UNIVERSITY OF CAPE TOWN

FACULTY OF EDUCATION

AN INVESTIGATION INTO THE ASSOCIATION BETWEEN QUALITATIVELY DIFFERENT PERCEPTIONS OF THE LEARNING CONTEXT AND STUDENTS' APPROACHES TO STUDYING

A dissertation
presented in fulfillment
of the requirements for the degree of

Doctor of Philosophy

by

PHILLIP PARSONS

MARCH 1992

PREAMBLE AND DECLARATION CONCERNING JOINT AUTHORSHIP OF PUBLICATIONS REFERRED TO IN THIS THESIS

PREAMBLE

A number of distinct paradigms exist in the field of research into student learning in higher education. It is inevitable that new research initiatives will adopt one of these paradigms as the primary focus of the investigation. However, the relationship that exists between paradigms is not one of mutual exclusivity; rather it is synergetic in nature with developments in one informing advances in another.

The perspective adopted in this thesis research is grounded in the naturalistic investigations into student learning in higher education undertaken by Noel Entwistle and his fellow researchers. When reference is made to this distinctive paradigm it is not to suggest that other researchers, adopting fundamentally different paradigms, have not informed the development of the concepts and ideas that are distinctive to this perspective. Indeed, parallel work undertaken by John Biggs into student motivation and its relation to approaches to studying made a significant contribution to the development of specific aspects of the paradigm, a contribution which may not be explicitly clear to readers unfamiliar with the early development of the Approaches to Studying Inventory.

Similarly, the pioneering work on the intellectual development of students in higher education undertaken by William Perry provided an important basis for the refinement of concepts within the paradigm that this thesis research has adopted.

Because the work of these researchers is implicitly acknowledged, it is important to stress that their role was at least as important as the role of those whose contributions are more explicitly evident, and who subsequently took their ideas and developed them further within the specific paradigm.

Phillip G Parsons

DECLARATION BY SUPERVISOR

The research undertaken by the candidate took place in the context of a much broader research programme being conducted at the University of Cape Town under the direction of Professor J.H.F. Meyer who also supervised this thesis research. A consequence of the overlapping research areas and interests of the candidate, and of the supervisor, respectively, inevitably led to the development of a close, symbiotic and interactive working relationship between the two.

An inevitable, and indeed highly desirable, consequence of this relationship was the considerable extent to which the candidate's research was informed by, and also informed, the research of his supervisor as evidenced in a number of a joint research publications. Such a productive working relationship does not always act in the interests of the candidate for the purposes of judging the merits of a PhD thesis; a question inevitably arises as to what the candidate's contribution has been to any co-authored publications cited in support of the thesis research, notwithstanding the fact that it is the thesis, and not the publications, that are under examination.

In the candidate's interest it has been deemed necessary to anticipate and address such a question in respect of co-authored papers that fall into two categories: those actually forming a part of the candidate's thesis research (these co-authored papers are included as Appendix H) and those forming a part of the supervisor's research. The equally important additional cited publications that bear only the candidate's name are obviously and entirely his own, unaided work.

Studies forming a part of the candidate's research

a) Meyer, Parsons and Dunne (1990a)

In this study the candidate was entirely responsible for the design and execution of the study which was undertaken at his own institution. He was also responsible for the introduction and the description of the investigation. He suggested the use of the term 'study orchestration' to specifically capture manifestations of approaches to studying as a response to perceptions of the learning context that is affected by the qualitative level of perception.

The intellectual thrust in this paper lies in the formulation of conceptual categorisation 'rules' applicable to individual-level study behaviour. The categorisation of students reported in this study was effected by synthesising a set of conceptual conditions independently formulated and applied by the candidate and by the supervisor. (In subsequent published work the supervisor has independently developed the definition of 'study orchestration' in terms of applying it to more generalised forms of contextualised study behaviour, has refined a set of conceptual 'rules' that go with it and explored its application within an individual difference statistical model of student learning).

The supervisor in this study was additionally responsible for the instrumentation employed and the execution of all the unfolding analyses, their interpretation and the conclusions emanating therefrom.

The third author was responsible for all the categorical data analyses on whose interpretation some of the main arguments of the study rest.

The discussion and conclusions of this study are thus not attributable to a single author; they reflect a joint contribution as indicated.

b) Parsons and Meyer (1990a)

This study reports work entirely undertaken by the candidate and represents a crucial pilot stage in the development and evaluation of the intervention programme that forms the essence of his thesis research. As such, the candidate was responsible for the design of the study as well as the collection and interpretation of all the data.

The supervisor's contribution consisted of supplying the instrumentation and performing the computation required to produce the (observed) individual study profiles given to the students as part of the intervention programme. In addition, he contributed to the drafting of the paper and its revision in the light of referee's comments.

Studies forming part of the Supervisor's research

a) Meyer, Parsons and Dunne (1990b)

This study sought to explore the stability of individual study orchestration over time in a sample of engineering students at the University of Cape Town.

The candidate was responsible for one of two sets of categorisations carried out for all the students on two occasions. The supervisor independently carried out a duplicate set of categorisations. Both sets of categorisations informed the final categorisations used in the study. The candidate also shared responsibility for the gathering and interpretation of the interview data and the conclusions emanating therefrom.

The supervisor was responsible for all the unfolding analyses, their interpretation and resultant conclusions.

The third author was responsible for all the categorical data analyses, their interpretation and resultant conclusions.

In this paper the responsibility for the design and execution of the research was substantively attributable to the supervisor. All three authors contributed to the conclusions as indicated through their respective responsibilities.

b) Meyer and Parsons (1989a)

This paper forms an extremely important part of the background to the candidate's thesis research as well as the supervisor's own research, for the conclusions of this study provided much of the impetus towards the development of an individual-difference model of student learning.

The candidate was responsible for the initiation of the study and the gathering and checking of the substantial amounts of data involved. He was also primarily responsible for the comparative analyses, interpretation and conclusions relating to the discussion on the first order factoring, and contributed on an equal basis to the drafting and revision of the paper as a whole. This aspect of the published work formed the basis of a successful M Ed degree programme.

The supervisor was responsible for carrying out the first order factoring, and the ex post facto regression analysis and higher order factoring that served as the substantive basis for investigating the empirical structures of the ASI and CPQ.

The important conclusions of this paper are equally attributable to both authors.

JHF Meyer, MSc PhD

Supervisor

PREFACE

The revision of this thesis submission has been greatly assisted by the constructive comments made by the anonymous examiners, to whom I am greatly indebted. I hope that in its present form it makes a worthwhile contribution to the advancement of our understanding of some of the complex relationships that contribute to successful learning in higher education.

The revised thesis contains an Introduction which attempts to place the reported research in the context of on-going studies into student learning in higher education. In order to make the thesis more easily understood by the non-specialist an attempt has been made to explain some of the "jargon" associated with the research perspective adopted, while recognizing that much of the terminology has now gained wider acceptance in the international literature on student learning.

In order to strengthen the empirical basis for the conclusions of the study, additional longitudinal data has been introduced which both supports and extends the findings reported in the original thesis. This additional data has made it possible to draw more comprehensive conclusions and to expand the implications of the study to encompass student support, staff development and course and curriculum design.

At the same time, areas for further research have been identified and some suggestions made as to the directions that this research might take.

It is hoped that these revisions will make the application of the findings of this study to the practice of higher education more immediate and accessible.

March 1992

AN INVESTIGATION INTO THE ASSOCIATION BETWEEN QUALITATIVELY DIFFERENT PERCEPTIONS OF THE LEARNING CONTEXT AND STUDENTS' APPROACHES TO STUDYING

PARSONS, Phillip University of Cape Town 1992

ABSTRACT

The aim of this thesis research was to investigate the possible effects that changing students' qualitative perceptions of learning context might have on their approaches to studying and their learning outcome.

As a basis for this investigation it was necessary to explore the posited association between qualitative perceptions of learning context and approaches to studying at the level of the individual, making use both of emerging theoretical insights and empirical studies. The Approaches to Studying Inventory (ASI) and the Qualitative Context Inventory (QCI) were considered appropriate instruments for this purpose, supported by student interviews.

Preliminary studies provided support for the use of study orchestration profiles as the basis for categorizing students according to their qualitative approach to studying and associated contextual perceptions. Empirical studies

yielded evidence that these categories were associated with success or failure in a manner entirely consistent with the theoretical model on which the categorization was based. As a result of these studies it was posited that a meaning orchestration and associated "deep" perceptions of learning context were a necessary prerequisite, although not a guarantee, of successful performance in higher education. Students with a "disintegrated" meaning orchestration together with the absence of "deep" perceptions of the learning context were unlikely to be successful in traditional examinations.

The question was then addressed as to whether an intervention programme could be designed for students identified as being "at risk", based on the proposition that learning outcome might be influenced by alterations to the perceptions of the context in which learning occurs. A pilot study was undertaken, using nine students in two classes in the School of Electrical Engineering at the Cape Technikon. The form of the intervention programme was informed by intervention models derived from other research perspectives.

On the basis of the positive results of the pilot intervention a larger-scale programme was undertaken using twenty-seven students in four classes in Electrical Engineering. The results of this study are reported and the changes that the intervention effected are explored statistically and by way of interview data.

It is concluded on the basis of both studies that the majority of students, not only those categorized as being "at risk", benefitted in terms of improved test and examination performance as a result of participating in the intervention programme. This benefit was more significant for second year students. Interview data provided evidence that this improved performance was associated with qualitatively improved perceptions of learning context and approaches to studying. The benefit of participating in the programme for the teachers concerned is also explored.

The adequacy of the intervention model is assessed and the implications of the study for the design and implementation of intervention programmes aimed at assisting students "at risk" is discussed. Methods of integrating the principles of the intervention into traditional classroom teaching in higher education are also proposed.

DECLARATION

I declare that this dissertation is my own, unaided work. It is being submitted for the degree of Doctor of Philosophy in the Faculty of Education of the University of Cape Town. It has not been submitted before for any degree or examination in any other university.

Phillip Parsons

March 1992

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ACKNOWLEDGEMENTS

The search for truth and knowledge requires the inspiration provided by significant others. The inspiration for this research project was derived from the work of Professor N J Entwistle and Professor J H F Meyer, to whom I would like to express particular appreciation.

In addition, from an extensive list of people whose support, encouragement and advice only I can truly appreciate, I would like to single out for special mention:

- Professor J H F Meyer for the intellectual rigor of his supervision,

- Dr T T Dunne for his advice on aspects of the statistical analyses,

- Mr Vidius Archer and Mr Tertius du Bruyn for their enthusiastic support of and wholehearted involvement in this project,

- my colleagues at the Cape Technikon, particularly Dr M Welgemoed, for their encouragement and patience, and

- my wife, Phillippa, and family, whose support and unending patience were indispensable throughout.

INTRODUCTION

This study needs to be viewed in the developing context of student learning in which it occurred; specifically in the time period between 1989 and 1990. It reflects the dynamic and symbiotic nature of the research presently being conducted in learning in higher education by which our understanding of the complex processes and relationships involved is being incrementally advanced. As such, it is hoped that it might contribute to changing practices in higher education.

The studies that are reported in this thesis have, as their background, the intense interest generated into the self-reported experiences of learning in higher education occasioned by the pioneer phenomenographic work of Marton and Säljö (1976a, 1976b). This interest was fueled by the work of Entwistle and Ramsden (1983) which further focussed attention on the implications of this research for the practice of higher education.

The complex inter-relationships that exist between the various factors that influence the outcome of learning have been the subject of much speculation. The possibility of moving from speculation to systematic exploration, based on the work of researchers in the phenomenographic field, proved an exiting challenge which was taken up by the international research community.

The most notable of these, and perhaps the most widely cited, was the extensive study by Entwistle and Ramsden (1983) which sought to examine the ways in which students in different higher education disciplines approached the task of studying and what related effects certain dimensions of the context in which learning took place had on learning outcome. While their (and subsequent) studies provided evidence of relationships between the qualitatively different ways in which students perceived the learning context and their approaches to studying, this evidence was analysed (and interpreted) at the group rather than the individual level.

An area of immediate interest was to explore what practical aspects of higher education could be altered in order to bring about desired changes in students' approaches to studying. For this reason the exploration of the very important posited relationship between certain dimensions of the learning context and <u>individual</u> student's approaches to studying received considerable attention. This relationship was seen by all researchers (see for example, Ramsden, 1987) as being of fundamental importance since it appeared to offer the prospect of affecting changes in approaches to studying where direct attempts to change the approach adopted by individual students had met with limited success (Ramsden, Beswick & Bowden, 1986).

The first step was to establish explicitly the linkages between perceptions of context, approaches to studying and learning outcome. In that endeavor the parallel work of

Meyer (1988) provided a more rigorous conceptualization of individual perceptions of certain dimensions of the learning context than had previous studies. Using this conceptual framework it was now possible to explore empirically these associations, aided by the relatively new technique of multidimensional unfolding (Meyer & Muller, 1988). These developments, with which the author was intimately involved (see Meyer, Parsons & Dunne, 1990a, 1990b), proceeded rapidly and formed the ongoing background against which this study was conducted. They provided sufficient empirical evidence for the author to address the central question which this thesis research sets out to answer: can students' approaches to studying be influenced by operating on the learning context; more specifically by operating on the context in a subjective rather than an objective sense at the level of individual perceptions formed about it.

The question posed thus seeks to explore influences on study approaches that are more basic than those attributable to the learning context in general terms, the argument being that altering the context in an objective sense does not necessarily alter students' perceptions about the context. This thesis research, therefore, proceeds to examine the effects of explicitly altering students' perceptions about the objective reality of their own learning experiences.

This question was addressed against the background of an emerging conceptual extension of the idea of study orientation (a relatively fixed approach adopted by students) to that of study orchestration (a context-specific approach to studying adopted by individual students on the basis of their perceptions of the learning context). The concept of study orchestration made it possible to develop a validated method of representing individual study orchestrations by way of an individual study orchestration profile. General "rules" for the categorization of these profiles into conceptually consistent and valid categories were then developed whereby the association between different categories and examination performance could be investigated. On the basis of a number of studies it became apparent that there was a consistent conceptual and empirical association between the categorization of students (on the basis of their approach to studying and associated perceptions of the learning context) and their test and examination performance. Students categorized as being "at risk" generally performed poorly, and these students were therefore identified as those who might benefit most from some form of intervention. It was proposed that this intervention would focus primarily on improving students' approaches to studying by changing their perceptions concerning certain key dimensions of the learning context.

On the basis of these studies and the emerging model of learning that this (and other contemporary) research was informing, it was possible to determine the nature and form of the intervention. Implementing the intervention made it possible to examine the effects on small numbers of students in a number of different classes over a period of two semesters. Both quantitative and qualitative data provided evidence as to the real and perceived benefits of such an intervention programme. No other published intervention programme has been implemented on the basis of an alternative conceptual model which has empirically demonstrated the association between students' perception of learning context, approaches to studying and learning outcome.

While the intervention addressed the fundamental aspect of changing students' perceptions about certain dimensions of the learning context, contemporary research was extending and validating the concept of study orchestration in different contexts. Longitudinal data was also becoming available which further illuminated the longer-term association between orchestration category and learning outcome, as well as the longer-term effects of the intervention programme. This pool of quantitative and qualitative data provides a source for advancing our understanding of the complex inter-relationships referred to at the beginning of this Introduction.

Since this study was conducted at least one other intervention programme has incorporated both its content and its form together with other aspects which have emerged from the work of the team at the University of Cape Town and from researchers elsewhere.

CHAPTER ONE

PHENOMENOGRAPHIC STUDIES OF STUDENT LEARNING AND THE SEARCH FOR FACTORS ASSOCIATED WITH LEARNING OUTCOME.

THE SEARCH FOR A RESEARCH METHODOLOGY TO EXPLORE THE PHENOMENON OF STUDENT LEARNING IN HIGHER EDUCATION

The learning process has always been one of the most tantalising of human activities, not only because each person is intimately acquainted with it but also because it is probably one of the most complex of all human endeavors. If the problem were simply that of identifying the many factors which influenced the outcome of learning, that would have proved daunting enough, but attempting to describe their inter-relationship confronts researchers with a problem that appears to defy solution.

Researchers have traditionally approached the search for factors which influence learning from a first-order perspective, the perspective of the observer (Marton, 1981). This approach has generally involved a process of experimentation or observation, description, conceptualisation, theory construction and validation.

While not wishing to denigrate the results of such traditional research, the comment by Shulman (1970) provides an apt summary of work done prior to the 1970s.

> "If the object of such research is the development of coherent and workable theories, researchers are nearly as far from that goal today as they are from controlling the weather. If the goal of educational research is significant improvement in the daily functioning of educational programs, I know of little evidence that researchers have made discernible strides in that direction." (p371-372)

It is hard to see much evidence of recent significant advances in traditional educational research which would modify this evaluation.

When attention is focussed specifically on the area of higher education the picture is not much brighter. Until comparatively recently learning in higher education was not considered a legitimate field of research and even the field of androgogics (the study of adult learning) was based largely on the principles enshrined in pedagogics (the study of learning in children). It would be hard to find any studies before the middle of the 1970s which attempted to address the question of <u>how</u> students in higher education learn, in contrast to studies of <u>what</u> or <u>how much</u> students learn under differing conditions of "instruction".

> "The study of student learning in high school and university has developed as a research area in its own right only in the last 10 or 15 years. ... Earlier work was restricted essentially to the prediction of academic performance by such factors as IQ, socioeconomic status, personality and cognitive style variables, special abilities, prior knowledge, interest in the subject matter, and so on (for example, Lavin, 1965). This kind of work was dictated by the approach which characterized

> educational psychology at that time; this was nomothetism,, or the search for general laws. 'Academic performance' was conceived of in ways little different from any other kind of performance; a student was simply characterized as the intersection of several continua of cognitive and affective variables." (Biggs, 1987 p1)

This failure to address what is, after all, the fundamental question, was largely the result of inappropriate research perspectives. While it might be claimed that training pigeons to press bars and observing the behavior of rats in a maze might give us clues as to how humans behave in simple learning situations, and that observing the way in which infants learn to conceptualize the world around them might provide useful insights into how children learn, these perspectives are obviously inadequate and inappropriate when applied to the complex process of learning in higher education. As Säljö (1988 p34) describes it: "Research mostly follows the hypothetico-deductive paradigm and the <u>independent variables</u>, such as intelligence, motivation, social class or any other of the factors that are used in research on learning, and the <u>outcome variables</u> (grades, test results, level of interest, etc) are borrowed from existing theories, or perhaps sometimes even taken from everyday assumptions about how such factors relate." It is for this reason that prior to the 1970s what research did take place into learning in higher education focussed more on comparative methods of presentation in which learning could be quantitatively measured than on how students engaged the task of learning based on their own perceptions of the processes involved. Such research awaited the development of an adequate and appropriate perspective. This perspective was provided by the work of educational researchers in Sweden in the early 1970s and has profoundly influenced the course of research in higher education, particularly in Britain and Australia.

THE PHENOMENOGRAPHIC RESEARCH PERSPECTIVE

Early research into learning was driven essentially by attempts to demonstrate the validity of psychological theories of education, and these attempts largely failed to explain observational phenomena. Phenomenography, as a research perspective, looks at learning from a fundamentally different starting point. It emphasizes idiographic rather than nomothetic explanations of student learning. Ramsden (1988c p5) succinctly described this difference: "Unlike some applications of psychology to education, it is not concerned with depicting the general processes of perception, thinking and management, nor with deriving law-like generalizations that can be applied to any subject matter or context." Phenomenography adopts a second-order perspective in describing, not objective reality, but people's ideas and perceptions about that reality. This allows us to "gain access to such phenomena [the way people go about teaching and learning] and analyze, in detail, representative instances of people engaged in such activities" (Säljö, 1988 p34). This alternative perspective provides a conceptual framework which is sensitive to the complex activity of learning in higher education.

One of the primary aims of phenomenographic research is to generate categories which fully capture the conceptions that people hold on a certain aspect of reality (Marton, 1981, 1986; Säljö, 1988). These categories are not generated *a priori*; they are developed on the basis of "structurally significant differences that clarify how people define some specific portion of the world" (Marton, 1986 p34). These categories are categories of perceptions of reality, not of the reality itself. "There is always a filter through which the world is seen if it is to be meaningful. The interest in this filter - the conceptions of reality that we have acquired as participants in human communication - is what characterizes phenomenography as a scientific undertaking." (Säljö, 1988 p37)

Marton (1986) identified four other characteristics of phenomenographic research. These are particularly important when it comes to looking for factors which affect educational outcome, as will become apparent later. Firstly, phenomenography is relational. That implies that all educational phenomenographic research is the exploration of relationships between the learner and what is learned, between conceptions of reality and the factors which influence those conceptions. The widely quoted work of Marton and Säljö (1976a, 1976b) illustrates this point.

They demonstrated that students adopt the now famous deep-level or surface-level processing approach dependent on their conceptions of the task requirement and that these levels of processing were related to qualitative levels of outcome. Level of processing is not an entity in itself, it is a relational response to perceptions of a specific context in which certain material has to be learned. (Context is used to describe the formal and informal environment in which learning takes place.) Levels of outcome are not separate entities; they are constructed on the basis of the content and the qualitatively different conceptions held by students of the same topic. "Within phenomenography, thinking is described in terms of what is perceived and thought about; the research is never separated from the object of perception or the content of thought." (Marton, 1986 p32) Or as Säljö put it: "Conceptions are conceived as relational phenomena rather than as inherent qualities in the mind of the thinker..."(Säljö, 1988 p44). The relational aspect of the student to that which he learns, thinks about and understands is always fundamental to any phenomenographic study (Marton, 1986; Ramsden, 1988c).

This highlights the second important feature of phenomenographic research, namely that phenomenographic studies are qualitative. The term "qualitative" implies that the categories generated about a particular aspect of reality are not concerned merely with differences in quantity (eg. how much different students know about a particular aspect) but reflect conceptions which are fundamentally different in quality. These two inter-related features are described by Ramsden (1988c p3-4) thus:

> "The most fundamental principle in this theory is that learning should be seen as a qualitative change in a person's way of seeing, experiencing, understanding, conceptualizing something in the real world - rather than as a quantitative change in the amount of knowledge someone possesses. Seen in this way, learning is a change in the <u>relation</u> between a person and the world around the person. For learning to take place, our conception of something in the world must change. So the subject of this perspective is simply the <u>relations</u> between people and the world around them."

