2. I organise my study time carefully to make the best use of it.
16. I try to do at least a couple of hours work most evenings.
30. I'm pretty good at getting down to work whether it's during the day or in the evenings.
58. It's most unusual for me to be late in handing in work.
44. I generally find time to work out thoroughly the problems we're given.

Distractability

3. I am always ready to go out with friends in the evening.
17. I find it difficult to concentrate on work for any length of time.
31. Distractions make it difficult for me to do much effective work in the evenings.
59. Personal relationships seem to distract me from my work, one way or another.
45. I find that I'm having to spend too much time on the necessities of everyday living.

Subject specific study skills

4. I always concentrate on trying to get a really full set of notes in lectures.
18. I like to use diagrams or graphs to help me understand mathematical relationships.
32. Often I try to work out examples or problems for myself to make sure I understand.
46. I usually check numerical answers to make sure they're plausible.
60. I try to see how lab experiments relate to the lecture course.

Negative attitudes to studying

5. Often I find myself wondering whether the work I'm doing here is really worthwhile.
33. I certainly want to pass the exams, but I don't mind if I just scrape through.
47. I find most of the work here awfully boring.
69. I hate having to work in the evenings.
19. I can't see the relevance of much of what we're doing here.

Approaches to learning

Deep approach

6. I almost always set out to understand thoroughly the meaning of what we have to learn.
34. I generally put a lot of effort into trying to understand things which initially seem difficult.
48. I almost always try to find the physical principles underlying a problem before deciding how to solve it
86. I try to relate things in the course to real-life situations, whenever I can.
20. In lectures I often find myself questioning what we're told, considering alternative interpretations.

Surface approach

7. I find I have to concentrate on actively memorising a good deal of what we have to learn.
35. When given a problem, I look first for a formula which fits the data we've been given.
49. I find I tend to remember things best if I think about the order in which they were presented.
63. I find I rely a lot on memorised definitions to explain what important terms mean.
21. When I'm working on a problem, I find it best to look for examples which look a bit like it.

Strategic approach

8. I always try to find out how the marks are allocated between different components of the course.
22. I keep an eye on the syllabus and on previous exam papers to decide my own priorities in studying.
50. I try to make the right impression by handing in work which looks good and is on time.
64. Before I begin studying, I weigh up what priority I should give to the various things I have to do.
36. I make sure I don't spend too long on any one bit of the syllabus.

Styles of learning

Holist style

9. I enjoy playing around with ideas of my own, even if they don't seem to get me very far.
23. Interesting problems I meet often set me off on long chains of thought.
37. When I'm explaining things, I like to use a lot of examples from my own experience.
65. I like to get an overview of a problem before coming to grips with the details.
51. I usually try to play about with different ways of looking at an idea or problem.

Serialist style

10. I generally prefer to tackle each part of a topic or problem in order, working out one step at a time.
24. I prefer courses to be clearly structured and well organised, even if they're not all that interesting.
52. In problems I find it difficult to 'switch tracks': I find it better to follow one track through first.
66. I need to understand the details of how a proof or formula works before I'm ready to make use of it.
38. I prefer exam questions which require calculations rather than writing notes or an essay.

Motivation

Intrinsic motivation

11. My main reason for being here is to learn more about subjects which really interest me.
25. There are some topics in the course that I find really quite exciting.
39. Often I follow up interesting ideas mentioned in class.
53. I enjoy discussing ideas from the course with other students.
67. Sometimes I find myself thinking about ideas from the course when I'm doing other things.

Vocational motivation

27. My main reason for being here is to get a good job afterwards.
41. I generally choose courses more for my career plans than from my current interests.
55. I suppose I'm more interested in the qualification that I'll get than in the courses I'm taking.
69. I'm really only interested in the parts of the courses with a strong professional element.
13. I like to see exactly how each part of the course is relevant to industry.

Fear of failure

26. I often seem to panic in an exam, making my mind go blank.
40. The pressure of work often gets me down and makes me feel really miserable.
54. I feel that I'll never be able to do the work as well as other people on the course.
68. Often I lie awake wondering how I can cope with the work I have to do.
12. I worry a good deal about whether I'll do well enough to stay on the course.