A third aspect of phenomenographic research which flows from the other two is that phenomenography is <u>experiential</u>. It is concerned with the individual's experiences, perceptions, conceptions and understandings of the world as he sees it, not as we (the observers) think he sees it. "... we are not trying to look into the learner's mind, but we are trying to see what he or she sees; we are not describing minds, but perceptions; we are not describing the learner, but his or her perceptual world." (Johansson, <u>et al</u>., 1985 p247)

Finally, phenomenography is <u>contextual</u>. This has been a distinguishing feature from the start (Marton, 1981 p194): "we cannot gain knowledge about learning <u>as such</u>, nor about operatory structures <u>as such</u> and not even about a conception of price <u>as such</u>. (In other words, learning, operatory structures, conceptions as psychological entities are epistemologically unattainable independently of context and content.)" Not only is learning the learning of something; it is learning in context as well, and the relationship between learner and context is fundamental to any phenomenographic investigation. It is no coincidence that Marton and Säljö (1976b p124) recognised this as being a key element in their pioneer research when they stated: "... the between-group differences point to the clear modifiability and context dependence of a person's conception of learning."

Inherent in a phenomenographic approach to educational research is the identification of relational factors which can have a direct impact on the qualitative improvement of learning: "... what is of immediate pedagogical interest is how students' conceptions can be changed by teachers and how better understandings can be arrived at by students. In fact such aims are built right into these descriptive investigations." (Marton, 1986 p44) This is one of the main reasons why the phenomenographic perspective, which has had such a profound effect on research methodologies, has proved so attractive to educational practitioners. This brings us back to the starting point of this chapter, namely the search for factors associated with learning outcome.

THE COURSE OF PHENOMENOGRAPHIC TYPE RESEARCH: THE SEARCH FOR FACTORS ASSOCIATED WITH LEARNING OUTCOME

Researchers in the Department of Education at the University of Gothenburg have provided a major contribution to our understanding of student learning. Based on phenomenographic type research, Marton and Säljö (1976a, 1976b) published the results of their investigations into how students approach the task of reading academic texts. In the first part of the experiment students were asked to read fairly long academic articles and they were then questioned on how they had approached the task. On the basis of their responses the distinction between deep and surface levels of processing (later termed approaches) was made. A deep approach focussed on the meaning of the passage and used processes appropriate for facilitating understanding; a surface approach focussed on the words (signs) of the text and concentrated on memorization of information. Clearly, these two approaches are qualitatively different, and were both logically and empirically associated with qualitatively different learning outcomes - a surface approach inevitably led to inadequate understanding, while a deep approach had the potential, in the presence of other conditions, for leading to understanding.

The defining feature of the two approaches relates to the intentions evidenced by the students. A deep approach, in addition to the intention to reach a personal understanding, described above, has "its roots in an intrinsic educational orientation and a sophisticated conception of learning. In adopting a deep approach, the student has to interact critically with the content, relating it to previous knowledge and experience, as well as examining evidence and evaluating the logical steps by which conclusions have been reached." (Entwistle, 1992) By contrast, a surface approach involves an intention merely to satisfy the perceived demands of the task or course. "This approach derives from an extrinsic orientation and a simple conception of learning as memorization." (Entwistle, 1992)

Of tremendous significance in our understanding of how students in higher education learn was the parallel finding that the approach adopted by an individual student (and the associated qualitative level of outcome) was not a fixed trait but was dependent on the perceived requirements of the task: "Students adopt an approach determined by their expectations of what is required of them." (Marton & Säljö, 1976b p125) In the experiment referred to above, the requirements were in terms of the evaluation procedures that the students perceived had to be satisfied: "If the type of learning depends (as it does here) upon the type of evaluation anticipated, what is learned will undoubtedly reflect what is seen to be appropriate for that particular purpose, although by other criteria it would be considered very poor." (Marton & Säljö, 1976b p124)

The two initial studies stressed the "functional relationship between intention, process and outcome" (Ramsden, 1986a p20). At the same time, although using the perspective of information processing and, more particularly, conversational theory, Pask illuminated two qualitatively different styles that students adopt when faced with a learning task (Pask, 1976). When faced with the same task requirement, that of developing an adequate conceptual understanding, some students adopted a holistic style (comprehension learners), attempting to establish a broad overview which went beyond the immediate demands of the task itself. The use of imagination, analogies, illustrations aided the achievement of an idiosyncratic and highly personalized understanding. Other students preferred an essentially conservative serialist style (operation learners), focussing narrowly on the task and concentrating on detail and the logical order in which the material was originally presented. According to Pask (1976) the ability to be able to switch from one style to the other (versatility) is needed to achieve full understanding of complex subject material typically found in higher education.

Students adopting an extreme holistic style (globetrotting) were inclined to draw conclusions poorly supported by evidence and to use broad generalizations. Students adopting an extreme serialist style (improvidence) often failed to see important relationships or to recognise useful analogies and, as a consequence, their understanding was impoverished (Pask, 1976; Entwistle, 1992).

Before examining these, and other related research findings in more detail, it is necessary to comment on the methodology to be followed in using results such as these to explore further the phenomenon of learning in higher education. Is it necessary first to establish a coherent theory and then to validate this on the basis of empirical studies, or can we proceed with further research and attempt to synthesize this into a theoretical framework which will account for and explain observed behavior? In answering this question, Säljö (1988 p34) argued that "The problem of providing conceptual frameworks that are sensitive to the complexities of learning in everyday studying indicates the need for a broad repertoire of methods." Therefore the two approaches can be seen as complementary, in much the same way as qualitative and quantitative research can be seen as complementary. It is important, as Säljö (1988 p34) pointed out, to generate "categories of description that provide an accurate basis for theorizing and intervention". At the same time, however, we can use established categories in order to extend existing theories and examine the results of interventions based on these theories.

THE EXPLORATION OF APPROACHES TO STUDYING USING STUDENT QUESTIONNAIRES

It became apparent to some researchers that in order to operationalize the concepts proposed by the early phenomenographic type and other studies it would be desirable to follow a dual approach. Firstly, a qualitative approach by way of structured interviews (see Entwistle & Ramsden, 1983) would facilitate the exploration of the concepts in order to refine and extend them across a range of teaching and learning settings in higher education. Secondly, using self-reporting student questionnaires, the relational aspects of concepts could be explored from a quantitative perspective in order to confirm or modify the posited relationships derived from the qualitative approach. Almost all subsequent studies have adopted this dual approach.

Perhaps the best known series of studies was reported by Entwistle and Ramsden (1983). Using extensive interviews with students to derive a pool of items which could be grouped on the basis of the concepts derived from the pioneer phenomenographic type studies, together with scales previously used as indicators of different forms of motivation, study methods and attitudes (Entwistle & Ramsden, 1983 p33-55; Parsons, 1988a p36-47; Entwistle, 1992), an Approaches to Studying Inventory (ASI) was developed. This instrument was used in an initial study of 2208 students in higher education (Entwistle & Ramsden,

1983) and has subsequently been used in a large number of studies in Britain, Australia and South Africa (for summaries see Parsons, 1988a p129; Harper & Kember, 1989; Meyer & Parsons, 1989a; Richardson, 1990). It has also been used as the basis for the development of other inventories for more specific contexts (Entwistle & Kozeki, 1985; Coles, 1985; Newble & Clarke, 1986; Newble et al., 1988).

Other instruments to explore students' self-reported approaches to studying have been developed. The better known are the Inventory of Learning Processes (Schmeck, 1983), based on theories derived from cognitive psychology, the Learning and Study Strategies Inventory (Weinstein, 1988) derived in large part from traditional research into successful study methods, the Study Activity Survey (Thomas & Rohwer, 1989) which derives from both cognitive psychology and information processing theory, and the Study Process Questionnaire (Biggs, 1979, 1989) which proceeds from a theoretical model of cognitive and affective factors involved in the learning process but which nevertheless reflects many of the ideas of the early phenomenographic research, namely the basic intentional and motivational factors respectively associated with deep and surface approaches.

Inventories which have concentrated more on the role played by personal factors in the learning process have been the Learning Style Inventory (Kolb, 1976; Lovie-Kitchen, et al.,

1989) and the Learning Style Questionnaire (Honey & Mumford, 1986; Lovie-Kitchen, et al., 1989). [The research perspectives of these as well as their conceptual frameworks do not in any way relate to the phenomenographic perspective - they are referred to simply to indicate that despite their use of similar terminology they do not, strictly speaking, relate to the mainstream of phenomenographic type research into factors associated with learning outcome.]

The appeal of the Approaches to Studying Inventory has been in two areas. The first lies in its conceptual derivation. It is not linked to a particular theory of psychology; rather it seeks to explore a variety of concepts derived from different perspectives and to examine the observed manner in which these concepts inter-relate. The relationships which have emerged between concepts have been of an illuminative rather than a prescriptive nature and they have been open to reinterpretation in the light of new evidence of both a qualitative and a quantitative nature. Thus the instrument is capable of modification and extension in the light of new evidence in a way which is not always possible with an instrument which attempts to capture a previously determined, and perhaps inflexible, theoretical association.

The second major appeal lies in the fact that, parallel to the development of the ASI, a complementary instrument was developed, the Course Perceptions Questionnaire (CPQ) (Entwistle & Ramsden, 1983), which sought to explore the educational context in terms of features exhibited by different departments and, more particularly, the association between these features and the approaches to studying adopted by students within these departments. It was this exploration of the association between course perceptions and approaches to studying which first attracted the attention of the author (Parsons, 1988a). Here was an attempt simultaneously to explore students' approaches to studying and the factors that were in part instrumental in giving rise to the differences in approach: "An approach to learning, far from being an individual characteristic of the learner, is a response to the teaching environment in which the student learns. It is the student's subjective perception of the requirements of teachers - the context of learning - that is the driving force behind much of their learning." (Ramsden, 1988a p20)

THE CONCEPTUAL STRUCTURE OF THE APPROACHES TO STUDYING INVENTORY

The conceptual relationship between the ASI and the subsequently developed phenomenographic perspective has been referred to above. It is also necessary to examine in some detail its own conceptual structure before considering the empirical evidence for associations between approaches to studying, learning outcomes and contextual factors.

The ASI, in the final form used for the original research study, consisted of 64 items grouped into 16 subscales [see Appendix A]. These subscales can be <u>conceptually</u> grouped as indicated in Figure 1.

Figure 1. Conceptual grouping of ASI subscales

Motivation	Intrinsic motivation Extrinsic motivation Achievement motivation Fear of failure
Approach	Deep approach Surface approach Strategic approach
Process	Use of evidence Relating ideas
Style	Comprehension learning Operation learning
Pathology	Globetrotting Improvidence
Other	Negative attitudes to studying Disorganized study methods Syllabus-boundness

The initial study (Entwistle & Ramsden, 1983) established the conceptual and empirical coherence of the subscale groupings using alpha factor analysis and item analysis. The integrity of the majority of subscales was independently confirmed in a large-scale study (Parsons, 1988a; Meyer & Parsons, 1989a) using factor analysis. Thus at the level of the individual subscales there is strong evidence to indicate both the conceptual integrity and the empirical stability of the item groupings. This allows for an exploration of the association between subscales in order to see whether there is a latent and recurring pattern of associations between these concepts, as well as confidence that differences in these associations are not attributable to different associations at the item level.

The method that has traditionally been employed to illuminate the associations between subscales has been to use factor analysis on groups of students (Entwistle & Ramsden, 1983; Watkins, 1983; Watkins & Hattie, 1985; Clarke, 1986; Meyer & Parsons, 1989a). Such factor analytic studies have produced evidence both of consistency and variability. The evidence of four study <u>orientations</u> (second-order associations of subscales) on the basis of the first research findings (Entwistle & Ramsden, 1983) has not been supported by the majority of studies, although in most studies two, and sometimes three, major orientations emerge, defined slightly differently in terms of the presence or absence of certain subscales.

The two major orientations that most frequently occur may be defined in terms of what Meyer and Parsons (1989a) termed "primary subscales". The first orientation, a <u>meaning orientation</u>, consistently brings together intrinsic motivation, deep approach, use of evidence, relating ideas and comprehension learning. The second orientation, a <u>reproducing orientation</u>, associates most or all of surface approach, improvidence, syllabus-boundness, negative attitudes to studying, disorganized study methods and fear of failure. In addition, some studies have shown evidence for a <u>strategic orientation</u> comprised of subscales such as achievement motivation, strategic approach, syllabus-boundness, fear of failure and operation learning. The original fourth orientation, <u>non-academic orientation</u> has not been consistently replicated (see Meyer & Parsons, 1989a). These empirical associations are all consistent with the theoretically anticipated conceptual associations and provide a coherent framework within which to explore approaches to studying in different contexts.

[For the sake of consistency, the following convention of designating the subscales has been adopted. Subscales associated with the meaning orientation are designated with two upper case characters (for example, DA) and those associated with a reproducing orientation with two lower case characters (for example, sa) - the so-called "primary subscales" (Meyer & Parsons, 1989a). Subscales whose empirical associations are less well established are designated with an upper and lower case character (for example, St) where their most common empirical association is with a meaning orientation, or a lower and upper case character (for example, gL) where their most common empirical association is with a reproducing orientation - the so-called "secondary subscales" (Meyer & Parsons, 1989a). The same convention is later applied to the subscales of the Qualitative Context Inventory, discussed in Chapter Two.]

It must be emphasized that all the studies referred to so far have examined the variability of the data at the level of the group rather than at the level of the individual and that the associations of subscales represent the associations that best account for the variability of the individuals in the group as a whole.

Before proceeding to examine the association between learning outcome and approach to studying as typified by the three major study orientations referred to above, it is both interesting and significant to comment on the similarity between the results obtained from the factor analytic studies of the ASI and studies undertaken using Biggs' Study Process Questionnaire (SPQ) and Schmeck's Inventory of Learning Processes (ILP). Factor analytic studies of the SPQ have confirmed empirically the theoretically posited association between approach, motivation and strategy (Biggs, 1985, 1989a) as shown in Figure 2.

These associations are similar in most essential features to the three primary orientations derived from the ASI (Biggs, 1989b), although the model on which the SPQ is based is deliberately more "parsimonious and theoretically coherent" (Biggs, 1979 p383) than the conceptual structure which underlies the ASI. Nevertheless, the measure of independent confirmation that this provides for the association of ASI subscales is encouraging.

Figure 2. Motive and Strategy in Approaches to Learning and Studying

APPROACH	MOTIVE	STRATEGY
Deep	Intrinsic: satisfy curiosity about topic.	Maximise understanding: read widely, discuss, reflect.
Surface	Extrinsic: avoid failure but don't work too hard.	Focus on selected details and reproduce accurately.
Achieving	Achievement: compete for highest grades.	Optimize organization of time and effort.

(Adapted from Biggs, 1989a)

A recent study by Entwistle and Waterston (1988) compared the dimensions emerging from the ASI (using a substantially shortened version for reasons of practicality) and those from Schmeck's ILP and concluded that "This research suggests a remarkably close coincidence between each set of scales" (Entwistle & Waterston, 1988 p264), although cautioning against concluding that this correspondence demonstrates a similar correspondence between research on cognitive psychology and student learning.

THE ASSOCIATION BETWEEN LEARNING OUTCOME AND APPROACH TO STUDYING

If we accept that there is widespread confirmation of the conceptual and empirical association of constructs embedded in the ASI, what evidence do we have firstly of an association between study orientations and learning outcome, and secondly between contextual factors and approaches to studying?

The original research of Marton and Säljö (1976a) indicated a strong association between qualitative level of outcome and level of processing. In a more general sense, Biggs (1979) claimed an association between qualitative level of outcome as measured by his Structure of the Observed Learning Outcome (SOLO) Taxonomy and study orientation. The internalizing orientation (deep approach, intrinsic motivation, appropriate strategies to achieve understanding) was weakly linked to higher SOLO levels, while the achieving orientation (achieving approach, achievement motivation and good use of study skills) was linked to low learning complexity but high factual recall. The utilizing orientation (surface approach, extrinsic motivation and rote memorization processes) was associated with fact retention and not with complexity of response (Biggs, 1979).

In a subsequent study, Biggs and Rihn (1984) cited a wide range of empirical investigations which supported the contention that a meaning orientation (in his terms, a "deep learning strategy") results in better learning whether that learning is defined in terms of complexity of outcome, satisfaction with performance, self-rated performance in comparison with peers or examination results. These results are confirmed by empirical studies which related the orientations to examination performance at tertiary level (Watkins & Hattie, 1981) and secondary level (Biggs, 1985). In both instances the correlation between examination performance and surface approach was in the region of -0.15, and for achieving approach and deep approach in the region of 0.20. In a more recent article (Biggs, 1989a) Biggs made the contention, supported by a number of studies, that: "A surface approach is effective for recalling unrelated detail, which frequently leads to low grades; a deep approach leads to structurally complex performances, which usually lead to high grades; an achieving approach likewise to high grades, if for different reasons." (Biggs, 1989a p13)

In exploring the specific association between the subscales of the Approaches to Studying Inventory, their composite orientations and learning outcome, Entwistle and Ramsden (1983) found self-rated academic performance in higher education had a positive factor loading (.31) on the meaning orientation factor, a negative loading (-.39) on the non-academic orientation factor and a negative loading (-.26) on the reproducing orientation factor. There was only a slight association (a loading of .19) between self-rated academic performance and the achieving orientation

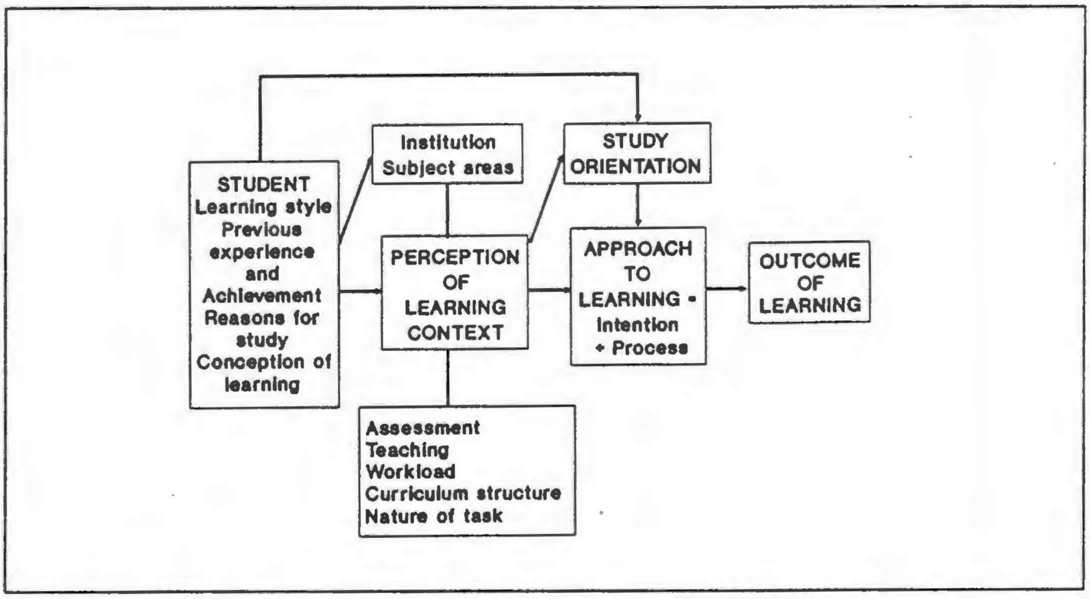
(Entwistle & Ramsden, 1983 p49-50). This pattern of associations is confirmed by a later study using a modified version of the ASI (Entwistle & Tait, 1990).

It is clear that not only is there a strong case to be made for the theoretical association between learning outcome (measured both in qualitative terms and in terms of more traditional examination results) and the major orientations to studying explored by the Approaches to Studying Inventory, there is also strong empirical support for such associations. The relatively strong association between the reproducing orientation and academic performance is negative; the association between the achieving orientation and academic performance is positive; the association between the meaning orientation and academic performance is also positive (although not as strongly so as for the achieving orientation). In this pattern of associations based on the available published studies there are no major anomalies, save for the weak association evidenced between meaning orientation and academic performance. On the basis of these associations at the group level we can now consider the associations between contextual factors and approaches to studying.

THE ASSOCIATION BETWEEN CONTEXTUAL FACTORS, APPROACHES TO STUDYING AND LEARNING OUTCOME

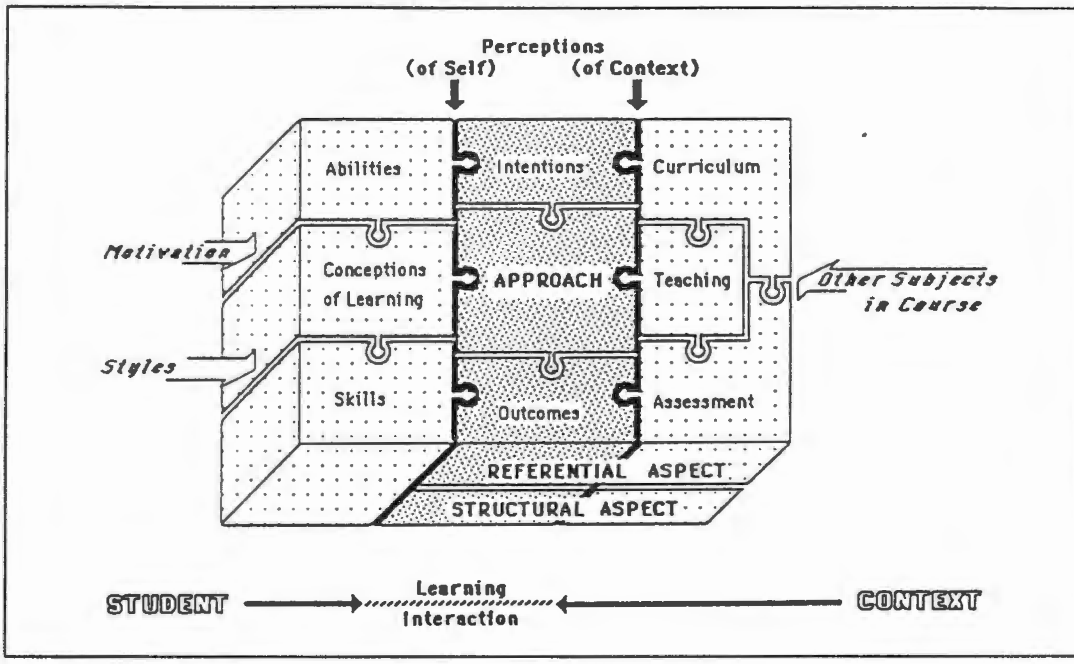
As has been stated elsewhere in this Chapter, from the earliest studies the association between contextual factors and approaches to studying has been recognised. This association has been represented diagrammatically by a number of authors (see Figures 3, 4, 5 and 6).