Need for achievement

14. It's important for me to feel that I'm doing really well on the courses here.
28. I enjoy competition: I find it stimulating.
42. I get really annoyed if I'm given lower marks than I expect.
56. It's important to me to get better marks than my friends, if I possibly can.
78. I really hate admitting that anything's defeated me.

UNIVERSITY OF EDINBURGH, DEPARTMENT OF EDUCATION AND TLA CENTRE

Experiences of Studying and Higher Education

Name .....***Title of this course*** .....

Sex M / F ***Grades in Highers /A Level***

.....

(delete as appropriate)

The following comments have been made by students in talking about their experiences of studying and of higher education in general. We should like to know to what extent you agree or disagree with what they have said. The statements are necessarily rather general. We realise that your feelings may vary from one part of the course to another, but here we are interested in your general reaction, either to the whole experience of studying, or, where appropriate, to this particular course. This way of exploring individual experiences requires quite a large number of comments, covering a series of overlapping ideas.

Please go through the comments quickly indicating your immediate reaction by circling the appropriate code number. There are no 'right' or 'wrong' answers: we are interested in **your own** experiences and feelings about studying. **Circle** the code number to indicate your answer.

5 means that you definitely agree (√√)
4 means that you agree, but with reservations (√)
3 means that you are not sure or that it doesn't apply (?)
2 means that you tend to disagree (x)
1 means that you definitely disagree (xx)

		√√	√	?	x	xx
1.	I don't seem to have a good grasp of the subjects I'm studying yet.	5	4	3	2	1
2.	I organise my study time carefully to make the best use of it.	5	4	3	2	1
3.	I always set out to understand thoroughly the meaning of what we have to learn.	5	4	3	2	1
4.	I find I have to memorise a good deal of what we have to learn.	5	4	3	2	1
5.	It's important to me to get better marks than my friends if I possibly can.	5	4	3	2	1
6.	I worry a good deal about whether I'll do well enough to stay on the course.	5	4	3	2	1
7.	It's most unusual for me to be late in handing in work.	5	4	3	2	1
8.	I find it difficult to concentrate on work for any length of time.	5	4	3	2	1
9.	I can't see the relevance of much of what we're doing here.	5	4	3	2	1
10.	In lectures I often find myself questioning what we're told, and looking for other interpretations.	5	4	3	2	1
11.	I keep an eye on the syllabus and on previous exam papers to decide my own priorities in studying.	5	4	3	2	1

		√√	√	?	x	xx
12.	Interesting problems I meet often set me off on long chains of thought.	5	4	3	2	1
13.	I often seem to panic in an exam, making my mind go blank.	5	4	3	2	1
14.	My main reason for being here is to get a good job afterwards.	5	4	3	2	1
15.	I enjoy competition: I find it stimulating.	5	4	3	2	1
16.	I find it really difficult to pick out the most important points in lectures or books.	5	4	3	2	1
17.	I'm pretty good at getting down to work whether its during the day or in the evenings.	5	4	3	2	1
18.	Personal relationships seem to distract me from my work, one way or another.	5	4	3	2	1
19.	Often I follow up interesting ideas mentioned in class.	5	4	3	2	1
20.	I generally choose courses more for my career plans than from my current interests.	5	4	3	2	1
21.	Often I find myself wondering whether the work I'm doing here is really worthwhile.	5	4	3	2	1
22.	I find most of the work here awfully boring.	5	4	3	2	1
23.	I find I tend to remember things best if I think about the order in which they were presented.	5	4	3	2	1
24.	I usually try to play about with different ways of looking at an idea or problem.	5	4	3	2	1
25.	I try to relate things in the course to real-life situations, whenever I can.	5	4	3	2	1
26.	Often I find I have to read things without having a chance really to understand them.	5	4	3	2	1
27.	Before I begin studying, I weigh up what priority I should give to the various things I have to do.	5	4	3	2	1
28.	Sometimes I find myself thinking about ideas from the course when I'm doing other things.	5	4	3	2	1

Please go straight on with the next section

Study habits

What proportion of the timetabled classes do you generally attend ?

	All/Almost all		Miss several		Miss many/Miss most
Lectures	5	4	3	2	1
Tutorials	5	4	3	2	1

How much time outwith timetabled classes have you spent in this course so far on each of the following?

	A lot		Fair amount	Some	Little	None
Rewriting/reordering lecture notes	5	4		3	2	1
Understanding lecture notes/handouts	5	4		3	2	1
Reading textbooks, journals, etc.	5	4		3	2	1
Working on past exam questions	5	4		3	2	1
Writing essays, doing problems or assignments	5	4		3	2	1
Being stuck and so unable to get on	5	4		3	2	1

How many hours do you spend on such work *outwith classes* ?

Use the grid below to indicate the time you spent at different times last week. If last week was not typical alter the hours to give a better indication, but do not exaggerate. Ring the number of hours in each part of the grid, even if it was '0'. Please **enter the totals** underneath.

	Morning					Afternoon					Evening						
Monday	0	1/2	1	2	3	0	1/2	1	2	3	0	1/2	1	2	3	4	5
Tuesday	0	1/2	1	2	3	0	1/2	1	2	3	0	1/2	1	2	3	4	5
Wednesday	0	1/2	1	2	3	0	1/2	1	2	3	0	1/2	1	2	3	4	5
Thursday	0	1/2	1	2	3	0	1/2	1	2	3	0	1/2	1	2	3	4	5
Friday	0	1/2	1	2	3	0	1/2	1	2	3	0	1/2	1	2	3	4	5
Saturday	0	1/2	1	2	3	0	1/2	1	2	3	0	1/2	1	2	3	4	5
Sunday	0	1/2	1	2	3	0	1/2	1	2	3	0	1/2	1	2	3	4	5

Total Hours Worked During Morning ..... hrs Afternoon ..... hrs Evening ..... hrs

Total for whole week ..... hrs

Experiences of *this particular* course

For each comment, decide to what extent it applies and then circle the appropriate numbers using the following codes as before:

definitely agree **5** *agree with reservations* **4** *unsure or doesn't apply* **3**
tend to disagree **2** *definitely disagree* **1.**

	√√	√	?	x	xx
Lecturers are good at bringing things down to our level.	5	4	3	2	1
Lecturers often seem to go too fast.	5	4	3	2	1
Lectures are generally well organised.	5	4	3	2	1
Lecturers generally explain things clearly.	5	4	3	2	1
Most of the lecturers are enthusiastic about their subject.	5	4	3	2	1
We're encouraged to discuss work difficulties with staff.	5	4	3	2	1
Markers' comments are usually helpful and constructive.	5	4	3	2	1
The workload for this course seems very heavy.	5	4	3	2	1
We're encouraged to follow our own interests in this course.	5	4	3	2	1
We receive good study skills advice from staff.	5	4	3	2	1
Handouts are generally well written and easy to follow.	5	4	3	2	1
Course books are usually easy to get hold of.	5	4	3	2	1

Learning Resources

Here we are interested in how **aware** you are of the importance of certain 'learning resources' in helping you to learn, and the extent to which you **actually use** them in carrying out your work. For each learning resource, indicate your answer by circling the appropriate number between **1** and **5** to indicate the extent to which you are aware of them, or use them. **5** means very aware or used a great deal.

	Degree of awareness					**Extent of actual use**				
	√√	√	?	x	xx	√√	√	?	x	xx
The library	5	4	3	2	1	5	4	3	2	1
Tutors	5	4	3	2	1	5	4	3	2	1
Textbooks	5	4	3	2	1	5	4	3	2	1
Handouts	5	4	3	2	1	5	4	3	2	1
Other students	5	4	3	2	1	5	4	3	2	1

Course Perceptions

This section asks more general questions about your preferences for different types of lecturing style, exam type, tutor style and course type. Please respond by circling the appropriate code number as before.