Figure 3. Understanding Student Learning.



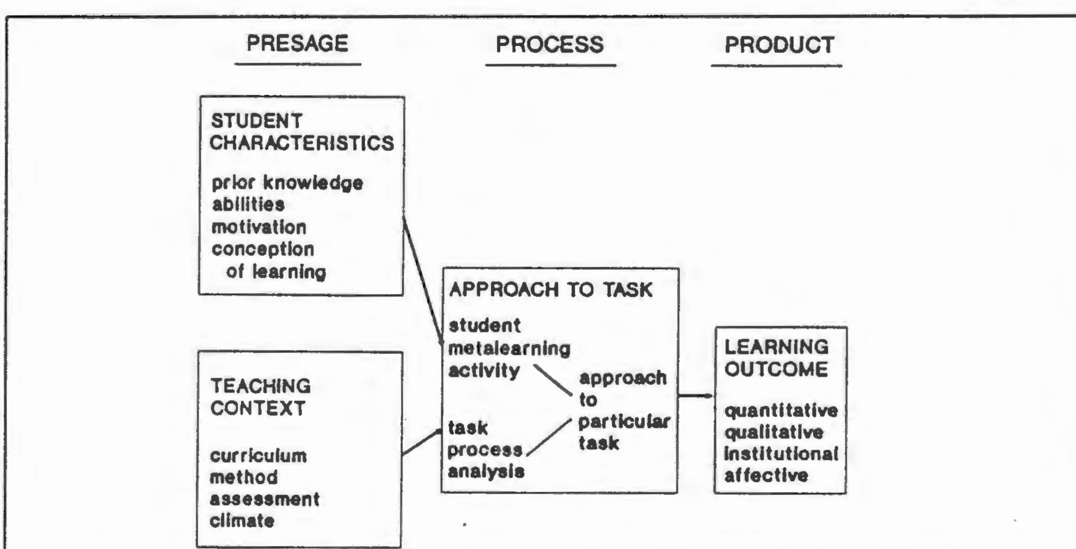
(Ramsden, 1985 p53)

Figure 4. The interaction between learner and environment depends on perceptions.



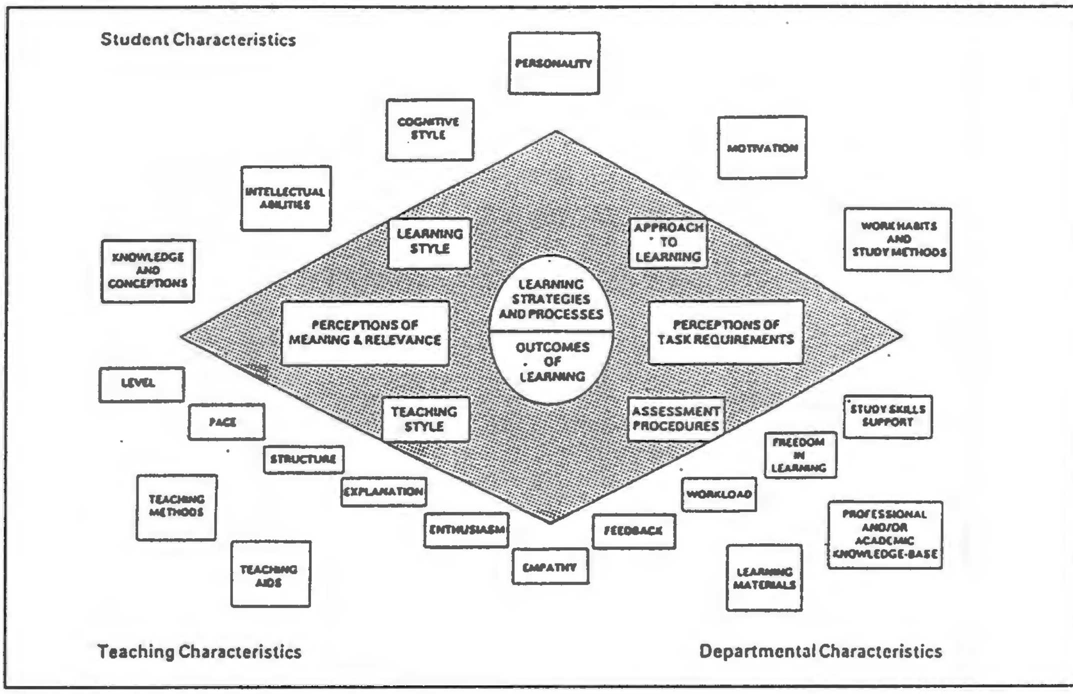
(Eizenberg, 1988 p197)

Figure 5. Presage, Process and Product in Student Learning.



(Biggs, 1989a p11)

Figure 6. A Heuristic Model of the Teaching Learning Process in Higher Education.



(Entwistle & Tait, 1990)

In addition, almost all researchers in this field acknowledge this as one of the most important relationships in our understanding of student learning (see for example, Marton & Säljö, 1976b; Biggs, 1985, 1989; Ramsden, 1985, 1986a, 1986b, 1987, 1988a, 1988b, 1988c; Fraser, 1986; Entwistle, 1987, 1992; Baird, 1988; Elton, 1988; Entwistle & Waterston, 1988; Ramsden, et al., 1989; Coles, 1990; Entwistle & Tait, 1990). What these researchers are trying to establish is perhaps best summed up by Ramsden:

> "The central argument of the research is that the **quality** of student learning depends on the students' approach to learning. The approach is in turn dependent on the student's previous experience and on how he or she interprets the requirement of the learning context. ... Students' perceptions of what

> the context demands and offers influences both their general tendencies to tackle learning tasks in particular ways (their study orientations) and their approaches to individual tasks."(Ramsden, 1986a p20)
>
> "... the question of which conditions will most encourage effective learning cannot be answered without considering our students' interpretations of the circumstances in which they learn. To improve learning, we should certainly change the conditions under which people learn, rather than trying to change the people themselves; but changing the conditions is only half the battle. One side of this view of learning is that what a student does should be understood in the context of the task; the other side is that the effect of the conditions has to be understood in terms of the perceptions of the individual learner." (Ramsden, 1988a p24)

It is clear that although the association between contextual factors and approaches to studying has been recognised by authors in the field, and many studies have been conducted into individual aspects of the learning context, very few have sought to describe the learning context of the individual in terms of a coherent conceptual framework. This situation is very similar to the situation referred to at the start of this Chapter, when the failure to address adequately the question of how students learn in a naturalistic setting was ascribed to the lack of an adequate research perspective within which to operate. This inadequacy is perhaps best illustrated by the Lancaster study and the instrumentation developed for the purpose of exploring this association.

One of the major objectives of the Lancaster study (Entwistle & Ramsden, 1983) was to explore the association between contextual factors and approaches to studying at the group level. Using an instrument specially devised for this purpose, the Course Perceptions Questionnaire (CPQ), administered together with the ASI, they investigated this association using joint factor analysis of the two instruments for the sample of 2208 students referred to previously. The CPQ represented eight dimensions which the researchers felt best captured the context of different departments on the basis of student interviews together with a survey of the relevant literature. These eight dimensions were: Formal teaching methods, Clear goals and standards, Workload, Vocational relevance, Good teaching, Freedom in learning, Openness to students and Social climate.

The results of the factor analytic studies were disappointing since there was "not a lot of overlap between the two sets of scales" (Entwistle & Ramsden, 1983 p184). The strongest association was that between workload and the reproducing orientation. The remainder of the seven subscales were all associated with factors representing the meaning orientation. Interviews conducted with students brought out other associations not revealed by the empirical analysis, although the researchers themselves admitted that these were "to some extent impressionistic and subjective, although the relationships appeared to be important ones" (Entwistle & Ramsden, 1983 p186). (These relationships will be referred to in more detail in Chapter Two when the conceptual basis for examining individual learning contexts is discussed.)

Since the CPQ appeared to be the only available instrument which could be used to explore empirical associations between perceptions of learning context and approaches to studying, a large scale preliminary study involving 1784 students who completed the ASI and CPQ simultaneously was conducted by the author in 1984. A comparative factor analytic study of the two instruments revealed an association between workload and the reproducing orientation but failed to establish any relationships between the other seven subscales and the meaning orientation. The author, in a joint publication (Meyer & Parsons, 1989a p151), concluded that "The CPQ's parsimonious model of learning context appears, in the present study, to be of limited value. No empirical associations between the CPQ and the ASI could be established with the exception of the association between the subscale 'workload' and 'reproducing orientation'." This conclusion is surprisingly in accord with the comment made by Entwistle and Ramsden in summarizing the limitations of the CPQ (Entwistle & Ramsden, 1983 p130):

> "The limitations of the CPQ are also apparent, however. Firstly, the picture provided of the perceived learning context is incomplete, because the questionnaire is unable to examine the detail of the relationships between an <u>individual</u> student's approach to a learning task and his perceptions of its context." (Author's emphasis)

It is possible that the CPQ might provide a useful tool with which to explore differences in the perceptions of different departments on the basis of indicators such as mean aggregate scores on the major study orientations as measured by the ASI. However, if we wish to investigate the association between contextual factors and approaches to studying at the individual level, then the CPQ is not an appropriate instrument. This is acknowledged by Entwistle in his invited reply to the article of Meyer and Parsons (Entwistle, 1989): "It seems likely that different kinds of items will have to be developed to explore the relationships between learning environment and students' approaches to learning."

If we wish to design an intervention programme at the level of the individual student, we need a research perspective which will allow us to explore the association between contextual factors and approaches to studying at the level of the individual student. In addition we need to be able to identify perceptions of contextual factors associated with undesirable approaches to studying and we need a clear indication of the nature of the perceptual changes that need to be effected in order to bring about a desired approach.

The methodology used to accomplish this will form the first part of Chapter Two, and the development of an instrument using this methodology will be described subsequently.

CHAPTER TWO

A CONCEPTUAL BASIS FOR THE INVESTIGATION OF INDIVIDUAL LEARNING CONTEXT.

A PHENOMENOGRAPHIC PERSPECTIVE ON INDIVIDUAL LEARNING CONTEXT

The vital role that phenomenography has played in the development of our understanding of student learning has already been referred to in Chapter One. Two distinctive features need to be elaborated upon in order to show how suitable this perspective is for exploring individual learning context.

The first of these is that an investigation from a phenomenographic perspective will generate, as one of the major outcomes, <u>categories of description</u> (Marton, 1981, 1986; Säljö, 1988). These categories will be limited in number, since one of the main premises of phenomenography is that there are "a limited number of qualitatively different ways in which the phenomena are comprehended" (Marton, 1986 p37). These categories are not simply descriptive; they are qualitatively different, implying that some are "qualitatively 'better' perceptions of reality" (Marton, 1986 p33) than others. This has tremendous potential for exploring individuals' qualitative perceptions of aspects of reality by means of an investigation which adequately maps out all the possible perceptions that individuals hold - termed the <u>outcome space</u> (Marton, 1981).

The second distinctive feature is that phenomenography is substance-orientated (Marton, 1981, 1986; Säljö, 1988) The results of such research are the phenomenography-of-something, not simply a set of conceptual categories unrelated to the content of the phenomenon under investigation. By way of illustration, we can consider the investigation reported by Dahlgren (1984) with respect to people's conceptions of 'price'. When asked the simple question: "Why does a bun cost about one [Swedish] crown?" (Dahlgren, 1984 p30) people responded with two qualitatively different conceptions. One group conceptualized price as the relationship between supply and demand, while another group conceptualized the price of the bun as representing the cost of production plus the assumed level of profit. Neither of these categories represent abstract conceptual categories; they are conceptions of something - in this instance 'price'. They are the perceptions, experiences and conceptualizations that people have about that aspect of reality, not the reality itself. There are not two types of price; we have simply arrived at two categories of perceptions about price on the basis of people's different conceptualisation. This is an important distinction because all too often researchers embody such perceptions with a factual existence, when by derivation and by definition these are qualitatively different, content-specific and context-specific descriptions.

Marton (1981, 1986) stresses these important distinctions and uses, as an analogy, the work of Piaget in the field of cognitive psychology. Piaget provided for us a detailed description of children's qualitatively different conceptions of aspects of reality as they perceived it. In so doing he was using a second-order, phenomenographic perspective. Most subsequent research in this field has, however, endowed these qualitatively different conceptions with a factual existence and considered them as conceptual stages through which children pass, as well as discrete categories into which children can be placed. However, the empirical evidence largely fails to support this, and rather reinforces the view that these so-called stages are merely descriptions of children's perceptions of reality and that these qualitative descriptions are not independent entities but are inextricably linked both to content and to context (Marton, 1981). The analogy between the course of research into children's conceptions of reality and into students' conceptions of learning and learning context must not be overlooked.

PHENOMENOGRAPHY AND THE APPROACHES TO STUDYING INVENTORY

In deciding to use the Approaches to Studying Inventory (ASI) as a tool with which to explore the association between perceptions of individual learning context and individual approaches to studying it is useful to assess in retrospect its conceptual position with respect to the phenomenographic perspective. In Chapter One the conceptual origins of the ASI subscales were discussed. In part these derive from phenomenographic type studies (Marton & Säljö, 1976a, 1976b) as well as from other research, which although owing nothing to phenomenography, nevertheless generated the same sort of qualitative category range (Pask, 1976; Biggs, 1979). In addition to these categories, the ASI contains other subscales derived from earlier work carried out by Entwistle into student learning (Entwistle & Ramsden, 1983 p33-41) which do <u>not</u> reflect a qualitative range of categories. While these may represent identifiable attitudes or activities and may be very obvious concepts used by students when describing their study habits, they do not reflect a range of qualitatively different categories; they simply indicate the presence or absence of a particular activity or attitude (Meyer & Muller, 1990b). This distinction is illustrated in Figure 7.

The process subscales, <u>relating ideas</u> and <u>use of evidence</u>, although formulated on the basis of the work undertaken by Marton and Säljö, fail to provide a suitable qualitative

Figure 7. Conceptual structure of the ASI

Perceived aspect of reality	Qualitative categories (subscales)
Approach to learning	Deep, Surface, Strategic
Learning style	Comprehension, Operation
Learning pathology	Globetrotting, Improvidence
Motivation	Intrinsic, Achievement, Extrinsic, Fear of failure
	Other categories
Cognitive process	Relating idea, Use of evidence
Approach to studying	Syllabus-boundness
Attitude to studying	Negative attitudes to studying
Study method	Disorganized study methods

range of perceptions. They are, by derivation, processes associated with a deep approach (Entwistle, 1987), but there are no other qualitatively different process categories present in the Inventory, associated, for example, with a surface approach, although argument for the existence of these (for example, the converse of relating ideas) has been presented in Meyer and Parsons (1989a).

Similarly the subscale strategic approach fails to reflect the qualitative differences evident in the work of Miller and Parlett (1974) from which it was partially derived (Entwistle & Ramsden, 1983 p 35). The subscale reflects the "cue-seeking" approach in which students concentrate their efforts on obtaining good grades by actively seeking information which will maximise outcome in relation to effort. However, the ASI has no subscales which represent the other qualitative dimensions of "cue-deaf" and "cue-conscious", approaches posited by Miller and Parlett.

The subscales <u>syllabus-boundness</u>, <u>fear of failure</u>, <u>negative attitudes to studying</u> and <u>disorganized study methods</u> are all subscales which fail to reflect qualitatively different categories of perception. They represent constructs formulated by the researchers prior to the emergence of the phenomenographic perspective and do not reflect (not could they be expected to reflect) qualitatively different categories for each of these constructs. The descriptions and compositions of some of these original subscales were modified for inclusion in the ASI (see Parsons, 1988a). It may be conjectured that these subscales possibly represent the extreme perceptual category within the outcome space for the concept being considered, and are therefore legitimate, although inadequate, perceptual categories.

The ASI itself, then, can be viewed as an eclectic instrument, taking the best of a traditional research perspective which sought to identify those aspects which had a significant effect on students' approaches to studying, and those qualitatively different categories of perception that phenomenographic type research into student learning had generated without necessarily attempting to represent or sample the outcome space.

That such an eclectic approach is legitimate is conceded by Marton, who proposed that one of the main benefits of this new perspective would be that it would lend support to "the claim to consciously realize the commonness of the second-order perspective in a great variety of scattered research efforts and to the argument for reorganizing such findings in terms of content" (Marton, 1981 p181). However, the ASI in its original research form reveals some of the dangers of an eclectic rather than a systematic approach to a field as wide as student learning. Viewed retrospectively from a phenomenographic perspective there are conceptual and qualitative "gaps" evident in the Inventory which theoretically limit its full potential usefulness as well as the results obtained from it and their subsequent interpretation.

It must be emphasized that the phenomenographic deficiencies of the ASI outlined above do not compromise the validity of the constructs it represents. Rather it can be argued that from a phenomenographic perspective the ASI is a relatively conservative instrument and that future research to rectify these shortcoming is clearly indicated.

However, the ASI has gained wide acceptance and has been used extensively in different contexts in higher education and a large number of comparative studies have been undertaken. These considerations, together with the conceptual richness of the Instrument (in comparison to Biggs' SPQ), led to the decision to use the ASI in its original form in the initial stages of the present research programme.

PHENOMENOGRAPHY AND THE STUDY OF INDIVIDUAL LEARNING CONTEXT

The results of research which sought to find empirical associations between approaches to studying (using the ASI) and departmental learning context (using the Course Perceptions Questionnaire) have already been described in Chapter One. The CPQ was not rejected for the present study on these grounds alone. If we consider the conceptual basis for the development of the CPQ we find a perspective adopted which owes nothing to phenomenography. Based on his own work and the work of other researchers Ramsden identified variables which students referred to when describing the context in which learning took place (Entwistle & Ramsden, 1983 p119). On the basis of interviews conducted with a relatively small number of students and staff in two academic departments he sought to identify constructs that were used to describe the departmental environments in which learning took place. On the basis of these interviews, and drawing on the work of other researchers (for a full description of this stage of the CPQ's development, see Entwistle & Ramsden, 1983 p119-

126) constructs were identified which "were consistent with previous research on students' perceptions of departmental environments" (Entwistle & Ramsden, 1983 p120). The next step was to "collect together a number of items descriptive of the context of learning through the students' eyes" and to sort these into scales "reflecting <u>hypothesised</u> dimensions by which students were <u>expected</u> to characterize their learning environment" (Entwistle & Ramsden, 1983 p121 [Author's emphasis]).

These scales were developed to investigate students' perceptions of different learning contexts at a departmental level. At no stage did the researchers generate qualitatively different categories of description for each of the dimensions. They focussed on the quantitative differences in the perceptions of different student <u>groups</u>. They sought to characterize departments by how much or how little of a particular construct was perceived to be present in the department. This can best be illustrated by way of example.

In terms of the construct <u>good teaching</u>, it was accepted that students shared a view as to what constituted "good teaching" and that they could indicate how much, or how little, of this "good teaching" they perceived to be associated with a particular departmental context. This was a quantitative rather than a qualitative measure. Indeed, the common perceptions that were in line with the hypothesised dimensions were taken as defining the concept and the differences were not investigated. Subsequent research (Entwistle & Tait, 1990) has revealed that the concept of "good teaching" is not universally perceived in the same qualitative terms but is directly related to contrasting conceptions of learning. Thus a scale which fails to accommodate these qualitatively different conceptions of "good teaching" may well be distorting or even concealing the different perceptions that individual students have about the same departmental context (Entwistle & Tait, 1990).

A retrospective evaluation of the CPQ in terms of the phenomenographic perspective shows marked differences between it and the ASI. The apparent failure of the CPQ to illuminate the association between approaches to studying and learning context <u>at the individual level</u> with respect to the dimensions included in the Questionnaire in the original, and in a subsequent comparative study (Meyer & Parsons, 1989a), may be due in large part to the perspective adopted (Entwistle, 1989; Ramsden, 1989b; Entwistle & Tait, 1990). The perspective adopted, as evidenced by the Questionnaire which was developed, has proved inadequate to address the complex interrelationships between individual perceptions of learning context, approaches to studying and learning outcome. Where conclusions have been drawn, these have been on the basis of "qualitative analysis of interview data" (Entwistle & Ramsden, 1983 p131) since these relationships could not be sustained on the basis of the CPQ numerical data alone.

The question that must be asked at this stage is whether the association between contextual variables and the approaches to studying adopted by individual students (posited and confirmed both intuitively and by interview data) can be demonstrated by the use of an inventory developed from a perspective more genuinely compatible with the phenomenographic perspective. It is proposed that this is possible providing two very important principles undergirding this perspective are maintained. These are:

1. Individual qualitative perceptions are the subject of investigation

In order to examine the perceptions that students hold with respect to learning context the starting point must be the perceptions of the individual. The universe of these individual perceptions will constitute the outcome space for the phenomenography of learning context and may then be separated into a number of qualitative categories. These categories may be seen as an end in themselves, or they may be used subsequently as a basis for investigating individual perceptions. As Marton has stated:

> "Let us assume that we are investigating conceptions of a certain aspect of reality in a certain group of people. Let us also assume that conceptions of this aspect of reality have not been discerned previously. If our undertaking is successful, then we may perhaps become able to describe a number of different conceptions and also to identify the distribution, over the categories, of the group participating in the study. We arrive in consequence at two different kinds of results, the

> categories of description themselves, and the distribution of subjects over them.
>
> ... on one hand we can view the results as categories of description considered as abstract instruments to be used in the analysis of concrete cases in the future. On the other hand, we can focus on the applicability of these categories in concrete cases, considering the possibility of applying the categories in order to make a statement about an historical fact such as, for instance, that individual X exhibited conception Y under circumstances Z." (Marton, 1981 p195-196)

2. Methods of representing the perceptions must maintain the qualitative nature of the investigation.

It is necessary that the methods we employ to represent the perceptions of individuals and the group to which those individuals belong must maintain the qualitative nature of the perceptions we wish to represent. To aggregate the perceptions of individuals in specific circumstances to arrive at a single category which is held to represent the common perception of the group is methodologically incompatible with the premises upon which the phenomenographic perspective is based and is patently meaningless and thus invalid. Qualitatively distinct categories of perception must be preserved and individuals assigned to these categories on the basis of their perceptions. We can, nevertheless, consider methods of data analysis which retain the perceptions of the individual while representing the distribution of the individuals in the group across the identified categories. For perceptions of a single aspect of reality (for example, level of processing) this is not too difficult, but when we are dealing simultaneously with a number of different aspects of reality (and the various qualitative categories associated with each) the problem is more complex. The challenge to accomplish this while retaining the associations between categories is a problem to which we will return in Chapter Three.

GENERAL SYSTEMS THEORY AS AN ANALYTICAL TOOL FOR THE EXPLORATION OF INDIVIDUAL LEARNING CONTEXT WITHIN A PHENOMENOGRAPHIC PERSPECTIVE

If we address student perceptions of learning context at the most general level we should be able to determine two things - what aspects of the context students are aware of in terms of conceptualizing the context, and the qualitative levels at which this awareness functions. To return to the analogy of Piaget alluded to by Marton, these would constitute the aspects of reality to be examined (number, volume, time, relationships, etc.) and the various perceptual categories relating to these aspects (pre-operational, concrete operational, etc.). Put in simple terms, we could examine <u>what</u> aspects of reality students perceive as constituting the learning context and we could examine the qualitatively different ways of <u>how</u> they perceive what they perceive.

When we are dealing with a relatively narrow concept such as processes adopted when reading an academic article (Marton & Säljö, 1976a) a purely phenomenographic type perspective is certainly adequate to explore and systematize the outcome space for that concept. It is doubtful, however, when dealing with a global construct such as learning context, whether a purely second-order perspective would be adequate to analyze the descriptions generated in the most economical and yet comprehensive way. It may be that an alternative analytical tool is necessary to complement this second-order perspective.

One of the most powerful analytical tools available to the researcher in any field of complex physical and non-physical phenomena is general systems theory. The application of this analytical tool to fields as diverse as nuclear physics, astronomy, medicine and sociology has greatly enhanced the ability of researchers to systematize their conceptions of the fields within which they are working. At its most basic, general systems theory offers a way of regarding complex phenomena in terms of interactions (relationships) between discrete physical or mental objects (elements) which can be described (or perceived) in terms of their distinguishing characteristics (attributes). In order to demarcate the boundaries of the system to be considered (since every system can be regarded as a sub-system of a larger system and similarly superordinate to other smaller systems) the purposive nature of the system is defined and all elements and relationships which contribute to that defined purpose are included as part of the system and other elements and relationships which do not contribute to the purpose of the system are excluded for analytical purposes - not conceptually.

As a conceptual tool general systems theory is appealing in its applicability to different situations, the rigorous nature of the analysis and its ability to give structure to otherwise unstructured phenomena. Thus it has become one of the most powerful analytic tools in the social sciences and has undoubtedly contributed to the emergence of sociology as a legitimate field of study. However, its application to the field of education has been limited (see for example, Kaufman, 1968) and many educational researchers overtly or covertly reject the applicability of this approach to the phenomenon of human learning. This may in part be due to philosophical reservations and also to the disenchantment with methodologies which have unsuccessfully attempted to describe human learning in terms of general and wholly unsatisfactory "laws" and "cause and effect" relationships.

Although few educational researchers have employed general systems theory directly to address educational problems, phenomenographic studies have emphasized precisely those aspects which are distinguishing features of general systems theory. Ramsden (1988c) argues that phenomenography provides a relational theory of learning - learning is seen as the "change in the <u>relation</u> between a person and the world around the person" (Ramsden, 1988c p4). The purposive nature of the system and the inter-relationship of all the elements is reflected in the emphasis on the content and the context of learning:

> "it is logically impossible for learning defined in this way to be content and context-free. Learning is without exception the learning of something. That something is learned for some purpose. Learning techniques and instructional strategies are tangled up with subject matter and the students' perceptions of task requirements; it is hazardous to think we can alter one aspect of this relation without affecting the others." (Ramsden, 1988c p5)

It would appear, therefore, that if we put aside the philosophical reservations and concentrate on the ability of general systems theory to provide a conceptual framework within which to organise the perceptions of students as to what constitutes learning we have a potentially powerful tool with which to explore more fully the concept of learning context. Such an analysis should enable us to structure the descriptions of learning context obtained from individuals in terms of <u>what</u> they perceive (elements, attributes and relationships) and <u>how</u> they perceive them in terms of qualitatively different categories of perception relating to the specific elements, attributes and relationships within the learning context they describe.

It is important to see that such an analytical tool does not <u>impose</u> a structure on the information, it merely provides a structure within which to systematically interpret and illuminate the descriptions generated. Such an analytical tool allows us to examine systematically the descriptions of learning context generated from a phenomenographic perspective in terms of what aspects of reality are being perceived (elements of the learning context), the attributes of these elements and the relationships that exist between these elements. It should be possible, using this methodology, to generate a more comprehensive and methodologically defensible conception of learning context as perceived by students than is practicable using other methods.

Strong advocates of the phenomenographic perspective have not ruled out the use of complementary methodologies. Marton (1981, p196) recognised the need to explore fully the "pool of aspects of reality worthy of study" and Johansson (Johansson, et al., 1985, p252) admitted the use of data collection other than interviews providing that the procedure used "should be sufficiently open to allow the subjects to express their own way of structuring the aspects of reality that they are relating to and to give them the opportunity to choose the terms in which they interpret the situation they are facing". Fleming went further. In a careful critique of the exclusive use of interviews and their analysis to generate aspects of reality and their qualitatively perceived categories, he stated:

> "I suggest that interviews produce a 'tourist guide' to student learning which is used by analysts to infer a learning reality beyond the interview setting. But phenomenography has not examined interviews as tales told to tourists. Instead, in imposing a variety of analyst's constructs such as

> 'approaches', 'orientations', 'categories' and 'strategies', the bulk of the analytical work revolves around the adequacy of the means employed in 'finding' these constructs in the interview accounts." (Fleming, 1986 p549)

One of the foremost proponents of a phenomenographic perspective on student learning, Paul Ramsden, in an article entitled "Improving Teaching and Learning in Higher Education" (Ramdsen, 1987) was pessimistic about the ability of this relational perspective to assist with learning strategies training. He suggested that the use of "some kind of systems theory" (Ramdsen, 1987 p283) might be able to reconcile holistic and reductionist approaches to understanding student learning. Biggs, in introducing his model of student learning (see Figure 5, Chapter 1) acknowledged the important part played by general systems theory in its formulation, by citing Van Bertalanffy (one of the "fathers" of general systems theory). He stated that his model of student learning represents "an interactive system in equilibrium; the components at presage, process and product levels tend to be in balance, and variations to any one component affect the whole system (Von Bertalanffy, 1968)." (Biggs, 1989 p12).

The adequacy of the conceptual paradigm provided by general systems theory is certainly not in question. What is questioned is the willingness of researchers into the phenomena of student learning and learning context to bring to bear on the mass of data and descriptive terminology the rigors of a conceptual tool that has proved itself in other fields of enquiry. White (1985) acknowledged the problem of systematically analysing the wealth of information contained in a single interview. It is also significant that even those researchers who are reluctant to employ this research tool nevertheless resort to the use of concepts which are essentially synonymous with the perspective of general systems theory.

Ramsden, (1988c), in arguing for a "relational" view of learning, quotes, in support of his view, the work of Roth and Anderson (1988) which examined how American eleven year olds learn from science textbooks. He stated that "Roth and Anderson trace the difficulty [in learning from given science textbooks] to the relation between the textbooks' features, the students' perceptions, and the use made of the texts by the teachers" (Ramsden, 1988c p12). The approach that Roth and Anderson have taken, and which Ramsden supports, is to identify the <u>element</u> ("the textbook"), to describe its <u>attributes</u> ("the textbooks' features") and to describe the <u>relationships</u> between the pupil, the teacher and the textbooks ("the use made of the texts by the teachers") all in terms of <u>qualitative perceptions</u> on the part of the pupils ("the students' perceptions").

Biggs (1989) is a strong advocate of a method that examines the educational context rather than trying to derive contextual dimensions from psychological theory. Entwistle himself (Entwistle & Tait, 1990) in recognizing the deficiencies of previous efforts to describe learning context, has attempted to utilize the components of his "heuristic model" (see Figure 6, Chapter One) which embodies dimensions suggested by interviews and research conducted by others. Obviously there is a perceived need on the part of researchers for a conceptual tool which will facilitate the rigorous, systematic exploration of learning context at the level of the individual student.

If we accept both the legitimacy of the general systems theory approach as well as its practicality, then it should be possible to provide a framework within which to describe, analyze and understand learning context from a phenomenographic type perspective.

EARLY ATTEMPTS TO EXPLORE LEARNING CONTEXT USING GENERAL SYSTEMS THEORY - THE AWARENESS OF CONTEXT (AOC) INVENTORY

Early attempts to utilize this framework to assist teachers to conceptualise the activities of teaching and course design were conducted by Meyer (1981) as part of an on-going programme of staff development at a number of institutions of higher education in South Africa. As part of this programme staff members were asked to provide a <u>written</u> "course description" using as a framework the conceptual distinctions between elements, attributes and relationships provided by general systems theory. (A "course description" refers to a written description of all aspects relevant to the teaching of a single subject in the context of higher education. It covers philosophical, organizational and instructional aspects, as well as content, method and assessment procedures. The form of the description is not prescribed, although general systems theory provides the conceptual framework for the activity.) This method of exploring teachers' perceptions is in accord with Johansson's statement, quoted earlier, that procedures for collecting data (about individual perceptions) "should be sufficiently open to allow the subjects to express their own ways of structuring the aspects of reality that they are relating to and to give them the opportunity to choose the terms in which they interpret the situation they are facing" (Johansson, et al., 1985 p252).

It was evident that the majority of teachers in higher education (over a number of years more than 250 staff members attended such courses, including the author) found that it was possible to apply general systems theory to the complex activities of teaching and course design and that such an application allowed them to explore these activities in a conceptually meaningful way (Meyer, 1988). Three other very important features emerged from this exercise. Firstly, it was evident that what teachers were describing (in terms of the particular courses they were teaching) was in most aspects the educational context that students would be perceiving. Secondly, teachers were describing very different courses in terms which were very similar. In other words, there was a finite number of perceived elements, attributes and relationships that were perceived to substantively define many learning contexts in higher education. (This is not to imply that courses are similar; rather it indicates that there is a very high degree of commonality when courses are conceptualized in terms of the framework provided by general systems theory.) Thirdly, it was apparent that although teachers perceived essentially the same elements, attributes and relationships to be present in different courses, <u>different teachers perceived these in terms which were qualitatively different</u>, even when they described aspects of the same "objective realilty".

An example will help to clarify these three aspects. One of the elements that nearly all teachers mention when asked to conceptualise the courses for which they are responsible is textbooks. When asked to describe the <u>attributes</u> of textbooks, teachers provide qualitatively different descriptions. Some described the course textbooks in terms of their size, price, comprehensive coverage of work, etc., while others concentrated on the manner in which the material was organised, the search mechanisms present, the ease of understanding, the use of illustrations, diagrams, etc. Clearly, while there is commonality in terms of the element (the textbook), there is considerable variation in the qualitative perceptions of the attributes (the range is more extensive than has been indicated; for ease of understanding two extreme views only have been cited). The perceptions of students concerning this particular aspect of the learning context must constitute at least a subset of the range of attributes mentioned by teachers.

With the growing interest in the relationship between contextual factors and approaches to studying, it was apparent that the results of the above research offered a potentially powerful method to explore students' perceptions of learning context, using as a conceptual framework the concepts and descriptions generated by teachers. Meyer (1988) produced a pilot inventory, the Awareness of Context (AOC) inventory, which contained 91 items, each of which described either a particular element, attribute or relationship common to most courses. These items could be logically grouped into fourteen dimensions, twelve of which sample the attributes of the twelve most common elements and two of which sample relationships. The fourteen dimensions, together with sample items, are given in Figure 8.

Most of the dimensions contained statements which reflected a qualitative range of perceptions about a particular attribute or relationship. Students were asked to respond in terms of their awareness of each item using a scale describing four categories of awareness. Using a simultaneous administration of both the ASI and the AOC, various statistical techniques were employed (for a full description, see Meyer, 1988) in order to explore associations between the three major (conceptually defined) study orientations of the ASI (meaning, strategic and reproducing) and the individual items of the AOC.

Figure 8. Dimensions of the AOC Inventory

<u>The lecturer</u> (10 items)
(28) The values or beliefs that your lecturers hold

<u>Student population</u> (6 items)
(79) The abilities of your fellow students

<u>Individual student</u> (7 items)
(58) Your reasons for being at this university

<u>Course content</u> (6 items)
(50) The structure of the content in the course you are studying

<u>Tests and examinations</u> (7 items)
(21) The different abilities that tests can measure

<u>Books</u> (9 items)
(61) The manner in which subject matter is organised in books

<u>Handouts</u> (6 items)
(63) Handouts that provide only the skeleton or outline of a lecture

<u>Student notes</u> (4 items)
(5) student notes that are a synthesis of concepts

<u>Lecture room</u> (4 items)
(4) The fittings and equipment in lecture rooms

<u>Media</u> (3 items)
(66) The legibility of what is presented on the chalkboard or on a slide or transparency

<u>University</u> (4 items)
(74) The academic standards of this university

<u>Library</u> (2 items)
(86) The manner in which publications are organised and stored in the library

<u>Relationships involving lecturers/students</u> (11 items)
(76) The manner in which your lecturers respond to you as an individual

<u>Relationships involving students</u> (12 items)
(69) Learning from your fellow students

The conclusion reached was that there were meaningful relationships between the two inventories, and in particular there were unique associations between the major study orientations and certain of the individual items of the AOC.

Summarizing these findings, Meyer concluded:

> "The present study demonstrates that a subset of the general perceptions that teachers express about learning context are shared by students and suggests, furthermore, that qualitatively different categories of these shared perceptions are correspondingly associated with qualitatively different study orientations."
>
> "The meaning orientation is associated with a rich, holistic perception of learning context that embraces deep, strategic and surface perceptions. All of these perception categories have some explanatory power for the meaning orientation. The reproducing orientation, on the other hand, is associated (if at all) with an impoverished (surface) perception of learning context, the qualitative extensions of which are weakly perceived or perhaps not even comprehended by many students." (Meyer, 1988 p81)

What is clearly evident on the basis of this research, is that the application of general systems theory as a conceptual tool to assist with the exploration of learning context provided results which were consistent with a phenomenographic perspective. The categories obtained (the fourteen dimensions) were not imposed; they were logical associations of items derived from written descriptions given by teachers using a conceptual framework in order to structure the task. The items were derived from the descriptions of individual staff members and were validated by means of interviews and written comments from students (see Meyer, 1988). The items indicated a qualitative range of perceptions over categories, and these qualitative perceptual categories were associated with qualitatively different approaches to studying.

Two problem areas were evident. Firstly, the AOC was a cumbersome instrument when administered simultaneously with the ASI, and secondly, a number of items were not uniquely associated with qualitatively different study orientations.

THE DEVELOPMENT OF THE QUALITATIVE CONTEXT INVENTORY (QCI)

On the basis of the study reported above, Meyer (Meyer & Muller, 1990) addressed these problems. The qualitatively different sets of items associated with qualitatively different approaches to studying were conceptually grouped to define seven subscales as shown in Table 1. Originally an eighth construct (handouts/notes - surface) was included but this subscale was omitted from the versions subsequently used since it was empirically the weakest of the "surface" perception constructs (Meyer & Muller, 1990b). [The full Inventory is given in Appendix B.]

Table 1. Subscales of the Qualitative Context Inventory

SUBSCALE	QUALITATIVE LEVELS	
Books	Deep	
Handouts/notes	Deep	
Methods of assessment	Deep	
Relationships	Deep	Surface
Course content		Surface
Learning environment		Surface

In addition to these seven constructs the scale "workload", as used in the original Course Perceptions Questionnaire, was incorporated in the QCI on the basis of the empirical association evidenced between this scale and the reproducing orientation in the two large factor analytic studies conducted by Entwistle & Ramsden (1983), and by Meyer & Parsons (1989a). The changes introduced reduced the number of items to 29. These were then added to the items of the ASI, making a composite instrument of 93 items grouped into 24 subscales.

THE CONCEPTUAL ADEQUACY OF THE QUALITATIVE CONTEXT INVENTORY

Before we examine the statistical techniques subsequently used to explore the association between the constructs of the QCI and the ASI, and their association with learning outcome, we need to reflect on the conceptual adequacy of the learning context as it is defined by the QCI. We can accomplish this by examining dimensions of the individual learning context in other studies and see whether these are reflected in the conceptual structure of the QCI in a way which could be considered meaningful from a phenomenographic perspective.

We need to appreciate, however, that the QCI as described above, does not sample the outcome space for each construct of the learning context, for reasons of economy and also because the intention is to identify conceptual categories which best accentuate <u>differences</u> between individual students adopting qualitatively different approaches to studying. These two premises formed the basis for the development of the QCI (Meyer, 1988; Meyer & Muller, 1990a, 1990b).

A number of other studies have identified dimensions of the individual learning context. Table 2 provides a summary of these studies and the contextual dimensions that they identified (personological and specifically departmental dimensions have been excluded from this table).

It can be seen from a comparison of Table 1 with Table 2 that all the dimensions identified in other studies of individual learning context are included in the QCI (peer interaction is subsumed in the two relationship subscales, and teaching aids are included in the learning space). In addition, different conceptions of teaching in terms of the differences in perceived relationship between the teacher and student are captured by the qualitatively different subscales "deep" and "surface" relationships.

Table 2. Identified dimensions of the individual learning context

DIMENSIONS	STUDY
How to use textbooks	Gibbs, 1982
Using reference material	Jackson & Young, 1988
Books - knowledge structures	Coles, 1990
Using textbooks	Entwistle & Tait, 1990
Structure of notes	Coles, 1990
Learning materials	Entwistle & Tait, 1990
Type of assessment	Marton & Säljö, 1976b
Assessment methods	Ramsden, 1986a
Feedback on assessment	Ramsden, 1988a
Assessment	Biggs, 1989b
Assessment	Entwistle, 1992
Assessment procedures	Entwistle & Tait, 1990
Conception of good teaching	Van Rossum *et al.*, 1984
Attitudes of teachers	Ramsden, 1986a
Student/teacher interaction	Biggs, 1989b
Qualities of good teaching	Entwistle & Tait, 1990
Conception of teaching	Entwistle & Tait, 1990
Peer interaction	Biggs, 1989a
Organization of content	Entwistle & Tait, 1990
Teaching aids	Entwistle & Tait, 1990
Workload	Entwistle & Tait, 1990
Amount of material	Ramsden, 1988a

In summary, then, the QCI demonstrates very adequate conceptual coverage of the dimensions of individual learning context identified in other studies. It retains the qualitative aspect fundamental to a phenomenographic perspective, and the associations demonstrated at the group level (Meyer, 1988) and subsequently at an individual level (Meyer & Muller, 1990b) are consistent with a theory that

links qualitatively different levels of perception with qualitatively different approaches to studying. Chapter Three will explore statistical techniques which allow for the exploration of the association between these contextual constructs and approaches to studying at the level of the individual student.

CHAPTER THREE

A DISCUSSION OF METHODOLOGICAL ISSUES AND PRELIMINARY INVESTIGATIONS RELATED TO INTERVENTION

THE LOGICAL ATTRACTION OF INTERVENTION AT THE LEVEL OF THE INDIVIDUAL - METHODOLOGICAL AND ANALYTICAL CONSIDERATIONS

The concept of intervention at the level of the individual has been an attractive and logical development of the earliest work undertaken from a phenomenographic and other perspectives. Marton and Säljö (1976b p125) proposed that students could be "helped by ensuring that the assessment procedures demand deep-level processing" while admitting that simply changing procedures might not be sufficient, and that "more explicit, redirection of attention may be necessary."

Gordon Pask (1976), employing a different perspective, (subsequently incorporated into the conceptual framework of the ASI) concluded that, within his framework of learning styles and pathologies, it was possible "to teach students to learn more effectively by the application of sophisticated principles of learning" (Pask, 1976 p145).

In summarizing the distinctive contributions to the understanding of learning and teaching made by their research programme, Entwistle and Ramsden (1983 p192) suggested that "it might be possible to make improvements in the quality of student learning in higher education by alterations to the contexts in which it occurs". Paul Ramsden (1984 p146) pointed to the "functional link between the context and students' intentions to understand". Almost all the models of student learning proposed by phenomenographic and other researchers (see Figures 3,4,5 and 6 in Chapter One) indicate the important role accorded to contextual factors in determining qualitative approaches to learning.

The prospect of intervention at the individual level to assist students who are perceived to be "at risk", based on the findings of phenomenographic (and other) studies is logical and attractive. From the outset programmes were devised, based on the best existing theoretical models (many using the ASI or particular variations of it suited to the special needs of different student populations), which sought to intervene at the level of the individual, rather than simply trying to improve the quality of teaching or the quality of the educational context (Newble & Jaeger, 1983; Biggs & Rihn, 1984; Biggs, 1987; Ramsden, Beswick & Bowden, 1987; Weinstein, et al., 1988; Van Overwalle, et al., 1989; Coles 1990). They met with varying success. Biggs (1987 p109-123) described the effects of an intervention programme ("Effective Learning Skills") offered by the Learning

Assistance Centre (LAC) at Stanford University. He concluded:

> "It is clear that intervention in the present example was successful, not only in changing students' approach to learning from surface to deep, and aligning achieving strategy with the achieving motive, but most importantly, in raising and maintaining the students' level of performance at university. In evaluating the study it must be emphasized that these students are not typical of the students usually at risk and seeking assistance from student counselling, in that the present sample were not at risk of failing, so much as not gaining B and A grades." (Biggs, 1987 p113)

A similar intervention with two regular Year 11 Australian classes at pre-tertiary level was equally successful (Biggs, 1987 p115). However, Ramsden, Beswick and Bowden (1987 p174) reported that "attendance at learning skills groups increased the reported incidence of surface approaches. Although it might have helped some students avoid failure, participation was not associated with a better than average level of grades". Van Overwalle summarized the effects of his video-mediated attributional intervention as having "produced modest but systematic improvements on both short-term and long-term academic achievement" (Van Overwalle, et al., 1989 p84).

In the light of the qualified success achieved, intervention at the individual level appears worth pursuing. This is particularly so, given the new insights provided by the more recent detailed investigations undertaken into individual perceptions of learning context and the development of the Qualitative Context Inventory. It appears that the elusive associations between approaches to studying and contextual factors at the individual level has been empirically established. However, before these insights can be practically applied to the design of an intervention programme aimed at individual students "at risk", a number of significant methodological problems and unanswered questions need to be addressed.