	√√	√	?	x	xx
I generally prefer lecturers who					
- show us how what we're learning relates to the outside world	5	4	3	2	1
- tell us exactly what to put down in our notes	5	4	3	2	1
- show us what they themselves think about a subject	5	4	3	2	1
- entertain us even if the content isn't particularly good	5	4	3	2	1
- use a lot of overheads or slides	5	4	3	2	1
I generally prefer exams which					
- have questions requiring specific detailed answers.	5	4	3	2	1
- give me an opportunity to show I've thought about a course for myself.	5	4	3	2	1
- can be answered directly from the material in our lecture notes.	5	4	3	2	1
- make it clear how much effort we're expected to put into each part of the question.	5	4	3	2	1
- have general questions which provide opportunities to follow a number of different lines.	5	4	3	2	1
I generally prefer tutors who					
- get us discussing ideas among ourselves	5	4	3	2	1
- go over the lecture to make sure we haven't missed anything	5	4	3	2	1
- show us very clearly what they think of our ideas	5	4	3	2	1
- are friendly, even if they're not so good at explaining things	5	4	3	2	1
- make things clear, even if they're rather critical of what we do	5	4	3	2	1
I generally prefer courses where					
- we're able to follow our own interests quite a lot	5	4	3	2	1
- it's made very clear just which books we have to read	5	4	3	2	1
- it's clear how important the various topics are for the exams	5	4	3	2	1
- we're encouraged to read around the subject a lot	5	4	3	2	1
- there's a good deal of detailed information to learn	5	4	3	2	1

THANK YOU FOR FILLING IN THIS QUESTIONNAIRE FOR US

Psychology and Engineering Study - Scoring key for inventory

Meaning Orientation

3. I always set out to understand thoroughly the meaning of what we have to learn.
10. In lectures I often find myself questioning what we're told, and looking for other interpretations.
12. Interesting problems I meet often set me off on long chains of thought.
19. Often I follow up interesting ideas mentioned in class.
24. I usually try to play about with different ways of looking at an idea or problem.
25. I try to relate things in the course to real-life situations, whenever I can.
28. Sometimes I find myself thinking about ideas from the course when I'm doing other things.

Achieving Orientation

2. I organise my study time carefully to make the best use of it.
5. It's important to me to get better marks than my friends if I possibly can.
7. It's most unusual for me to be late in handing in work.
11. I keep an eye on the syllabus and on previous exam papers to decide my own priorities in studying.
15. I enjoy competition: I find it stimulating.
17. I'm pretty good at getting down to work whether its during the day or in the evenings.
27. Before I begin studying, I weigh up what priority I should give to the various things I have to do.

Reproducing Orientation

4. I find I have to memorise a good deal of what we have to learn.
6. I worry a good deal about whether I'll do well enough to stay on the course.
13. I often seem to panic in an exam, making my mind go blank.
23. I find I tend to remember things best if I think about the order in which they were presented.
26. Often I find I have to read things without having a chance really to understand them.

Non-academic Orientation

8. I find it difficult to concentrate on work for any length of time.
9. I can't see the relevance of much of what we're doing here.
18. Personal relationships seem to distract me from my work, one way or another.
21. Often I find myself wondering whether the work I'm doing here is really worthwhile.
22. I find most of the work here awfully boring.

Academic self-confidence (reversed scoring)

1. I don't seem to have a good grasp of the subjects I'm studying yet.
16. I find it really difficult to pick out the most important points in lectures or books.

TRANSITION FROM SCHOOL TO HIGHER EDUCATION

Please fill in details or circle code numbers as appropriate.
If you need extra space for any answers please continue on to back page.
All answers will be kept confidential

BACKGROUND INFORMATION

1 Surname.....First Name.....

2 Sex Male.....1 Female.....2

3 Institution Edinburgh 1 Strathclyde 2 Napier 3 Paisley 4

4 Qualification sought BA 1 MA 2 BComm 3 BSc 4 BEng 5

Main subject of degree.....

5 Age on starting this course .....yrs

6 Did you enter the first year straight from school? Yes.....1 No.....2
If *No,* what did you do between leaving school and starting this course?

7 Have you repeated a year or transferred course? Yes.....1 No..... 2
If *Yes,* please give details:

8 Where do you live during term time?

Parents' or own home 1 Halls of residence 2 Flat 3 Digs or lodgings 4 Other 5

9 Please tell us about your parents' jobs. Fill in the grid below indicating what your parents do and where they work:

	Father (or guardian)	Mother (or guardian)
Occupation (or last job if unemployed/retired/deceased)		
Place of work (eg shop, factory,office, hospital etc)		

QUALIFICATIONS AND EXPERIENCE OF SCHOOL

10 Please enter all the grades you obtained in the grid below using the letters for the grades (A to E)

If you repeated a Higher please enter grades for both years
If you completed a course but did not sit the exam, put NS
If you sat the exam and were not awarded a grade, put F
**If you sat more than one Maths paper put all grades in same box*

SUBJECT	HIGHERS		SYS	A LEVELS
	5th Year	6th Yr/College	----------	----------
Accounting				
Art/Design				
Biology				
Chemistry				
Economics				
English				
French				
Geography				
German				
History				
Latin				
Mathematics			*	*
Mod/Gen Studies				
Physics				
Others (specify):	----------	----------	----------	----------

11 What other entrance qualifications (if any) do you have? (eg National Certificate, completion of access course, overseas qualifications etc) Please specify below:

12 In what type of school/college did you obtain your entry qualifications?

Local state school in Scotland..... 1
Independent fee-paying school in Scotland..... 2
FE College in Scotland..... 3
Local state school outwith Scotland..... 4
Independent fee-paying school outwith Scotland..... 5
FE College outwith Scotland..... 6
Sixth Form College outside Scotland..... 7
Other (please specify)..... 8.....

'F YOU HAVE HIGHER/SYS QUALIFICATIONS PLEASE GO TO Q13 (p3)
'F YOU HAVE FOLLOWED A 2 YEAR 'A' LEVEL COURSE PLEASE GO TO Q14 (p6)
'F YOU HAVE OVERSEAS OR OTHER QUALIFICATIONS PLEASE GO TO Q14 (p6)

13 STUDENTS WITH HIGHER/SYS QUALIFICATIONS

a) At which stage did you leave school?

Prior to O grade/ Olevel/Standard Grade.....	1	*PLEASE ANSWER SECTION C (p5)*
After O grade/ O level/ Standard Grade.....	2	*PLEASE ANSWER SECTION C (p5)*
After Highers in S5.....	3	*PLEASE ANSWER SECTION A (p3)*
After Highers in S6.....	4	*PLEASE ANSWER SECTION B (p4)*
After SYS/SYS and Highers in S6.....	5	*PLEASE ANSWER SECTION B (p4)*
After A levels/other qualifications in S6.....	6	*PLEASE ANSWER SECTION B (p4)*

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*SECTION A **Fifth Year Leavers***

b) How strongly did the following reasons influence your decision to leave school after 5th year?

	Very strong	Strong	Fairly	Slight	Not
I was expected to leave school then.....	5	4	3	2	1
I had the qualifications I needed.....	5	4	3	2	1
A 6th Year would have been a waste of time.....	5	4	3	2	1
My friends were leaving.....	5	4	3	2	1
To take some time out before going to college/university.....	5	4	3	2	1
My parents wanted me to leave.....	5	4	3	2	1
My school had a poor choice of SYS subjects.....	5	4	3	2	1
My parents could not afford to keep me at school.....	5	4	3	2	1
I really wanted to leave school.....	5	4	3	2	1
I wanted to get on with my college/university education.....	5	4	3	2	1
I didn't think about it, I just assumed I'd leave.....	5	4	3	2	1

Any other reasons *(please specify)*:

c) Did you consider staying on for a 6th year? Yes.....1 No.....2

d) Please explain as fully as possible why you did <u>not</u> stay on for a sixth year:

e) Do you feel that you were at any particular advantage or disadvantage when you entered this course, compared with those who did do a sixth year at school?

Advantage..... 1
Disadvantage..... 2
Neither..... 3

Please explain your answer below:

Now go to Q15 'Course Choice' (p6)

SECTION B ***Sixth Year Leavers***

b) How strongly did the following reasons influence your decision to stay on for a sixth year at school?

	Very strong	Strong	Fairly	Slight	Not
I was expected to stay on for a 6th year	5	4	3	2	1
I was too young to enter my chosen course	5	4	3	2	1
I did not have the qualifications for my course	5	4	3	2	1
My friends were staying on at school	5	4	3	2	1
The SYS course at school appealed to me	5	4	3	2	1
I enjoyed school life	5	4	3	2	1
To have better job prospects in the future	5	4	3	2	1
I needed time to decide my future plans	5	4	3	2	1
I didn't feel mature enough to start this course	5	4	3	2	1
SYS seemed a good preparation for this course	5	4	3	2	1
My parents wanted me to stay on at school	5	4	3	2	1
I didn't think about it, I assumed I'd stay on	5	4	3	2	1

Any other reasons *(please specify):*

c) Did you consider leaving school after the fifth year? Yes.....1 No.....2

d) Do you feel that you were at any particular advantage or disadvantage when you entered this course compared with those who came here directly from 5th year?