PROBLEMS RELATING TO THE INTERPRETATION OF FACTOR ANALYTIC AND CORRELATIONAL STUDIES AT THE INDIVIDUAL LEVEL

I - METHODOLOGICAL PROBLEMS

Major studies that have investigated the empirical association between constructs imbedded in the ASI (as well as between these constructs and those of other inventories such as Ramsden's Course Perception Questionnaire) have been characterised by the employment of factor analytic methodological techniques (Entwistle & Ramsden, 1983; Meyer & Parsons, 1989a; Harper & Kember, 1989). The need to produce stable factor solutions in such studies has required the use of large population samples. Small samples (of the size typically found in a higher education classroom) generally produce unstable solutions whose interpretation often has to be guided by the results of larger analyses.

This would be satisfactory provided these (and other) studies had consistently replicated the empirical manifestation of the conceptual factor structure for different populations in different educational settings. This, however, is not the case. Indeed, the empirical factor structure of the ASI in the original large scale study by Entwistle & Ramsden (1983 p49) has not consistently recurred and further comparative studies (Meyer & Parsons, 1989a; Harper & Kember, 1989; Richardson, 1990) have revealed that a number of other researchers have similarly failed to replicate the original factor structure. Entwistle and Tait (1990) indicated that different factor structures were found in different subject areas. They proposed that "repeated analyses by sub-group are essential" (Entwistle & Tait, 1990 p3).

What has consistently emerged in most studies involving the ASI is the presence of two primary factors, designated <u>meaning orientation</u> and <u>reproducing orientation</u> together with one, or sometimes two, other factors. (For a detailed analysis, see the comparative studies cited above.) Even these two primary orientations are defined slightly differently in different studies in terms of their subscale compositions. Harper and Kember (1989 p72) concluded that the studies they compare showed "two factors which show a remarkable degree of consistency and two which show much greater variability. ...(The latter two factors) are possibly influenced to some extent by the learning context." Meyer and Parsons (1989a) arrived at virtually the same conclusion. They stated that other studies confirmed "the presence of two major study orientations but fail to support the additional two orientations as defined by Entwistle and Ramsden" (Meyer & Parsons, 1989a p151).

If we wish to interpret and subsequently classify, in a qualitative sense, the individual approaches to studying adopted by students in a class whose size precludes the confident application of factor analysis, we face the problem of fitting an individual into a group whose empirical manifestation may not adequately represent him. In addition, recent studies have called into question whether even the apparently consistent subscale associations hold true for particular sub-groups (Meyer & Muller, 1990b; Meyer, Parsons & Dunne, 1990). Factor analysis as a technique for illuminating associations between constructs at the level of the individual may not be suitable, since a fundamental assumption in group multivariate analysis is that "an individual fits into a group, and that the characteristics of the group capture the characteristics of the individuals in it" (Meyer & Muller, 1990b p10).

Indeed, factor and correlational analyses <u>may</u> reduce or even eliminate the empirical associations between approaches to studying and contextual perceptions (Entwistle, 1989). This may occur where either a high degree of consensus exists in the students' experience of some aspect of the learning environment (Entwistle, 1989) or where "evaluation scale scores are built up of different sets of items between students of contrasting study orientations. ...by using only the mean scores of students in those departments, varying perceptions between individual students are removed from the analysis." (Entwistle & Tait, 1990 p14)

While the suitability of factor analytic methodological techniques to explore the association of subscales for both the ASI and related inventories is not called into question, these techniques are not adequate to illuminate the (possibly unique) associations at the level of the individual within a small group (Meyer & Muller, 1990b).

II - CONCEPTUAL PROBLEMS

A serious drawback evidenced by the factor analytic studies using the Approaches to Studying Inventory and the Course Perceptions Questionnaire (Entwistle & Ramsden, 1983; Meyer & Parsons, 1989a) was the lack of empirical associations between the constructs of the two inventories, except for the consistent association between the contextual subscale "workload" and the reproducing orientation. While other associations were posited on the basis of extensive interview data, these were not evidenced in the factor analyses.

These problems severely restricted the development of an intervention programme aimed at the individual student, using as diagnostic tools the combined subscales of the ASI and QCI. Not only were factor analytic methodological techniques unable to illuminate the association between context and approaches to studying, they were unable to represent subscale associations for small groups with confidence, or to represent these associations for each of the individuals within the group (Meyer & Muller, 1990b).

Upon completion of the comparative project to explore approaches to studying and course perceptions using the Lancaster Inventory (Meyer & Parsons, 1989a) and the parallel work undertaken by Meyer (Meyer, 1988) it was clear that a potentially powerful model existed for the development of such an intervention programme. At about this time Meyer and Muller (see Meyer & Muller, 1988) were exploring the application of a statistical technique, multidimensional unfolding analysis, to the data generated by the ASI and the QCI. Muller had developed a particular approach (see Meyer & Muller, 1990b for technical details), for the multidimensional unfolding of preference data, and early preliminary studies (Meyer & Muller, 1988) using this approach seemed to hold much potential for addressing the problems outlined above.

MULTIDIMENSIONAL UNFOLDING AS A REPRESENTATIONAL TECHNIQUE

Unfolding analysis is a technique for examining peoples' degrees of preference, interest or attention for a set of stimuli. Multidimensional unfolding differs from factor analysis and from multidimensional scaling in that it is able to represent "the association between *two* sets of points: one set corresponds to people and the other corresponds to the constructs being measured. ...The fundamental assumption made in group multivariate analyses that an individual fits into a group, and that the characteristics of the group capture the characteristics of the individuals in it, is not made in unfolding analysis." (Meyer & Muller, 1990b p9-10) Although this technique had not previously been widely used in education it has been applied in other fields (see Meyer & Muller 1990b). It is similar to multidimensional scaling, a technique employed by Van Overwalle (1989) to explore the association between academic achievement, student self perception and social environment.

Two other major advantages of this technique are evident. Firstly, it can be performed successfully on small groups of students (typically of the order of twenty in its application to the ASI/QCI data), making it ideal for exploring the associations between approaches to studying and contextual perceptions for individuals within natural class groups in higher education. Secondly, it does not assume a linear relationship between the constructs that is implicit in correlational techniques. For the purposes of this study it is not deemed necessary to examine in detail the underlying mathematical models nor the computational procedure for multidimensional unfolding. Rather the process will be explained by means of a hypothetical scenario. However, a full treatment of these aspects (Appendix 1 of Meyer & Muller, 1990b) is provided by way of Appendix C.

A HYPOTHETICAL SCENARIO FOR AN UNFOLDING ANALYSIS OF THE ASI

In order to facilitate understanding of how an unfolding analysis is performed and how the results are interpreted, let us consider the following hypothetical scenario, described by Meyer & Muller (1990b p10-11).

> "In the first stage of the scenario we must imagine an empty courtyard with a flat floor. A student is placed on the courtyard floor together with sixteen movable trolleys. Each trolley represents one of the constructs of the ASI and is clearly labelled as such, together with a brief explanation of what the construct stands for. Thus, for example, the 'deep approach' trolley (abbreviated to 'DA') will represent an approach to studying characterised by an active search for meaning, interacting actively with what is being learned and linking it with real life.
>
> The student is now asked to move the trolleys around in the courtyard and position them relative to himself in such a manner that his proximity to the various trolleys (constructs) reflects his relative 'preferences' for them in terms of personal perceived approaches to studying. (This is essentially how the ASI works. The constructs are descriptions of intentions, learning processes, motives and study activities. Students' self-report responses to these are perceptions of their own personal intentions, motives, and so on.) In the remainder of the discussion the term 'preference' will be adhered to in keeping with the terminology usually used in unfolding analyses.
>
> The courtyard exercise is trivial with one student and can be performed easily on a group of individuals using pencil and paper, or by moving pieces of suitably labelled cardboard around on a

tabletop. Each individual will produce a spatial representation that can be interpreted easily by anyone else who has done the exercise.

In the next step of the scenario a second student is introduced into the courtyard and the two students are then required to move the trolleys and themselves such that the final spatial representation reflects *both* their individual preferences. If the second student has similar preferences to the first student, he need only position himself next to the first student. The extent to which his preferences are dissimilar will determine the amount of moving around that will need to take place. This can, once again, be done in a pencil and paper exercise.

A third student is now introduced into the courtyard and the exercise is repeated, then a fourth student, and so on. As we proceed, a very interesting spatial representation would develop on the courtyard floor from which we could obtain much useful information: firstly, we could interpret how all the constructs were associated for the group of individuals as a whole. The proximity of the trolleys relative to each other would indicate those constructs which were associated and those which were not. Trolleys that were very close together would indicate similar patterns of preference for these constructs for all the people, or more precisely, for all those people whose observed preferences can be adequately represented in the space. This would inform us about the underlying *structure* of the data in a manner which is analogous, but not comparable, to a factor structure. Secondly, the proximity of individuals relative to one another would identify which individuals had similar preferences and which did not. (Individuals who were close together would have similar preferences.) Thirdly, we could interpret preferences <u>for each individual</u> in the group <u>within</u> the associated structure of the trolleys. This captures the essence of an unfolding analysis.

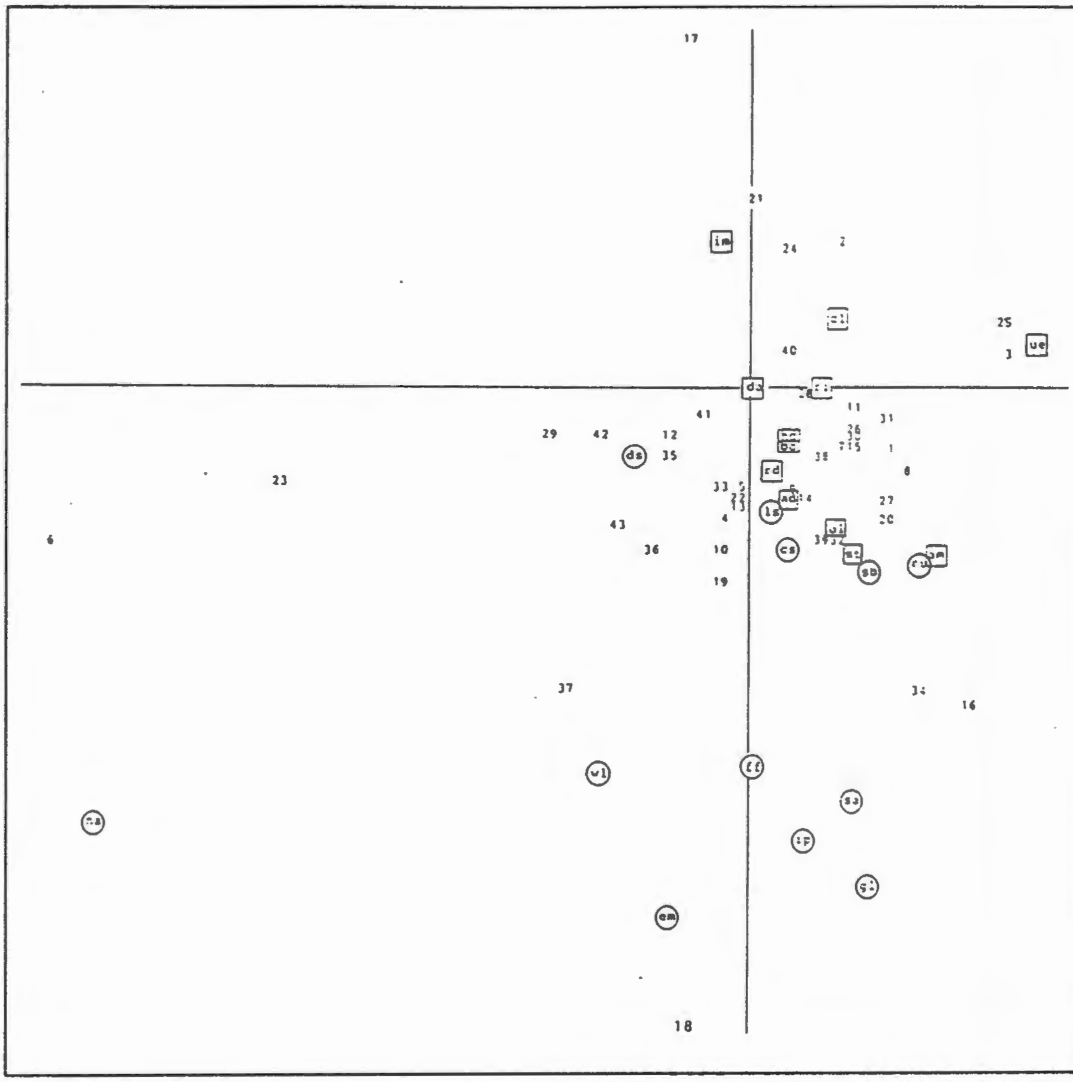
There is, however, a limit beyond which this interesting practical exercise cannot proceed. Depending on the range of individual preferences (and therefore, differences) that need to be represented, the exercise becomes progressively more difficult, until eventually it becomes impossible to carry out in the manner that has been described. Two related problems arise: the sheer complexity of the process and the fact that it actually becomes impossible to capture everybody's preferences

> exactly. Instead, one can, at best, attempt to construct an <u>optimal</u> representation that captures as many of the individual preferences as accurately as possible.
>
> It is mathematically possible, however, to find such an optimal solution that accommodates as many individuals as we care to choose - subject to the very real constraints of computational tractability. ...We can, thus, produce an optimal spatial representation containing both the trolleys, *and* the individuals in either a two- or three-dimensional space. In an unfolding analysis the space containing the individuals and the constructs is referred to as a <u>joint space</u>."

Clearly, as was demonstrated, this procedure can be extended to include simultaneously the conceptually related constructs of the ASI and the QCI (Meyer & Muller, 1990b). The result for a first year Electrical Engineering Electronics group is given in Figure 9 in order to illustrate the features of this form of analysis.

It is not intended to examine in detail the representation provided in Figure 9, but rather to examine the <u>features</u> of the representation which give an indication of the value of this technique, how its use evolved and ultimately how it was used in the design and implementation of the intervention programme which forms the major part of this study.

Figure 9. Joint space for first year Technikon Electrical Engineering Students (n=43)



Note:

1. Legend: da=Deep Approach, ri=Relating Ideas, ue=Use of Evidence, im=Intrinsic Motivation, sa=Surface Approach, sb=Syllabus-boundness, ff=Fear of Failure, em=Extrinsic Motivation, st=Strategic Approach, ds=Disorganised Study Methods, na=Negative Attitudes, am=Achievement Motivation, cl=Comprehension Learning, gl=Globetrotting, ol=Operation Learning, ip=Improvidence, bd=Books(Deep), ad=Assessment(Deep), rd=Relationships(Deep), hd=Handouts (Deep), cs=Content(Surface), rs=Relationships(Surface), ls=Learning Space(Surface), wl=Workload.

2. Meaning orientation and associated deep perceptions of context indicated by squares.
Reproducing orientation and associated surface perceptions of context indicated by circles.

Certain features of the representation achieved by the technique of multidimensional unfolding need to be highlighted.

- The picture is plotted with the subscale "deep approach"(DA) taken as the origin and the scale fixed by the position of the subscale "relating ideas"(RI), since the relationship between these two subscales was considered to be one of the most stable on the basis of all other reported studies. [In later versions of the unfolding analysis, the scale was fixed on the position of the contextual subscale "deep perceptions of books"(BD).]

- The position of all the subscales of the ASI and the QCI can be meaningfully interpreted in terms of their proximity to the other subscales. They define two spatial "envelopes" in this example, representing (broadly) the two primary "orientations" (with their associated categories of contextual perceptions) as defined by this particular group.

- The positions of all the students (numbered 1 to 43) are also readily interpretable in terms of their relative proximity to the constructs. However, the complexity of these associations at the individual level is clearly retained (as opposed to factor analysis, where this complexity is largely eliminated) and indicates great variation at this level of analysis.

The relative position of each individual is only an <u>approximation</u> since the picture presents the optimal solution for all the students' observed preferences jointly. The degree to which the individual's observed preferences cannot be accurately represented is measured by a <u>stress</u> function which can vary between zero (indicating that the representation perfectly captures that individual's preferences) and unity (indicating that none of the individual's preferences has been captured). A similar stress value can be computed for the representation as a whole. Typically the stress value for the group is in the order of .20 (the analysis captures 80% of the preferences) and for the individual often as low as .10. In interpreting the position of an individual <u>by inspection</u> in an unfolding solution, one therefore has to be guided by the accuracy of that individual's representation in the space as indicated by the corresponding stress function value.

The limitation of this technique in terms of representing to a high level of accuracy the observed preferences of each individual within the group does not pose a major problem when examining the association of constructs at the group level. However, it does limit the ability to interpret the relative position of those individuals whose preferences cannot be adequately represented (as indicated by high stress values, typically greater than .25).

The application of multidimensional unfolding to the exploration of the associations between approaches to studying and contextual perceptions is best illustrated by a more careful examination of the results represented in Figure 9.

At the level of the group (n=43) we can see that there is a partial validation of the association between constructs of the ASI as posited by the many factor analytic studies referred to earlier. One spatial envelope contains the constructs IM, CL, UE, RI and DA; another contains the constructs na, eM, ff, ip, sa, and gL. In a spatial position which indicates the transition from one envelope to another lie the constructs Ol, St, sb, ds and Am. This association accords well with the posited association of primary and secondary subscales (Parsons, 1988a) and is an independent validation of these associations at the individual level using a statistical technique based on different assumptions concerning the underlying structure of the data.

The constructs of the QCI are associated with those of the ASI in a manner which is entirely consistent with the studies reported by Meyer (1988) and with later reported studies based on unfolding analysis (Meyer & Muller, 1990a; 1990b). The "deep" contextual perceptions are all associated with the meaning orientation constructs. The "surface" contextual perceptions are situated on the boundary between the two spatial envelopes, indicating that they are perceived by students to be associated with both the meaning and reproducing orientations. This validates the earlier finding by Meyer (1988 p81) that "the meaning orientation is associated with a rich, holistic perception of learning context that embraces deep, strategic and surface perceptions. ...The reproducing orientation, on the other hand, is associated (if at all) with an impoverished (surface) perception of learning context".

PRELIMINARY INVESTIGATIONS:

I - LEARNING OUTCOME AND ITS ASSOCIATION WITH APPROACHES TO STUDYING AND CONTEXTUAL PERCEPTIONS

In the design of an intervention programme it was essential to be able to explain and predict qualitatively different learning outcomes on the basis of the conceptual model of the ASI/QCI. Since it was considered impractical in a conventional higher education context to redefine quantitative learning outcomes in qualitative terms, learning quality was assumed to be reflected in traditional test or examination results, given certain conditions concerning the lecturer's ability, commitment to the goals of higher education, and so on. Alternative ways of classifying learning outcome were considered, such as Biggs' SOLO taxonomy (Biggs & Collis, 1982). Such classifications, however, require students' work to be assessed using criteria which differ from those traditionally employed in the assignment of marks or grades. It was felt that, given the context of higher education within which the present research was undertaken, it would be unrealistic to expect staff members already committed to a full teaching programme to learn and apply an additional method of classifying learning outcomes. For this reason it was decided that the use of traditional test and examination results would be the most economical method and one which would readily allow for comparisons across subjects to be made (see Newble, et al., 1988; Entwistle & Tait, 1990).

In most instances achievement scores were used to allocate students to appropriate categories or to place students in rank order. However, in all cases, care was taken to ensure that tests and examinations did not simply reflect rote learning nor were the questions of such a nature that the subjectivity of marking could play a significant role in the students' achievement score. Most of the questions had a mathematical basis (by the very nature of the subjects chosen) and marks were allocated on the basis of correct calculation, analysis and reasoning.

The choice of student group was determined by the need to find a teacher who demonstrably strove for those qualitative aspects of learning reflected in the ASI. A teacher in the School of Electrical Engineering was chosen because of his professional contact with the author. He had received a merit award for outstanding teaching the previous year and had expressed interest in the research programme. All the preliminary studies were undertaken using student groups taught by him, and the test and examination results were taken to reflect a qualitative rather than a purely quantitative learning outcome.

The insights provided by multidimensional unfolding offered the prospect of investigating the association between learning outcome and the approaches to studying and contextual perceptions of individual students. The positions of individual students with respect to both qualitative approach to studying and qualitative contextual perceptions could be established and, furthermore this relative <u>conceptual</u> position (as indicated by the spatial position in the unfolding analysis) could be compared with learning outcomes as a basis for exploring any further empirical associations. If such associations were indeed evident, then, for the first time, they would provide an empirically-based framework for <u>explaining</u> and <u>predicting</u> learning outcome in terms consistent with the theoretical perspective from which the two inventories were derived.

The approach used to explore this association is best illustrated by a number of examples. If we consider the case of student number 34 (in Figure 9), we can see that his reproduced position is one which, from a <u>theoretical</u> point of view, and in the absence of any other factors which would significantly alter the picture (such as deliberate falsification in the completion of the self-perception questionnaires), is unlikely to lead to a satisfactory learning outcome.

Student number 34 failed his end-of-semester examination, as did a number of other students whose position would similarly seem to put them theoretically "at risk", namely numbers 18, 23, 29, 35, 42, and 43. If, in addition to considering the relative position of the individual, we also take into account the stress value for individual students, we gain further insights. [The stress value is an indication of the extent to which the individual's observed preferences have been accurately reproduced in the unfolding analysis.] Dividing students on the basis of those with stress values greater or less than that of the group as a whole (.24) it can be seen from Table 3 that the stress value is clearly associated with learning outcome (chi-square = 5.24 which is significant at the 5% level. df=1).

Table 3. Individual stress value versus learning outcome for first year Technikon Electrical Engineering Students (n=43)

	STRESS < .24	STRESS > .24	TOTAL
PASS	16	6	22
FAIL	8	13	21
TOTAL	24	19	43

This conclusion is in keeping with those of other studies and must be interpreted in the wider context that they provide. Thus, Meyer and Muller (1990b) demonstrated that high stress values were empirically linked to the decomposition of the association of meaning orientation constructs. Meyer, Parsons and Dunne (1990) showed that such a decomposition is associated with academic failure. Entwistle, Meyer and Tait (1991) identified a conceptually related phenomenon, that of a breakdown among failing students of the coherent association between approach to studying and preferences for learning environment manifested by achieving students.

What is not apparent from the unfolding analysis in Figure 9 is the association of constructs evidenced by such students, since the high stress values indicated that many of their observed preferences have not been accurately reproduced in the space. Clearly, if we could see <u>how</u> those students associate the ASI/QCI constructs, we would be in a far better position to explain why they are unlikely to reach satisfactory levels of learning outcome. This would then provide a sound empirical and theoretical base on which an intervention programme could be developed.