Advantage..... 1
Disadvantage..... 2
Neither..... 3

Please explain your answer below:

Now go to Q15 'Course Choice' (p6)

SECTION C ***Students who left school without Highers***

b) Why did you leave school without taking Highers?

c) How did you get the necessary qualifications to start this course?

d) Do you feel that you were at any particular advantage or disadvantage when you entered this course compared to those who stayed on at school to take their Highers?

Advantage..... 1
Disadvantage..... 2
Neither..... 3

Please explain your answer below:

Now go to Q15 'Course Choice' (p6)

14 STUDENTS WHO HAVE DONE A 2 YEAR 'A' LEVEL COURSE (OR OVERSEAS QUAL)

a) Why did you choose to enter a university/college in Scotland?

b) Do you feel that you were at any particular advantage or disadvantage when you entered this course compared to those who had done Highers/SYS?

Advantage..... 1
Disadvantage..... 2
Neither..... 3

Please explain your answer below :

Now go to Q15 'Course Choice'

All students: Please complete all of the following questions

COURSE CHOICE

15 Why did you decide to go on into higher education?

Below you will find eight reasons that are typically given by students. Indicate by circling the appropriate code number how strongly each of these reasons apply to you. Do not just choose those responses which you think would make a good impression: we want to know what you really felt. The code numbers indicate that you felt it ... very strongly = 5 ; strongly = 4 ; fairly strongly = 3 ; only rather weakly = 2 ; very weakly, or not at all = 1 .

1 The qualification at the end of the course should enable me to get a good job when I finish	5	4	3	2	1
2 I was looking for a course which would help me develop knowledge and skills which would be useful to me later on.	5	4	3	2	1
3 Having done reasonably well at school, it seemed to be the natural progression to go into higher education.	5	4	3	2	1
4 It will give me the opportunity to study the subject in depth and should provide interesting and stimulating courses.	5	4	3	2	1
5 I wanted to prove to my own satisfaction that I could cope with a degree level course.	5	4	3	2	1
6 I wanted to broaden my horizons, develop new insights, and face intellectual and personal challenges.	5	4	3	2	1
7 The facilities for sport or social activities looked particularly attractive.	5	4	3	2	1
8 I'm not really sure why I decided to continue my education: it was perhaps a mixture of other people's expectations and no obvious alternative.	5	4	3	2	1

Any other reasons *(please specify):*

16 How satisfied are you with your choice of course?

Very satisfied..... 1
Satisfied..... 2
Dissatisfied..... 3

Please explain your answer below:

17 Has this course been as you expected it to be, or quite different?

As expected..... 1
Different..... 2
Did not know what to expect..... 3

Please explain your answer below:

EXPERIENCE OF COURSE

18 How well do you feel that you have done so far on this course?

Very well	Quite well	Average	Not so well	Badly
5	4	3	2	1

19 Do you feel that the course generally started at the right level for you?

Yes.....1
No.....2 *If No, please explain:*

20 When you started this course how well prepared did you feel in terms of being able to:

	Very well	Well	Fairly	Badly	Not applic
Write your own lecture notes	5	4	3	2	1
Write essays	5	4	3	2	1
Write lab reports	5	4	3	2	1
Read textbooks and journals	5	4	3	2	1
Use library facilities	5	4	3	2	1
Work independently	5	4	3	2	1
Motivate yourself to study	5	4	3	2	1
Prepare for exams	5	4	3	2	1
Prepare for tutorials	5	4	3	2	1
Manage your time effectively	5	4	3	2	1

21 Have you considered leaving this course at any point in your first year? Yes.....1
No.....2

If *Yes*, what were the main reasons?

Difficulties with aspects of the course..... 1
Financial circumstances..... 2
Poor exam results..... 3
Difficulties in settling in/making friends..... 4
Homesickness..... 5
Disappointment with course content..... 6
Falling behind with work..... 7
Problems with girlfriend/boyfriend..... 8
Wanted to transfer to another course..... 9
Other reasons *(please specify)*:

22 Since you started has your interest in this course: Increased..... 1
Decreased..... 2
Remained the same..... 3

Please explain:

23 Approaches to Studying

The following comments have been made by students in talking about how they go about studying. We should like to know to what extent you agree or disagree with what they have said. Please go through the comments quickly indicating your immediate reaction by circling the appropriate code number. Try not to use the middle category. Circle the appropriate code number to indicate that you ...

definitely agree = 5 ; agree on the whole = 4 ; are unsure = 3 ; disagree on the whole = 2; definitely disagree = 1 .