It was realised that the unfolding analysis provided insights into the association of constructs (as perceived by the group) that were essential for an understanding of how the individuals <u>within the group</u> perceived these same constructs. At the same time, an examination of the relative position of an individual gave meaningful insights regarding the qualitative approach taken to learning and the perceptions of learning context in a manner that was, in most instances, consistently reflected in learning outcome. However, the loss of accuracy for some individuals made the interpretation of their theoretical position and the prediction of their learning outcome more difficult. It was appreciated that if a more satisfactory method of interpreting their observed (rather than their reproduced) preferences for the ASI and QCI constructs could be developed, it could be used in conjunction with the unfolding analysis as a basis for identifying students who might benefit from an intervention programme.

II - THE DEVELOPMENT OF INDIVIDUAL DIAGNOSTIC PROFILES

The possibility of implementing an intervention programme depended to a large extent on the successful identification of students "at risk" in terms of their approaches to studying and their contextual perceptions. It was felt that a useful first step would be to determine whether students' self-reported approaches to studying (as reflected in their relative positions in the unfolding analysis) could be validated by someone who had experience of them in a naturalistic educational setting. For this purpose the teacher of the group referred to above was given three written descriptions (corresponding to the meanings of the constructs in closest proximity to the three students as evidenced by the unfolding analysis and which, in terms of the statistical model, would be expected to capture their strongest preferences) together with the names of the three students and asked to match the descriptions to the names given. The three descriptions are given below.

> [Student No 24] He is interested in the subject and he enjoys it (IM). He tries to understand (DA) not just reproduce what he has to learn and tries to think logically and reason out his approach (UE and RI). He might be interested in going on further with his course (IM) and is certainly willing to devote the necessary amount of time, and possibly even more time than is absolutely necessary, to his present studies. It might seem that he strays from the point at times when trying to get to grips with a new concept or section of the work, but invariably he is able to grasp new concepts and integrate them into his existing frame of knowledge (CL). He can use textbooks with confidence (BD) and does not need undue guidance when expected to do independent study (RD).

> [Student No 43] His approach to studying is disorganized; he never has enough time to finish things, but he usually leaves them until the last minute (ds). He is worried that he might fail (ff), but there always seems so much work that he can never really get on top of it (wl). He is easily worried by little things such as the noise in the classroom or where he is sitting (ls). Although he feels he has a fairly good general knowledge of the subject when it comes to the details he is very weak and has difficulty sorting out what is relevant from what is not (ip and gL). He relies on memorization (sa) and tends not to try to think for himself because he feels that the subject is too complicated.

> [Student No 32] He concentrates on what is required in tests or assignments and tries to give back only that (St). This he does by following well-tried approaches which rely more on memorization of detail than on understanding of the whole picture (Ol). Success in things like tests and exams is important to him and he likes to compare his performance with others (Am). He does not make as much use of your help as he could nor does he employ the help of others to the extent that he could (rs). He will try to understand the work,

> but will not really go beyond the boundaries of what he knows is required of the course (sb).

The teacher was able to allocate correctly the names to the descriptions, indicating that the self-perceptions of students were reflected in their naturalistic (and teacher observed) approach to studying. This exercise seemed to indicate that the self-perceptions of individual students were accurate reflections of their approaches to studying and that the use of some sort of "profile" might thus be of help in identifying and diagnosing students' learning problems. The view that a "profile" might capture individual approaches to studying and perceptions of learning context better than, say, an aggregated score on one or more of the hypothesised study orientations, and be more useful for diagnosis and remediation, is supported by Newble et al. (1988):

> "It is known that the approach to learning adopted by students has a significant impact on the quality of learning and academic success. ...We wished to obtain information which would allow us to determine whether students were predominantly using a surface, deep or strategic approach. However, it seemed unlikely to be of great value simply to provide an overall score on a scale developed for each of these approaches. More diagnostic help was likely to accrue from more specific information about the motivational, intentional and process components of the students' behaviour." (p518)

> "(It was hoped that the instrument would) provide more specific diagnostic information on the nature of the problem which might subsequently help guide remedial advice or 'treatment'. Information on major subscale scores (surface, deep, strategic) would be of limited value for this purpose. Rather it would be the profile of subscale scores which would be of more assistance in diagnosis, in a way analogous to multiphasic biochemical screening in clinical medicine where the pattern of abnormal

> results is often of more help than a single abnormal value. This concept of profiling the approach to learning and study habits has not yet been fully investigated but the strong negative correlations of some subscales with performance suggests that this may prove to be feasible for the most important group to identify, the low achievers." (p525)

Individual profiles were produced in the first semester of 1989, using first and second year Electrical Engineering classes. Exploratory profiles for the first year class, based on <u>reproduced</u> preferences obtained from an unfolding analysis, are given in Table 4. Although the exploratory profiles did not indicate tied preferences, these were considered when carrying out the categorisation.

[Although profiles using the more accurate observed preferences were subsequently produced, these were not available for the analysis described below. All subsequent profiles were based on the observed individual preferences (with tied preference indicated) used as input to the unfolding procedure.]

Subsequent independent investigations, in which students have been interviewed and asked to comment on the accuracy of the profile of subscale preferences produced by this method, have in the vast majority of cases confirmed that these profiles are perceived by the individuals themselves to be an accurate reflection of their preferences. Reference to these observations will be made in later discussions in Chapters Five and Six.

Table 4. Exploratory profiles for 1st year Electrical Engineering students - 1st semester 1989

STUDENT NUMBER	RANKED SUBSCALE PREFERENCES																	
1	ol	st	da	rd	cs	ri	ls	ad	em	sb	cl	hd	bd	am	im	ue	ds	rs
2	sb	ds	ff	wl	na	sa	ol	ip	ls	ad	rd	em	gl	am	hd	bd	cs	st
3	sb	ol	em	wl	ls	rd	sa	ad	ip	na	st	ff	hd	cs	ds	da	bd	ri
4	sb	wl	ol	ff	sa	ls	ad	ip	hd	rd	bd	ds	am	st	cs	gl	da	ue
5	ds	sb	ff	ls	ol	ad	wl	rd	sa	am	cs	cl	st	bd	hd	ip	da	em
6	sb	hd	bd	rd	ad	ol	st	ls	sa	wl	ue	ip	am	cs	da	ff	rs	cl
7	ls	ad	ds	cl	am	cs	rd	st	da	ri	ol	bd	hd	ff	im	ue	sb	gl
8	ds	ff	wl	ls	am	sb	ad	gl	sa	cl	ol	ip	bd	rd	cs	hd	st	ri
9	sb	ds	ff	wl	ol	sa	ls	ip	ad	rd	am	na	hd	gl	bd	cs	em	st
10	sb	ff	ls	ad	wl	ds	ol	sa	am	hd	bd	rd	ip	st	gl	cs	cl	ue
11	sb	ls	ad	ol	rd	st	hd	cs	bd	am	da	cl	ri	ff	ds	ue	wl	sa
12	sb	wl	ff	ol	ds	sa	ls	ip	ad	na	rd	hd	em	bd	am	cs	st	gl
13	ad	ls	am	bd	hd	ff	rd	sb	st	ol	cs	ds	ue	cl	wl	sa	da	gl
14	ue	hd	im	bd	st	rd	ad	am	da	cs	ri	cl	ls	rs	gl	cl	ip	sa
15	sb	hd	ol	rd	st	bd	ad	ip	sa	wl	ls	ue	da	cs	am	rs	ri	em

Note:
1. Legend: da=Deep Approach, ri=Relating Ideas, ue=Use of Evidence, im=Intrinsic Motivation, sa=Surface Approach, sb=Syllabus-boundness, ff=Fear of Failure, em=Extrinsic Motivation, st=Strategic Approach, ds=Disorganised Study Methods, na=Negative Attitudes, am=Achievement Motivation, cl=Comprehension Learning, gl=Globetrotting, ol=Operation Learning, ip=Improvidence, bd=Books(Deep), ad=Assessment(Deep), rd=Relationships(Deep), hd=Handouts (Deep), cs=Content(Surface), rs=Relationships(Surface), ls=Learning Space(Surface), wl=Workload.

2. Subscales are in order of preference from left to right.

3. Subscale rankings are obtained from the input to an unfolding analysis.

III - THE CATEGORISATION OF STUDENTS ON THE BASIS OF INDIVIDUAL STUDY ORCHESTRATIONS

Since the ultimate objective of the research programme was to develop an intervention programme aimed at assisting students who were "at risk" of failing, the next exploratory step was to develop a method of categorizing students on the basis of their profiles and to establish whether there was a consistent empirical relationship between this categorisation and learning outcome (as reflected in test and examination results).

In developing a method for categorizing students on the basis of their individual approaches to studying and course perceptions profile it was necessary to examine:

- the conceptual origins and the meanings of the ASI constructs

- the theoretically posited relationship between these constructs and qualitative learning outcome

- the empirical associations between the ASI constructs both at the group, and at the individual, level. This was done by a comparison of factor analytic studies (Entwistle & Ramsden, 1983; Parsons, 1988a; Harper & Kember, 1989) as well as the unfolding analyses performed to date on a number of student groups

- the empirical association between the ASI constructs and the qualitative perceptions of learning context as reflected in the QCI.

Each of these aspects provided a new perspective in terms of which the individual profiles could be assessed and a synthesis of these theoretical and empirical perspectives led to the development of general rules of categorisation, on the basis of which students could be assigned to a particular category (for a detailed analysis see Meyer, Parsons & Dunne, 1990). These categories were described in terms of qualitative approaches to learning. Initially the general rules were somewhat rigid, but with the increasing insights that numerous additional studies provided, these rules evolved into a fairly elaborate classification procedure which was sensitive to contextual differences across disciplines.

Indeed, it was decided for the purposes of classification not to use the term "orientation" with its emphasis on "a combination of approaches to studying and styles of learning which is relatively stable across different educational tasks" (Entwistle & Kozeki, 1985 p125) but rather to introduce the term "<u>orchestration</u>". This term was chosen to indicate that the association of ASI constructs at an individual level is a <u>context-specific response that is linked to the qualitative level of perception of certain elements of the learning context</u>. While recognizing that individual students may manifest associations of ASI constructs which reflect the group associations (orientations), the pattern of associations at the individual level is nevertheless unique and is related to the qualitative level of perception of certain key elements in the learning context. The term "orchestration" was therefore used in describing the classification referred to below, and is used subsequently to indicate the individual pattern of subscale associations.

The categorisation provided for three categories: "at risk", "average" and "star". A brief description of how students were allocated to these categories is required.

The initial exploratory categorisation was performed on the basis of two criteria employed simultaneously. The first dealt with the observed preferences for the ASI subscales. On the basis of theoretical and empirical considerations it was determined that a qualitatively desirable approach to studying (a meaning orchestration) would be indicated by an observed preference for a combination of the following subscales (not in any particular order):

deep approach (DA)

use of evidence (UE)

relating ideas (RI)

intrinsic motivation (IM)

comprehension learning (CL)

while the addition of some or all of the following could be admitted:

strategic approach (St)

achievement motivation (Am)

operation learning (Ol).

Similarly, students who showed an observed preference for the following subscales (again, not in any particular order) were considered to be exhibiting a qualitatively undesirable approach to studying (a <u>reproducing orchestration</u>):

disorganized study methods (ds)

negative attitudes to studying (na)

improvidence (ip)

surface approach (sa)

fear of failure. (ff)

syllabus-boundness (sb)

possibly associated with one or both of the following:

globetrotting (gL)

extrinsic motivation (eM).

The second set of criteria that were applied was the observed preferences for the contextual constructs. The subscales which reflect these qualitatively distinctive perceptions of learning context have been shown to be associated with qualitatively different study "orientations" (Meyer, 1988; Meyer & Muller, 1990a, 1990b). On the basis of these studies it had been concluded that students with a meaning orchestration (<u>and</u> deep perceptions) are <u>potentially</u> good students, while students with a reproducing orchestration (together with an absence of deep perceptions) should be <u>theoretically</u> at risk.

Some students exhibited a disintegrated or contaminated meaning orchestration, that is, remnants of the meaning orchestration were clearly evident although some of the desirable subscales had been substituted by subscales associated with a reproducing orchestration. For example, certain key constructs such as "comprehension learning" might be replaced by "syllabus-boundness". Other key constructs, such as "intrinsic motivation" might be absent altogether, or might be replaced by those with qualitatively opposite meaning, such as "extrinsic motivation". Students exhibiting this pattern of subscale associations were placed in an intermediate category.

It must be understood that although these rules appear rigid they were applied as guidelines and the categorisation was based on an understanding of the <u>conceptual</u> as well as the reported empirical associations between the constructs. For example, although "fear of failure" is indicative of a qualitatively poor approach (in combination with the subscales listed above), in close proximity (in terms of perceived preferences) to the subscale "achievement motivation" it could be viewed as reinforcing an approach which is concerned with success and competition, which, in the presence of the other qualitatively desirable constructs, could be taken to indicate a meaning orchestration. A similar argument obtains for the subscale "syllabus-boundness".

A synthesis of the arguments outlined above thus led to the formulation of a <u>general categorisation rule</u>. This rule is based on the simultaneous consideration of the observed approaches to studying preferences and those relating to perceptions of learning context, and is performed independently of measures of learning outcome (such as test or examination results).

> "a well defined meaning orchestration coupled with a rich, holistic perception of learning context (in terms of 'deep' perceptions) is theoretically desirable and should lead to academic achievement. Students with this pattern of orchestration/ perception are placed in Category 3 ["<u>star</u>"]. A reproducing orchestration (which empirically may be expected to be less robustly defined) coupled with an impoverished perception of learning context (in terms of, at best, 'surface' perceptions) is theoretically undesirable and should lead to academic underachievement or failure. Students with this pattern of orchestration/perception are placed in Category 1 ['<u>at risk</u>']. The transition from Category 3 ['star'] to Category 1 ['at risk'] is characterised by a <u>disintegration</u> of the meaning orchestration and the loss of 'deep' perceptions." (Meyer, Parsons & Dunne, 1990 p76. Author's categories in brackets.)

At some intermediate point between the categories of "star" and "at risk" it may still be possible to recognise the remnants of a meaning orchestration that is defined in less theoretically desirable terms. Such an orchestration, coupled with a fragmented perception of learning context, is theoretically problematic and could be expected to lead, at best, to "average" or "borderline" academic performance. Students with this pattern of orchestration/perception are categorised as "average".

> "The method and form of classification deserves further comment. It is not a rigid classification based on absolute rules but is to a degree subjective, based on the classifier's understanding of the ASI and QCI constructs and their interpretation. The categorisation rule is a synthesis of overlapping areas of agreement between theoretical and empirical perspectives on student learning. The method of classification does not impose artificially simplistic divisions which fail to retain the flexibility that the uniqueness of the individual learning orchestration requires. It is also clear that the general rule employed combines, in effect, the outcome of two classifications: the individual orchestration of the ASI constructs and the qualitatively perceived context with which it is associated. This two-fold classification is supported by the view expressed by Ramsden (1985, p62) that personal and environmental factors need to be regarded as complementary rather than trying to 'force a dichotomy between student characteristics and context'. (Meyer, Parsons & Dunne, 1990 p76)

IV - THE ASSOCIATION BETWEEN INDIVIDUAL CLASSIFICATION AND LEARNING OUTCOME IN THE ABSENCE OF INTERVENTION

The classification described above was performed on the first and second year Electrical Engineering samples in the first semester of 1989. It is important to stress that this classification was performed on the basis of the individual responses to the ASI/QCI in the absence of any information about the students and before any test results in the subject were available. In all instances it was this initial classification that was used to explore the association with learning outcome in the absence of intervention. The aim was to establish whether the theoretically posited link between the qualitative classification and learning outcome would be reflected in an empirical association at the individual level. In other words, could the test and examination performance of individual students be anticipated on the basis of the classification categories alone?

Once the classification had been performed for the two classes their individual test and examination results were monitored throughout the semester for the subject for which they had completed the two inventories. The results of the classifications were not divulged to the students. The analyses of the association between classification and learning outcome for the two groups are given in Table 5 and Table 6.

A comment on the choice and form of the analysis is needed. It was decided to use the rank position as an indicator of performance, since this was based on the actual mark of the student in relation to the group as a whole and was unaffected by any movements in test averages or measures of score dispersion. The use of standardized scores was considered, but the small sample sizes and the assumptions of normality required favoured a measure of performance which reflected the position of each student relative to the group as a whole. This allowed for easy comparison between

Table 5. The association between classification and learning outcome for 1st year Electrical Engineering students (n=40)

TEST 1

	THIRDS			
CLASSIF	TOP	MIDDLE	BOTTOM	TOTAL
STAR	9	5	0	14
AVERAGE	2	7	3	12
AT RISK	1	1	12	14
TOTAL	12	13	15	40

TEST 2

	THIRDS			
CLASSIF	TOP	MIDDLE	BOTTOM	TOTAL
STAR	10	4	0	14
AVERAGE	4	3	5	12
AT RISK	0	6	8	14
TOTAL	14	13	13	40

FINAL EXAM

	THIRDS			
CLASSIF	TOP	MIDDLE	BOTTOM	TOTAL
STAR	9	5	0	14
AVERAGE	3	5	4	12
AT RISK	1	2	11	14
TOTAL	13	12	15	40

Note:
1. Column totals vary because of tied rank positions.
2. Test 1: Gamma =0.867 ±0.082 t=7.71
   Test 2: Gamma =0.769 ±0.083 t=7.884
   Test 3: Gamma =0.817 ±0.090 t=7.036.

Table 6. The association between classification and learning outcome for 2nd year Electrical Engineering students (n=34)

TEST 1

	THIRDS			
CLASSIF	TOP	MIDDLE	BOTTOM	TOTAL
STAR	9	5	2	16
AVERAGE	1	3	6	10
AT RISK	1	2	3	6
TOTAL	11	10	11	32

TEST 2

	THIRDS			
CLASSIF	TOP	MIDDLE	BOTTOM	TOTAL
STAR	8	5	3	16
AVERAGE	2	2	6	10
AT RISK	1	2	3	6
TOTAL	11	9	12	32

FINAL EXAM

	THIRDS			
CLASSIF	TOP	MIDDLE	BOTTOM	TOTAL
STAR	7	6	3	16
AVERAGE	3	3	4	10
AT RISK	1	2	3	6
TOTAL	11	11	10	32

Note:
1. Column totals vary because of tied rank positions.
2. Test 1: Gamma =0.609 ±0.173 t=3.242
   Test 2: Gamma =0.493 ±0.193 t=2.416
   Test 3: Gamma =0.389 ±0.212 t=1.738.

groups irrespective of group size, test average or mark dispersion characteristics.

Three categories of learning outcome were established by dividing the group rankings into thirds. The three categories reflected an average, an above average and a below average performance in terms of learning outcome. For diagnostic and intervention purposes, the methodology adopted, which is concerned with the broad association between categories and learning outcome, is preferred to one which might offer greater discriminatory power in terms of numbers of categories.

It is appreciated that this is a very conservative approach to data analysis. However, the use of more sophisticated correlational and multivariate techniques makes a number of assumptions concerning the nature of traditional measures of academic achievement. One major assumption is that these techniques treat learning outcome as a qausi-continuous variable that is linearly associated with academic ability across the range of measurement. It was felt that this assumption was not justified. (See Meyer, Parsons & Dunne, 1990a for a more detailed justification for the use of conservative statistical analyses using similar data.)

An additional factor influencing the adoption of this conservative technique was the small size of the samples used (generally in the region of 40). For this reason it was decided to rely upon the cumulative weight of evidence rather than on the statistical significance of any one analysis.

In Tables 5 and 6 the ordinal nature of the categories suggests that one prefer the gamma statistic as a measure of the ordinal association between the two variables (classification and learning outcome), rather than chi-square. Gamma statistics are analogous to correlation coefficients in taking values between +1 and -1, for perfect direct or inverse relationships respectively, and 0 for absence of ordinal association. The t-statistics generated by the gamma values allow tests for the null hypothesis of zero ordinal association.

Table 5 provides overwhelming statistical evidence for an association between classification and learning outcome ($p \ll 0.001$). Only one student classified as "at risk" obtained a position in the top one-third on the first test, no student on the second test and only one on the final examination. The position of the 14 students classified as "star" conveys a similar picture. No student was placed in the lower one-third and nine of the thirteen students in the top one-third in the final examination were from this group.

Clearly there is an association between the "star" and "at risk" categories of classification and learning outcome and this association is in line with that predicted on the basis of the theoretically posited associations. A meaning orchestration coupled with a "deep" holistic perception of learning context is almost invariably necessary for the achievement of a qualitatively good learning outcome. A reproducing orchestration linked to an impoverished perception of learning context almost inevitably leads to a qualitatively poor learning outcome. The exploratory classification, then, appeared to be a promising indicator of both immediate and longer-term academic performance in the subject in the absence of any intervention aimed at changing the student's study orchestration.

Table 6 presents less but consistent evidence (p«0.05 for Tests 1 and 2) of the association evident in Table 5. However, the strength of the association is not as evident as in Table 5 and indeed becomes weaker from Test 1 to the Examination. A Kruskal-Wallis analysis of variance of ranks confirms this trend (Test 1: H=9.86 p«0.01; Test 2: H=6.09 p«0.05; Test 3: H=3.91 not significant).

Two students who were classified as "at risk" and who were ranked in the top one-third of the group on the final examination have been excluded from the analysis: one student had completed a similar course which had covered most of the work dealt with in this subject at another institution, and another student had transferred from an engineering course at a local university and had also covered much of the work. It was considered that it was not valid to compare their performance with the performance of other students who were studying the subject for the first time and, on that basis, they have been excluded from the analysis presented in Table 6.

The evidence in Table 5 and Table 6 generally supports the theoretical derivation of the classification rule in terms of the association with learning outcome. On this basis it was felt that a pilot intervention programme could be instituted aimed at assisting students who were classified as "at risk" and who, in the absence of such intervention, would be unlikely to succeed academically.

V - EVIDENCE FOR THE STABILITY OF STUDY ORCHESTRATIONS OVER TIME

Before discussing the theoretical derivation of an intervention programme aimed at assisting students who are theoretically "at risk" in terms of their study orchestrations, it needs to be established whether there is independent evidence which supports the view that, in the absence of intervention, study orchestrations are relatively stable over time in similar educational contexts. Evidence for such stability is necessary if we wish to argue that improvements in academic performance are directly attributable to the results of intervention.