1.	I organise my study time carefully to make the best use of it.	5	4	3	2	1
2.	I find I have to memorise a good deal of what we have to learn.	5	4	3	2	1
3.	I always set out to understand thoroughly the meaning of what we have to learn.	5	4	3	2	1
4.	On average, I suppose I do at least two hours work an evening.	5	4	3	2	1
5.	I don't seem to have a good grasp of the subjects I'm studying yet.	5	4	3	2	1
6.	I try to make the right impression by handing in work which looks good and is on time.	5	4	3	2	1
7.	I worry a good deal about whether I'll do well enough to stay on the course.	5	4	3	2	1
8.	In lectures I often find myself questioning what we're told, and looking for other interpretations.	5	4	3	2	1
9.	Generally I fit in a couple of hours' work of my own during the day.	5	4	3	2	1
10.	I find it difficult to concentrate on work for any length of time.	5	4	3	2	1
11.	It's important for me to feel that I'm doing really well on the courses here.	5	4	3	2	1
12.	I often seem to panic in an exam, making my mind go blank.	5	4	3	2	1
13.	Interesting problems I meet often set me off on long chains of thought.	5	4	3	2	1
14.	At weekends, I often spend at least four hours on my work.	5	4	3	2	1
15.	I can't see the relevance of much of what we're doing here.	5	4	3	2	1
16.	I enjoy competition: I find it stimulating.	5	4	3	2	1
17.	I like to be told precisely what to do in essays or other written work.	5	4	3	2	1
18.	Often I follow up interesting ideas mentioned in class.	5	4	3	2	1
19.	In vacations, I make sure I keep several days clear for studying.	5	4	3	2	1
20.	I find it really difficult to pick out the most important points in lectures or books.	5	4	3	2	1
21.	I'm pretty good at getting down to work whether its during the day or in the evenings.	5	4	3	2	1
22.	I find I rely a lot on formal definitions to explain the meaning of important concepts or ideas.	5	4	3	2	1
23.	I try to relate things in the course to real-life situations, whenever I can.	5	4	3	2	1
24.	I try to get some work done between classes if I possibly can.	5	4	3	2	1
25.	I find most of the work here awfully boring.	5	4	3	2	1

Any comments?

24 Experiences of this subject

Now we are interested in your actual experiences of being taught in this particular department. Circle the appropriate numbers, using the codes to indicate your level of agreement, as before...

definitely agree = 5 ; agree on the whole = 4 ; unsure = 3 ; disagree on the whole = 2; definitely disagree = 1 .

1.	We are given a good idea of the standard we are supposed to reach.	5	4	3	2	1
2.	We're encouraged to follow our own interests in this course.	5	4	3	2	1
3.	The reasons why things are in the syllabus are made clear to us.	5	4	3	2	1
4.	The various course topics seem to come in a clear logical order.	5	4	3	2	1
5.	The workload is really much too heavy to keep up properly.	5	4	3	2	1
6.	Lecturers often seem to assume we know things that we don't.	5	4	3	2	1
7.	Most of the material in lectures is interesting.	5	4	3	2	1
8.	Many of the ideas in lectures are very difficult to follow.	5	4	3	2	1
9.	The relevance of what is being taught is usually easy to see.	5	4	3	2	1
10.	Lecturers are good at bringing things down to our level.	5	4	3	2	1
11.	New ideas are dealt with in lectures much too quickly.	5	4	3	2	1
12.	Lectures seem to be well planned and well structured.	5	4	3	2	1
13.	Lecturers generally explain things clearly.	5	4	3	2	1
14.	Real life examples are often used to help us to understand things.	5	4	3	2	1
15.	Many of the lecturers enliven the lectures with a bit of humour.	5	4	3	2	1
16.	Most of the lecturers are enthusiastic about their subject.	5	4	3	2	1
17.	The lecturers seem to recognize what we'll find difficult.	5	4	3	2	1
18.	We're encouraged to discuss work difficulties with staff.	5	4	3	2	1
19.	Markers' comments are usually helpful and constructive.	5	4	3	2	1
20.	We get a good idea of how well we're doing on this course.	5	4	3	2	1
21.	We receive good advice on study skills from staff.	5	4	3	2	1
22.	Course books are usually easy to get hold of.	5	4	3	2	1
23.	To do well in the exams you have to show you understand things.	5	4	3	2	1
24.	You have to have read around the lectures to do well on this course	5	4	3	2	1
25.	The examiners here seem to judge you mainly on how well you're able to reproduce the information presented in lectures.	5	4	3	2	1