Evidence to support this contention comes from the first year group (first semester, 1989) referred to above. Twelve students who successfully completed the first year course in the first semester of 1989 were present in the second year class during the second semester of 1989. This was one of the two classes selected for the pilot intervention programme (see Chapter Five). For these twelve students we have, therefore, the results from two separate administrations of the ASI/QCI and two independent categorizations. The results of the two categorizations are given in Table 7.

Table 7. Stability of study orchestrations over time

CATEGORISATION:	FEB 1989 / JULY 1989
STABLE	11
CHANGED	1
TOTAL	12

Table 7 presents evidence for the general stability of study orchestrations over time in the absence of any intervention. Only one student in the sample of twelve changed category over the six month period despite the fact that the inventories were administered in two different contexts (albeit two different years of the same subject taught by the same teacher). Interesting, too, is the fact that this student, when categorised as "at risk" in the first year course, was ranked 19 out of 40 on the final examination, and when categorised as "star" in the second year course he was ranked 6 out of 53, supporting the view that categorisation and learning outcome are clearly associated.

Further confirmation of the relative stability of students' study orchestration comes from another independent study with which the author was involved. This investigated the study orchestrations of students who were part of the Academic Support Program for Engineering at the University of Cape Town (ASPECT). The ASPECT programme is a foundation year involving a more intensive study of three (as opposed to the traditional six) subjects. All students come from educationally disadvantaged backgrounds, and the aim of the programme is to help them adjust to the demands of a regular academic programme in engineering (for a more detailed discussion of this and other support programmes, see Hofmeyr & Spence, 1989). The nature of the programme is such that it offers an educationally supportive environment and one which is aimed at improving the quality of students' learning (however that quality may be defined by the organizers).

The ASI/QCI instruments were administered to the students in April and October 1989 in the context of Applied Mathematics. Two independent categorizations were performed on the basis of the two sets of responses. The conclusion that was reached on the basis of a comparison of the two categorizations was that the study evidenced an "apparent consistency of individual study orchestrations manifested in a supportive context expressly designed to alter them" (Meyer, Parsons & Dunne, 1990). At the same time they contended that "the data presented substantially supports the argument that in order to achieve academically (that is, to pass) it is essential to have an orchestration that does not place one at risk" (Meyer, Parsons & Dunne, 1990).

Although not all the results cited above were available at the time the pilot intervention programme was designed and implemented, they serve to confirm the premise on which the programme was based, namely that students would consistently evidence a learning outcome associated with their study orchestration for a particular educational context in the absence of an intervention programme specifically designed to facilitate reorchestration. The theoretical design of this programme forms the basis for Chapter Four.

CHAPTER FOUR

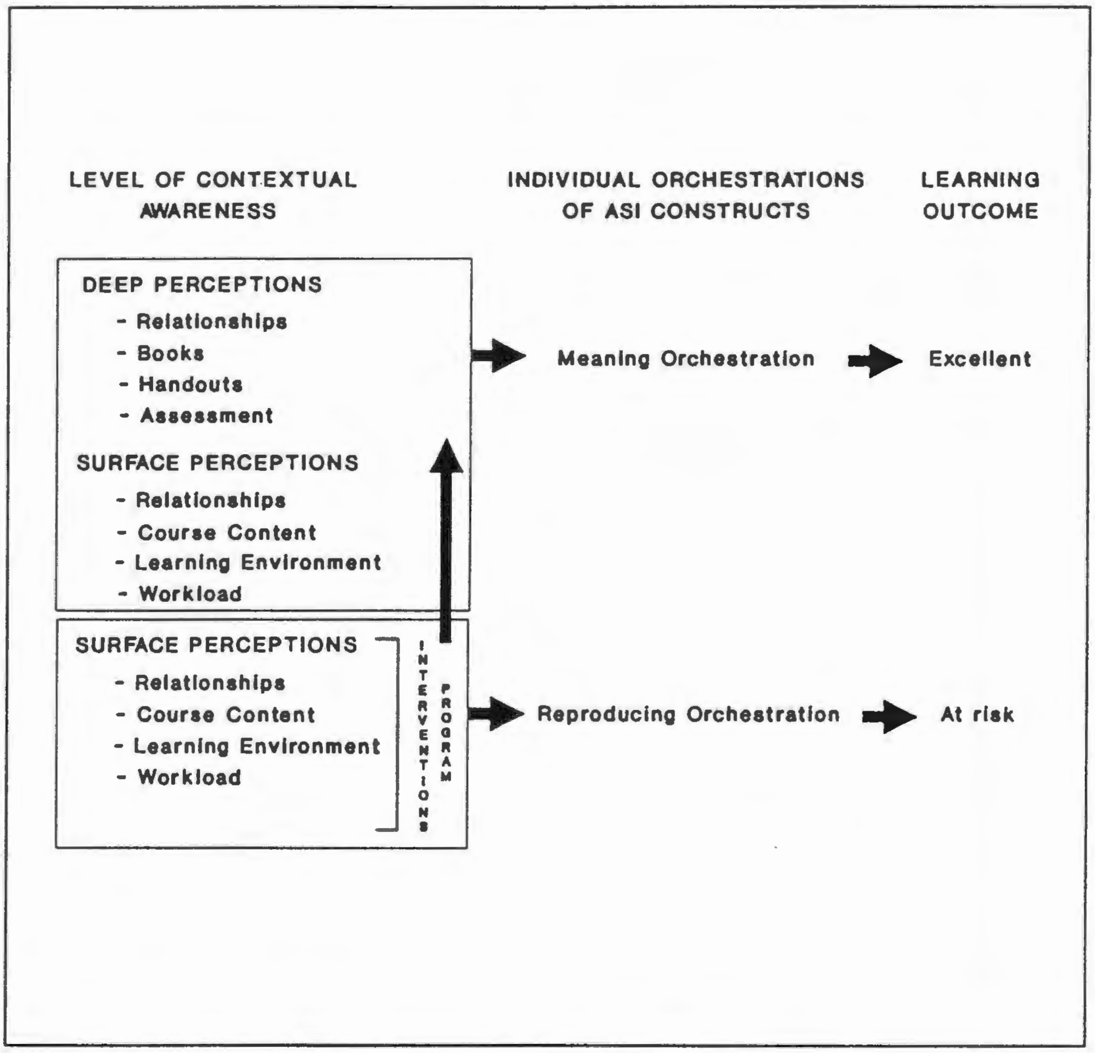
THE THEORETICAL BASIS FOR THE DESIGN OF AN INTERVENTION PROGRAMME

A CONCEPTUAL BASIS FOR INTERVENTION

The QCI, as described earlier, was developed and used to explore the associations between individual students' approaches to studying (in terms of their unique orchestration of ASI constructs) and their qualitative perceptions of certain key elements of the learning context. This theoretically posited and empirically verified association revealed that individual study approaches could be viewed, certainly at one level, as a response to those qualitative contextual perceptions. The relationships between qualitative contextual perceptions, study approaches and learning outcomes is illustrated in Figure 10.

It would, however, be simplistic to try to reduce the complex processes of learning in higher education to a simple relationship between context, process and outcome. Nevertheless, there is considerable empirical quantitative and qualitative evidence supporting the general proposition

Figure 10. The Relationship between Contextual Perception, Study Orchestration and Learning Outcome



made by Entwistle and Ramsden (1983) that learning outcome is affected by the perceived context in which learning occurs. This, indeed, was one of the main contentions of Chapters One and Two. On the basis of this contention, two approaches are apparent. Firstly, we could seek directly to alter the context in which learning takes place. Traditionally this has been the method employed to improve the quality of learning. Emphasis has been placed on improving the quality of teaching, providing better textbooks and notes and altering the assessment system in ways which should promote more desirable approaches to studying. Such major, deliberate structural changes to the context have met with success in some instances (see, for example, Newble & Clarke, 1987). However, many studies which have investigated the influence of context have demonstrated that it is less the real context than the students' perceptions of that context that are the determining factors (see Ramsden, 1988b for a good summary).

A second approach, therefore, would be to address directly the perceptions that students have about the educational context and try to change these in a qualitatively desirable way that is consistent with reality. Research using the QCI has demonstrated that students form qualitatively different perceptions of the same educational context and that these are associated with qualitatively different approaches to studying. Changing these perceptions is a potentially powerful approach. Indeed, logically, there is little point in doing the first without doing the second. Ramsden (1988a p24) described the logical relationship between the two approaches:

> "To improve learning, we should certainly change the conditions under which people learn, rather than trying to change the people themselves; but changing the conditions is only half the battle. One side of this view of learning is that what a student does should be understood in the context of the task: the other side is that the effect of the conditions has to be understood in terms of the perception of the individual learner."

If perceptions of context play such a determining role in approaches to studying, it follows logically that changing these perceptions in a qualitatively desirable way might hold considerable prospect in terms of the design of an intervention programme.

Traditionally, attempts to improve students' perceptions of the learning context have focussed on the influence of assessment. This was the first major dimension identified by Marton and Säljö (1976b) and it has been emphasized in most subsequent research. Entwistle, in summarizing the results of this research, stated that "The strongest and most pervasive influence on approaches to learning seems to be the assessment procedures, and how they are perceived by students" (Entwistle, 1992). Attempts to identify other dimensions of the learning context which exert a strong influence on approach to learning concentrated on the group rather than the individual context. Dimensions such as "good teaching" and "freedom in learning" were identified as contributing (at a group level) to a favourable approach to learning, whereas a perceived heavy workload discouraged such an approach (Entwistle & Ramsden, 1983 p208).

However, the limitations of these findings in terms of their application to individual students have been recognised and, conceptually, research to identify <u>additional</u> dimensions of the learning context has been reported (Meyer, 1988; Van Overwalle, 1989; Entwistle & Tait, 1990; Meyer, Parsons & Dunne, 1990). In particular, the earlier work reported by

Meyer (1988) identified qualitatively different perceptions of additional dimensions of the learning context as well as providing a conceptual framework which has expanded our understanding of learning context. This work has facilitated the empirical exploration of the associations between these different perceptions and approaches to studying, as described in Chapter Three.

Based on the success of the conceptual framework and the methods of analysis described in Chapters Two and Three, the author felt it was now possible to address directly the question: "Can an intervention programme be designed and implemented, based on this conceptual framework, that will take an 'at risk' student and change his qualitative perceptions of context in such a way that he can successfully reorchestrate his approaches to studying, thereby improving his performance in traditional examinations?" (The term "reorchestrate" is simply an extension of the concept of orchestration and is used to signify the change in the pattern of perceived preferences for the ASI constructs associated with qualitative changes in perceptions of the learning context.)

In designing and implementing the pilot intervention programme the model outlined in Figure 10 was explicitly used at each stage, while the <u>form</u> of the programme sought to incorporate features and methods considered desirable on the basis of the results obtained from other intervention programmes using different conceptual frameworks.

It was hoped that an intervention programme based more firmly on theoretically established and empirically verified relationships between qualitative perceptions of learning context and study approaches, and which acted directly to produce a qualitative change in these contextual perceptions, would be effective in producing qualitative changes in study orchestrations. The results of these changes would be evidenced in an improvement in learning outcome.

[How this qualitative change in study orchestration is to be established is a major question, since it cannot simply be inferred on the basis of an improvement in learning outcome. It would, however, be premature to deal with the issue here, so detailed treatment is reserved for the discussion of the pilot intervention presented in Chapter Five, where a method of providing evidence for the changed study orchestration is introduced.]

AN ANALOGY OF THE CONCEPTUAL MODEL

It might be helpful to consider an analogy to illustrate the relationship between qualitative perceptions of context, associated study approaches and learning outcomes. At the same time it illustrates how an intervention programme acting directly on only one aspect, namely contextual perceptions, might be expected to produce more comprehensive qualitative changes in approaches to studying.

Let us consider the analogy of a number of students called upon to compose a piece of music. All students are given specific information about the requirements for the final composition, and are told that they may use all or some orchestral instruments in any way which they consider appropriate. Consider, then, two extreme cases, student A and student B.

Student A has had wide exposure to orchestral music; he has attended many concerts and as part of his general musical education he has learnt to play a wide range of instruments. He is reasonably aware of the capabilities of each as well as how they can best be combined in order to achieve a desired result. In composing his piece of music he has at his disposal a wide range of instruments as well as a qualitatively rich perception and experience of how they can be used. It is logical to suggest that student A has the <u>potential</u> to produce a musical composition which is of a high standard, since it incorporates both a wide range and combination of orchestral instruments.

Student B is faced with the same task. He, however, does not share the rich experience of student A; he has rarely seen orchestral instruments in action and he has not learnt to play more than a limited range of these instruments. In fact, he is unaware of the existence of some instruments found in most orchestras, and he is unaware of the full capabilities of even those instruments that he can play. In seeking to satisfy the requirements of the task, student B has an impoverished perception of the resources available to him and how they might be used, and the quality of his final composition will be limited in that it cannot display the variety or the combinations suited to the demands of the task, and the final musical production must be qualitatively inferior to that potentially produced by student A.

Should we wish to improve the ability of student B to compose in a manner appropriate to the task, an evident point of departure would be to try to improve the qualitative perceptions that he holds concerning the range of orchestral instruments. Simply talking to the student about the need to incorporate more instruments in a more appropriate way would not be effective unless, at the same time, the student's awareness of the range of instruments available and how these instruments could be used was increased. Such a rich, holistic perception of the instruments that can be appropriately employed is an essential <u>prerequisite</u> for a qualitatively improved composition. A rich, holistic perception is not, by itself, a guarantee of a high quality composition. However, it does give to the student the <u>potential</u> to satisfy the qualitative demands of the task.

The analogy with learning context and the qualitative demands of learning in higher education should be clear.

Without a rich, holistic perception (in qualitative terms) of a range of key elements in the learning context - not only the demands of the assessment system - students are unlikely to be in a position to orchestrate their approach to studying in a qualitatively desirable fashion and, other things being equal, their learning outcome will generally reflect the quality of their study orchestration. Put another way, a rich, holistic perception of learning context is invariably necessary for excellent learning outcome, although of itself it is not a guarantee that such outcome will be attained. Conversely, the absence of such perceptions will preclude the majority of students from attaining an excellent learning outcome. This is the central thesis upon which the intervention rests.

This contention derives support from the empirical evidence presented so far in this thesis study. The studies presented earlier have shown that an orchestration that classifies a student as "at risk" is more strongly associated with academic underachievement than the meaning orchestration is associated with academic success. Although students with theoretically desirable orchestration profiles make up the majority of the top one-third of each group in the present study, some students with theoretically desirable orchestration profiles do not succeed academically, possibly because of the effects of environmental and personological factors. However, hardly any students with theoretically undesirable orchestration profiles achieve academic success, because by definition their impoverished contextual perceptions and associated decomposed meaning orchestrations exclude those qualitative dimensions theoretically (and empirically) associated with academic success. In order to assist such students it is not enough to intervene at the level of study orchestration alone. We must also address the associated level of contextual perceptions which will allow the student to reorchestrate his approach to studying in qualitatively desirable terms.

PRACTICAL DESIGN OF THE INTERVENTION - AN ANALYTICAL FRAMEWORK

The objective of the research programme was ultimately to assist students who had been identified as "at risk" to improve their academic performance in a way which was qualitatively desirable. It was not enough that students so assisted might be expected to obtain better test and exam scores, although this could follow as a natural consequence of the qualitative improvement, and could be established by quantitative analyses. There had to be an attendant fundamental change in their approach to learning which would be evidenced in qualitative analyses of structured interviews. The intervention which forms the basis of this thesis research was intended to accomplish both these objectives, and the research design thus incorporated both quantitative and qualitative analyses.

In designing the intervention, based on the conceptual relationships illustrated in Figure 10, there was a deliberate attempt to address the major areas of criticism levelled at more conventional study skills programmes, and to use this conceptual model of intervention as an analytical framework within which to synthesize principles originating from other conceptual perspectives.

Ford (1980), in a meta-analysis of the work done in the area of general study skills courses and handbooks on study techniques, summarized the criticisms levelled against such courses in terms of five broad categories, which conveniently form the basis for an analytical framework within which the attributes of the present intervention programme can be summarized: the data-base, models of learning employed, individual differences, learning task formulation and managing change.

I - THE DATA-BASE

Coles (1990) presented a dismal picture of the results obtained by study skills courses and booklets.

> "In the past two decades scores if not hundreds of study skills booklets have been published, and dozens of courses, some very expensive, have been run on this topic. However, much of this had very little impact on improving student learning (Becher & Kogan, 1980) and the results have been inconclusive to say the very least (Ford, 1980; Hartley, 1986)." (Coles, 1990 p300)

Traditional study skills courses provide advice that is often based on subjective experience or out-of-date psychological data (Ford, 1980). Selmes (1987) illustrated the problem when he cited two books on study skills which advocated contradictory methods. One claimed that it was better not to study the night before an examination, while the other suggested that as much work as possible should be done just before the examination. Selmes concluded:

> "Such contradictions are to be expected with each author proposing study methods that they, as individuals, have found useful. The advice is not based on any underlying rationale devised from a systematic investigation of pupils' learning processes." (Selmes, 1987 p9)

Entwistle (1992) cited the lack of "any theoretical basis or empirical support" as the major weaknesses of most early study skills training.

By contrast, the evidence presented in the preceding chapters as well as the other research referred to constitutes the foundations of such a data-base. It is appropriate insofar as it originates from and relates to the real experience of students in a variety of higher educational contexts. It is adequate to the extent that it consistently demonstrates the role played by perceptions of learning context in the determination of qualitative approaches to learning, which, in turn, are associated with qualitatively different learning outcomes. There is thus good theoretical and empirical justification for designing an intervention which addresses students' qualitative perceptions of the learning context.

II - MODELS OF LEARNING

The models of "learning" on which most study skills programmes are based do not accord with the complex realities of a naturalistic learning setting in higher education (Ford, 1980). The comment of Eysenck and Piper (1987) is apposite:

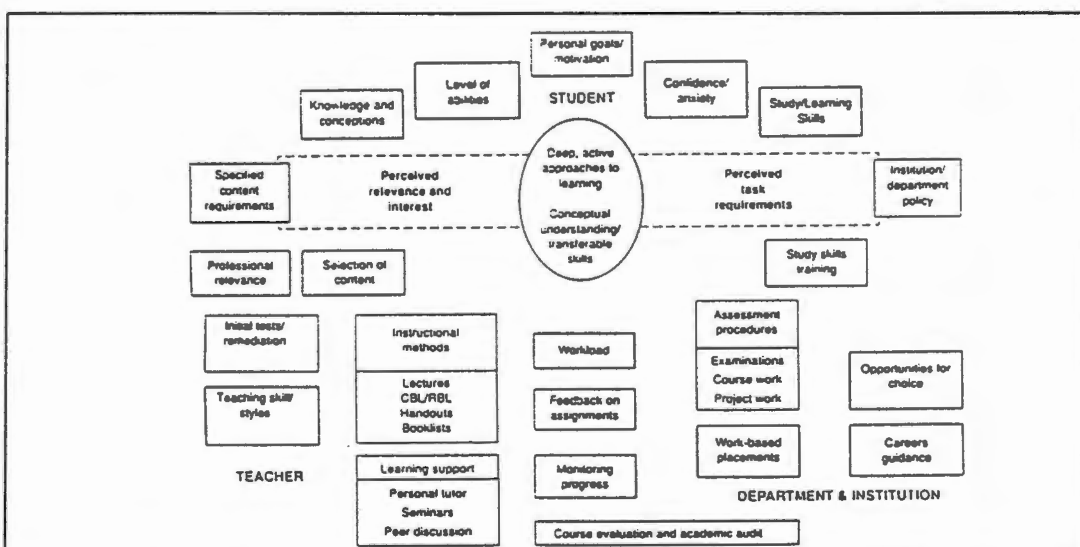
> "the crucial issue is whether the identification of processes or mechanisms by cognitive psychologists can be of use to educational researchers. There is some plausibility in the reductionist notion that research at a molecular level can provide explanations at a more molar level (eg, physiological findings may clarify our understanding of psychological phenomena). However, reductionism typically provides very limited explanations. One may go further, and argue that in many cases a molecular account is simply irrelevant to phenomena at a molar level. For example, carpenters and physicists may both have a detailed understanding of wood, but the physicist's knowledge of the atomic structure of wood is of essentially no relevance to the carpenter." (Eysenck & Piper, 1987 p213)

As Entwistle observed: "To intervene effectively it is crucial to be able accurately to describe the everyday study behaviour of students." (Entwistle, 1992)

The phenomenographic perspective of student learning outlined in Chapter Two has expanded our understanding of the way in which students approach a naturalistic learning task to the extent that it has been possible to synthesize these insights with those derived from alternative perspectives (Entwistle & Waterston, 1988; Ramsden, 1988c; Biggs, 1989a; Entwistle, 1992). The results of such a synthesis are presented in a conceptual model of a teaching-learning system in higher education (Entwistle, 1992) shown in Figure 11.

The conceptual model on which the present intervention programme is based, (see Figure 10) is subsumed under this more general model of the teaching/learning process in higher education and thus accords with currently accepted theories. Figure 10 also illuminates, at one level, the complex interactions between perceptions of learning context, approaches to studying and learning outcome that the model presented in Figure 11 suggests.

Figure 11. A Conceptual Model of a Teaching-Learning System in Higher Education



(Entwistle 1992)

III - ADDRESSING INDIVIDUAL DIFFERENCES

Because most study skills courses have been based on a synthesis of the study behaviour of "good" students they have largely ignored the differences that even these students exhibit, let alone the needs of the students (the so-called "bad" students) for whom the courses are intended. The concern has been more with the symptoms of learning inefficiency than with its causes.

Biggs, one of the foremost researchers in the field of student learning in higher education, in an article predating Ford, strongly rejected the idea of a general, non-individualised study skills course: "...the data confirm that the notion of a 'one best method' study, involving trainable skills and habits, is a lost cause." (Biggs, 1970 p173)

It is clear that in its design and implementation any intervention must not be generally prescriptive. It must identify the unique problems of <u>individuals</u> and present an intervention that will allow each individual to address these problems in a manner that is personally meaningful. Alex Main recognised the value of such an alternative approach which emphasized "more experiential and more reflective activities which involve learners in monitoring and evaluating their own learning capacities and styles" (Main, 1985 p91).

Although it was considered impractical to offer individual counselling, since this would demand too much time from staff and from the facilitator, individual diagnosis was practical through the use of individual study orchestrations profiles. This method was supported by Biggs (1987) when he described the successful Australian intervention study.