Any comments?

25 Teaching preferences

This section asks about your preferences for different types of lecturing style, exam type, tutor style and course type. Please respond by circling the appropriate code number as before...

I generally prefer lecturers who

1.	- show us how what we're learning relates to the outside world.	5	4	3	2	1
2.	- tell us exactly what to put down in our notes.	5	4	3	2	1
3.	- show us what they themselves think about a subject.	5	4	3	2	1
4.	- entertain us, rather than concentrating on the content.	5	4	3	2	1

I generally prefer exams which

5.	- give me an opportunity to show I've thought about the course.	5	4	3	2	1
6.	- can be answered directly from the material in our notes.	5	4	3	2	1
7.	- indicate the marks or importance of each part of the question.	5	4	3	2	1
8.	- have open questions which allow different lines to be followed.	5	4	3	2	1

I generally prefer tutors who

9.	- get us discussing ideas among ourselves.	5	4	3	2	1
10.	- go over the lecture to make sure we haven't missed anything.	5	4	3	2	1
11.	- interact with our ideas by showing what they think of them.	5	4	3	2	1
12.	- enjoy chatting about things not really to do with the course.	5	4	3	2	1

I generally prefer courses where

13.	- we're able to follow our own interests quite a lot	5	4	3	2	1
14.	- it's made very clear just which books we have to read	5	4	3	2	1
15.	- it's clear how important the various topics are for the exams	5	4	3	2	1
16.	- we're encouraged to read around the subject a lot	5	4	3	2	1

26 What were the biggest difficulties you had in moving from school (or elswhere) to this institution?
(a) academically

(b) socially/personally

27 What might have been done to help you with the transition?
(a) before entering

(b) at your present college/university

Any other comments/observations on your experience of first year?

THANK YOU FOR YOUR HELP (Department of Education, University of Edinburgh)

Transition from School to Higher Education Study - Scoring key for inventory

Meaning Orientation

3. I always set out to understand thoroughly the meaning of what we have to learn.
8. In lectures I often find myself questioning what we're told, and looking for other interpretations.
13. Interesting problems I meet often set me off on long chains of thought.
18. Often I follow up interesting ideas mentioned in class.
23. I try to relate things in the course to real-life situations, whenever I can.

Achieving Orientation

1. I organise my study time carefully to make the best use of it.
16. I enjoy competition: I find it stimulating.
21. I'm pretty good at getting down to work whether its during the day or in the evenings.
6. I try to make the right impression by handing in work which looks good and is on time.
11. It's important for me to feel that I'm doing really well on the courses here.

Reproducing Orientation

2. I find I have to memorise a good deal of what we have to learn.
7. I worry a good deal about whether I'll do well enough to stay on the course.
12. I often seem to panic in an exam, making my mind go blank.
17. I like to be told precisely what to do in essays or other written work.
22. I find I rely a lot on formal definitions to explain the meaning of important concepts or ideas.

Non-academic Orientation

10. I find it difficult to concentrate on work for any length of time.
15. I can't see the relevance of much of what we're doing here.
25. I find most of the work here awfully boring.

Academic self-confidence (reversed scoring)

20. I find it really difficult to pick out the most important points in lectures or books.
5. I don't seem to have a good grasp of the subjects I'm studying yet.

Time

4. On average, I suppose I do at least two hours work an evening.
9. Generally I fit in a couple if hours' work of my own during the day.
14. At weekends, I often spend at least four hours on my work.
19. In vacations, I make sure I keep several days clear for studying.
24. I try to get some work done between classes if I possibly can.