> "The programme started with a pretest to determine 'What am I currently doing?' Students were then individually given their own existing profile of study habits and these became the focus of class discussion: the intention is that the students look metacognitively at their own learning processes at the outset." (Biggs, 1987 p114)

For the design of the present intervention programme it appeared to be of value to show to students their individual study orchestration profile and to explain to them both the significance of the theoretical concepts represented as well as the theoretically desirable and undesirable orchestrations of these concepts. In addition, they would be presented with the posited association between contextual perceptions and approaches to studying (by way of Figure 10) and the association of these with learning outcome. The objective of this would be to indicate to students that learning outcome was not simply the result of personological factors such as intelligence, but that "Quality of learning ... [is] the effective orchestration and control of the learning process"(Baird, 1988 p146). [Baird's use of the term "orchestration" should not be confused with its more precise usage in this thesis research.] By equipping students with more appropriate, holistic perceptions of learning context they would effectively be in control of their own study orchestration. This, it was felt, would be a powerful motivator which was consistent with the work done by Van Overwalle, et al. (1989), and consistent with his finding (Van Overwalle, 1989) that factors inside the educational context, rather than factors outside the immediate academic environment, were the most important in determining academic success.

Van Overwalle, Segebarth and Goldchstein (1989) used an in-class intervention by means of videotaped interviews which attributed academic failure to factors under the control of the student, (attribution factors such as lack of effort) rather than those over which the student had no control (attribution factors such as low ability). Using this method the researchers were able to produce a statistically significant improvement in the performance of marginally failing students.

In addition, a powerful argument existed for presenting students with the conceptual framework upon which the intervention was based. This was in line with the view that students should be informed as to the nature and results of research into student learning (Entwistle & Ramsden, 1983 p192). This in turn would provide a framework to address the problem noted by Entwistle (1992):

> "A starting point may well be the observation that students who fail often seem to lack any coherence in their perceptions of the links between the

> academic context and their approaches to learning." (Entwistle, 1992 [Author's emphasis])

Providing students with their individual study orchestration profiles would not only address the question of attribution change, within a theoretically consistent and empirically verified framework, it would also embody the concept of metacognition, or "the knowledge, awareness and control of one's own learning" (Baird, 1988 p145). Students given such diagnostic profiles would be enabled to make appropriate attributions for the causes of their poor performance, rather than blaming external causes, such as "the system" or their own lack of intelligence or ability (Entwistle, 1992).

Ramsden (1987) argued against the teaching of metacognitive strategies apart from content and context and suggested, rather that we should "encourage students to reflect on learning in specific content domains" (Marton & Ramsden, 1988 p274). By explaining to students the interaction of motive, approach, process, contextual awareness and learning outcome this process of thinking about learning would be facilitated in the immediate context of their own orchestration profiles for a specific content-related subject. This approach parallels that of Coles (1990) who provided a form of intervention in which "students can be encouraged to reflect on their experience of learning, and at the same time it introduces them to some of the theoretical work which helps make sense of learning-failure and - success" (Coles, 1990 p301). In advocating a method, he said:

> "Whatever methods you use, qualitative and/or quantitative, it is important that students come to see for themselves what they are doing when studying and why they are doing it. Collecting diagnostic data about a student's way of learning is only valuable when students see for themselves its significance and worth." (Coles, 1990 p303)

He further suggested the use of "hard data", such as the results of the ASI (he suggested the use of numerical values to describe individual approaches to studying) as an effective means of giving significance to this diagnostic data (Coles, 1990). Entwistle made the following suggestions about the approach that could be taken in the design of a successful intervention:

> "First, it would be necessary to identify students with problems in studying and the probable reasons for those difficulties. This might involve an initial use of inventories, supplemented by individual counselling where difficulties were not easy to diagnose."
>
> "Students whose conceptualization of teaching and learning in higher education are incoherent would probably benefit from individual counselling to encourage a reintegration of their perceptions of the academic context." (Entwistle, 1992)

While the emphasis of the intervention would be individual (particularly by way of the individual study orchestration profiles), the intervention would be conducted by way of group discussion. There was ample evidence from other intervention programmes that working in groups was beneficial in terms of collaboration and co-operation (eg, Marton, 1986; Ramsden, 1988a; Baird, 1988 for an excellent summary; Coles, 1990; Entwistle, 1992). It was hoped that the collaboration which would be initiated in the programme would subsequently extend to natural learning situations.

IV - LEARNING TASK FORMULATION

Many study skills manuals simply restate the content or the learning task ("explain", "summarize", "critically evaluate") with no indication of how these outcomes are to be achieved (Ford, 1980). Telling students what to do, without explaining adequately the purpose for which they are doing it or the underlying procedures that are assumed to be necessary for the performance of the task, has demonstrably little value. Reformulating a task such as "summarizing" in terms of "identifying the main points of the argument" is helpful only if students are able to follow the logic and structure of the argument - which many are not able to do, or they would not be following such a study skills programme. As Gibbs put it:

> "...only a broad reconceptualization of what a study task is about will provide scope for significant development. There is little point in teaching a student to go about essay writing in a thoroughly organized and efficient manner if, overall, the student takes a surface approach from an absolutist intention to reproduce the 'right' answer." (Gibbs, 1981 p90)

What is needed is that students be made more aware of the processes and principles that underlie learning and task engagement in higher education. This procedure would be similar to the approach advocated by Ford (1980) and by Biggs (1985, 1987) who used the term metalearning to describe the process of metacognition as applied to the area of student learning. He advocated two phases in metalearning: "being aware of the available options, and of exerting control over these options" (Biggs, 1987 p75). The first of these two phases would be reflected in the explanation of the theoretical basis of the ASI and QCI and in the development of a holistic perception of the learning context. The second phase would be dependent on the first - students cannot exercise control over aspects of which they are unaware - so increasing available options, by way of enhanced contextual awareness is a natural prerequisite to the exercise of control over these options.

> "A long-standing issue in the student learning literature is the extent to which students can be trained to become better learners. Gibbs (1977) puts the question succinctly but with some skepticism: 'Can students be taught how to study?' His answer is 'No'; learning to him is a self-defined and self-taught process that one needs to encounter and negotiate for oneself. ...The present model suggests that the answer would depend on the student's metalearning capability. If there are ways in which an outsider, such as a teacher or counsellor, can facilitate students' analysis of their own resources in relation to task demands, this would seem to be potentially very useful." (Biggs, 1985 p205 [Author's emphasis])

In order to facilitate this process it would be desirable to choose an excellent teacher and include him/her as an active participant in the intervention programme. Biggs (1989a p22) described excellent teachers as those who had "excellent content knowledge, and held high expectations of their students; they used a repertoire of different teaching strategies, and were themselves open to possible changes in their teaching". Such a teacher would be in a position to explicate the content of the intervention, in terms of his own personal "deep" perceptions of relationships, printed materials and assessment. Since the course would rely heavily on content-specific input and an intimate knowledge of textbooks and course notes the choice of teacher to participate would be a very important consideration when selecting a student group for the pilot intervention programme. As was shown in Chapter Two, not all teachers in higher education conceptualize the learning context in qualitatively similar terms. Therefore it was important when selecting the teacher to participate in the intervention to ensure that the he perceived the context in deep, holistic terms in order to facilitate the acquisition of such perceptions by the students.

Students participating in the intervention would have to be given context-specific and content-related examples. For this reason it was necessary to contextualize the intervention in terms of a specific subject and a specific teacher so that the materials used, as well as the illustrations, would all be context- and content-specific.

In addition, the teacher would be in a position to benefit personally from the intervention exercise in terms of possible changes to teaching that the conceptual basis of the programme might suggest and which the teacher-student interaction might indicate should be implemented. Gibbs (1981) recognised this potential benefit:

> "One of the 'unexpected' outcomes of these exercises [group sessions involving students and teacher], which seems enormously beneficial, is that teachers can discover some of the consequences of their teaching and curricula and how they affect the way students study." (Gibbs, 1981 p98)

This aspect should not be underestimated in view of the commitment of many higher education institutions to some form of organised staff development programme. In summarizing the benefits of his own intervention programme, Coles (1990) said:

> "People might consider incorporating some of the points raised in this booklet in any staff development programme. Importantly this should focus on students and their learning, and only then on what teachers should do to help students learn. Good teaching, like good learning, means more than adopting certain skills. It means making the right assumptions and having the right perceptions of one's task. Good teachers are those who help learner learn effectively, that is to elaborate their knowledge. In this sense all teachers should be engaged in helping students with learning difficulties. It should not be seen as an activity of specialists to whom problem students are referred." (Coles, 1990 p311)

V - MANAGING CHANGE

Traditional study skills programmes often pay little attention to the fact that there may be no immediately perceived gain for students in such programmes and that existing study patterns are deeply entrenched (Ford, 1980). Indeed, Entwistle observed that study strategy training "often lacks realism and practicality" (Entwistle, 1992), while Selmes (1987 p8) found that much of the advice given "is essentially unrealistic by demanding much more time than pupils have available".

Because of the difficulty of bringing about desired changes, the intervention programme must be seen to be beneficial in terms of immediate results. The effort required to change must not be disproportionate to these results. This would be accomplished in two ways. Students would be given the results of the studies referred to in Chapter Three to show that unless they were able to change their study orchestrations they would be unlikely to pass the course. It would also be stressed to students that the aim of the programme was simply to increase their awareness (in qualitative terms) of the learning context. They would not have to work longer hours or follow prescriptive study methods. The application of the principles would be in their hands. The programme would provide only a new and perhaps richer awareness of how they could effectively relate to certain key dimensions of the learning context.

From a theoretical and practical perspective it was possible to restrict these key dimensions to three areas: perceptions of relationships (lecturer/student and student/student), printed materials (books and notes) and assessment (tests and examinations). The theoretical and empirical justification for this emphasis has been provided in Chapters Two and Three (see particularly Table 2). How these three dimensions were incorporated into the intervention programme is described in Chapter Five.

A major consideration in determining the duration of the group sessions which would form the basis of the intervention programme was the workload of the students who would be involved. Early work with the Course Perceptions Questionnaire (Entwistle & Ramsden, 1983; Meyer & Parsons, 1989a) had shown a consistent association between a perceived heavy workload and a reproducing orientation. It was clear, therefore, that any course offered would have to be of relatively short duration and would have to present all that was necessary to achieve the objectives of the programme within the contact periods allocated. It was felt that it might be necessary to limit the intervention to four or possibly five forty-five minute group contact sessions (see Van Overwalle, et al., 1989 for a similar strategy), with the author in the role of facilitator and the lecturer present at all sessions to provide the necessary content- and context-specific examples. In this way the additional workload for students would be kept to a minimum and the content of the programme could be dealt with fully in the contact period allowed, without students being required to complete additional work at home.

In summary, then, it was concluded that an intervention programme, based conceptually on the model proposed in

Figure 10 and buttressed by the empirical evidence presented in Chapter Two and Chapter Three, was supported by evidence from many other sources. In terms of this thesis research it was thus considered worthwhile to pursue its implementation in a pilot form first in order to evaluate critically the results obtained.

CHAPTER FIVE

A PILOT INTERVENTION PROGRAMME AIMED AT IMPROVING THE QUALITATIVE PERCEPTIONS OF THE LEARNING CONTEXT OF STUDENTS IDENTIFIED AS "AT RISK"

THE PILOT INTERVENTION PROGRAMME

A first and second year class were selected in the School of Electrical Engineering at the Cape Technikon. Both groups were enrolled for the second semester of 1989 in a course whose duration was six months. The ASI and QCI were given out to students in both classes early in the semester and individual study orchestrations were produced, enabling students to be categorised on this basis. Students who were identified as "at risk", based on the administration and analysis of the ASI and QCI given out before the first class test of the semester was written in the subject, and who subsequently performed badly in this first test, were identified as possible subjects for the pilot intervention programme, which involved four distinct stages.

<u>Stage one</u> involved the categorisation of students on the basis of their approaches to studying and perceptions of

context. Those students categorised as "at risk" and who failed the first test were invited to participate in the intervention programme. For moral reasons it was felt that any other students who wished to join the programme should be allowed to do so, although it was realised that this might well make the interpretation of the final data relating to the success or failure of the programme more difficult. (This procedure was adopted for both the pilot and the larger-scale studies. The difficulties anticipated were encountered, but they were not of such a nature that the author felt compelled to deny that opportunity to students who wished to participate. It was felt by the author and the participating staff members that moral considerations were more important than research design in the context of a naturalistic study in higher education in which the aim was to influence the academic success of students by means of the intervention.) Students were given feedback on the results of previous studies by way of Table 8 but were told that no guarantee could be given that the intervention programme would improve their position at all.

Six first year and three second year students agreed or asked to participate in the intervention programme. Of these nine students, three were categorized as "at risk" and performed badly on the first test, three were "at risk" and performed well on the first test and three were "average" or better. Of the five students who asked to participate in the intervention programme, two were categorised as being

Table 8. Predictive Value of Study Orchestration Analysis for 1st Year Electrical Engineering Students - First Semester 1989

	AT RISK	STAR	TOTAL
PASS	3	13	16
FAIL	11	1	12
TOTAL	14	14	28

[Chi-square value 14.58, significant at the 0.01 level of significance. df=1]

risk" although they performed well in their first test. At this stage no student had been informed of his classification, so the desire on the part of these two students to participate was taken to indicate an awareness that despite their good performance in the first test, they were conscious of a potential problem with their approach to studying (a problem independently identified by their classification as "at risk"). This, together with the consistent comments of students about the accuracy of their reported study orchestrations, provides further evidence that the analysis produced valid results and that the classifications were a reflection of the students' natural approach to studying and not an artefact of the inventories employed to capture their perceptions.

The <u>second stage</u> of the programme involved two sessions in which the participating students were given their individual study orchestrations. (The two year-groups were dealt with separately.) A conceptual overview of the ASI and the QCI was provided by way of discussion to enable them to interpret their orchestrations. Also outlined to them was the posited relationship between their qualitative perceptions of context and their individual approaches to studying. This relationship was illustrated by way of Figure 10, and emphasized as the rationale for the remainder of the programme. The principles underlying this approach are consistent with those advocated by Biggs (1987 p109-116), Ramsden (1988a, 1988b), Van Overwalle, Segebarth and Goldchstein (1989) and Coles (1990) which were referred to in Chapter Four.

The response of students at these initial sessions indicated that they were able to interpret their individual orchestrations, that their orchestrations were an accurate reflection of their perceived approaches to studying and levels of contextual awareness, and that they perceived an association between their lack of success and the concepts that they had ranked as primary in terms of their own perceptions. Two students, commenting at interviews conducted just before the final examinations were written, described the value of this stage in the following terms:

> Student D1: "...that printout. That amazed me because it was so true; it actually frightened me. Because I had all the bad ones on the top, like sb (sb stands for the construct 'syllabus-boundness') and the one where you're doing the subject not because you understand it, you just want to do it for the money..."

> Interviewer: "Did that picture help you to change your attitude?"
>
> Student D1: "It did in a way, yeah."
>
> Student K1: "I think it told me basically where I was going wrong."

While no direct attempt was made to change students' study orchestrations, the outline of the conceptual framework necessitated an explanation of the association between concepts that, from a theoretical as well as an empirical perspective, are linked to qualitatively desirable learning outcomes. The reason that the individual approaches to studying concepts were not directly addressed was that the <u>orchestration</u> of these concepts is seen, in large part, as a response to qualitative perceptions of key elements in the learning context, and without a qualitative change in contextual perceptions a desirable reorchestration would be difficult, if not impossible, to achieve. However, an understanding of what these concepts mean is a necessary step in the process of providing students with the sort of qualitative level of awareness needed in order to consciously change their study orchestration. The process of effecting this reorchestration is not addressed directly since evidence as to how this can be accomplished by intervention is at best equivocal (Ramsden, 1987).

Clearly this approach has much in common with the attributional theory employed by Van Overwalle (Van Overwalle, 1989; Van Overwalle, <u>et al</u>., 1989) in the design of an intervention programme that was briefly discussed in Chapter Four, although the conceptual framework is significantly different. In both programmes students were given to understand that their success was attributable to factors under their direct control. The significant difference is that, in the intervention programme which forms the basis of the present study, a conscious effort was made to change the quality of perceptions that students had formed about specific aspects of their learning context which, in terms of previous studies, had been identified empirically as being associated with qualitatively desirable study orchestrations.

The third stage of the programme focussed on group interaction, involving the lecturer in a "consciousness raising" exercise intended to modify perceptions about the attributes of, and the interaction with, elements of the learning context. These sessions were devoted to a discussion between students, the lecturer and the facilitator of the three aspects of the context which were seen as being determining factors in the successful reorchestration of the ASI constructs. These three aspects were "deep" relationships, "deep" perceptions of textbooks and notes, and "deep" perceptions of tests. While there was a measure of general discussion in these sessions, the focus was always on the specific context of the lecturer and the subject concerned. Thus, the relationship between the specific lecturer and the students was highlighted in terms of the lecturer's values, expectations and attitudes in terms which reflected the essential qualities of a "deep" relationship. The lecturer, by way of guided discussion on the part of the facilitator, was able to explain that he saw his role as being to guide students through the subject material, to provide relevant examples of the concepts, to clarify the relationships between concepts, to distinguish between important and relatively unimportant concepts in order to facilitate understanding on the part of the students. He expressed his concern for them as individuals and his willingness to help them reach understanding even if this made heavy demands on his time outside the formal lecture periods. The students, for their part, had an opportunity to enquire as to his expectations of them as students and what he required of them in order to ensure that this relationship was maintained.

It was also pointed out to students that "deep" relationships did not only involve the relationship between student and lecturer, but also that between student and student. They were encouraged to make use of each other in terms of obtaining clarification of concepts not understood, the working through of practical examples and general assistance with content-related study problems. It was suggested that these relationships might be more formalized by students committing themselves to working together in groups, thus making better use of the human resources present in the learning context.

The session that dealt with textbooks and notes focussed on those aspects which characterized qualitatively "deep" perceptions. These included the awareness of the structure of the textbooks used in the course, their search and reference mechanisms, the value and role of examples, the visual signals used to indicate the relative importance of a section or sub-section, the way in which the writers expected the books to be used and how this was reflected in the layout (for example, the use of overview and review sections). The students were encouraged to apply the principles of textbook layout to their own notes so that structure, examples, visual signals and search mechanisms could be incorporated to make their own notes more valuable as aids to understanding.

The final interactive session dealt with tests and the information that could be derived from work marked and graded by the lecturer. The basis of norm-referenced assessment was explained to them as well as the information required in order to interpret test marks correctly. This was felt to be essential for students to judge accurately their own progress throughout the semester. In addition, examples of marked answers in the subject were discussed to illustrate how students could obtain feedback on the level of their understanding and the reasons for incorrect answers.

The <u>fourth</u> and final stage of the intervention programme dealt with monitoring the progress of all the students in the two classes and conducting follow-up interviews with those involved in the programme to obtain feedback on its perceived effects.

Not all students expressed a conscious appreciation for the benefit of the intervention programme. Comments were made that it was too short and that the benefits wore off over time. Others admitted that they were openly skeptical when embarking on the programme. However, those who felt that they were aware that they had benefitted expressed the value of the programme in terms which indicated that it had achieved at least some of its objectives of changing perceptions about key contextual elements. Students indicated that, where changes had taken place in terms of their perceptions, these were <u>qualitative</u> changes related to the specific aspects dealt with in the intervention programme. The change in perceptions of the relationship between lecturer and students was expressed in terms such as these:

> Student M1: "Perhaps the way in which I looked at the lecturers more than anything else. ...my approach towards the lecturers actually changed a bit."

> Student C1 (second year): "He was putting across the sort of thing you told us we should expect from a lecturer and he made it much easier for me to pick up things that I didn't before, things that I didn't notice."

> Interviewer: "How did your approach change?"
>
> Student K1: "As far as what he [the lecturer] said in class. You would pay more attention to little

> things he said. When he gave us examples and said things like 'Now concentrate on this and that'.

The effect on students' perceptions of books and the result of this qualitative change was described by one student in these terms:

> Interviewer: "How did it [the intervention programme] help you?"
>
> Student C1 (second year): "Well, it opened my eyes to a lot of points that at other times I thought weren't that important. Like, for example, the review at the end of the chapter and an overview at the beginning of a chapter. Things like that. ...The last couple of chapters I found I understood much better and I found my tests were much better as well because from the review I could see he [the lecturer] sort of highlighted points you should know, and I had them written down so I could refer back to them, and it was much easier. ...Study-wise it didn't change things but reading-wise it did. Before, I used to study, you know, that and that. I used to think that was important and that was important and I studied that. ...I saw from the piece of paper you gave me (his individual orchestration) that I liked strategic-type studying, but that changed because I did more reading. Like I tried to get more of an overview of the chapter, like a broader grasp of it so I could fit it together with other chapters. In other words I spent more time trying to understand it rather than trying to learn something that was just there."

The results of these changes in qualitative perceptions of key contextual elements are reflected in the comments that students made about the general effects of the intervention programme:

> Student D1: "I won't say I've worked harder; I've thought more about what I was doing."
>
> Student K1: "I tried to take a more broader view of it [the subject], trying to see where everything fits in, like from a wider angle."

Student M1: "I won't necessarily say it's made me work harder."

Interviewer: "That was the other question I wanted to ask you. Did you put in more work?"

Student M1: "No, I actually haven't. I haven't put in as much work this semester as last semester, but I think what I have done is the work that I have put in, it's been more effective than last semester."

Student C1 (second year): "If I think back I would understand it but not as well as now. Some things I learn now I have a better understanding than I did before."

Comments such as these suggest that a qualitative change in perceptions did take place along the lines that the intervention programme was designed to achieve and that associated with this was a resultant change in approach to studying. The quantitative results presented further on suggest that this qualitative change in perceptions was associated with improved performance on traditional assessment procedures.

ANALYSIS OF THE RESULTS OF THE PILOT PROGRAMME

The intervention programme was targeted at students categorized as "at risk" and who were performing badly in the subject on the basis of the first test. Of the nine students participating in the programme the three students who fell into this category all passed the final examination. The three students who were categorized as "at risk" and who performed well on the first test all passed the final examination and maintained or improved their relative position. Of the remaining three students who were categorized as "average" or "above average" two passed and the one student who failed did so despite a year mark (contributing 40 % to his final mark) of 75%. The position of each student relative to the performance of the class group as a whole, before (results on Test 1) and after (results on final examination) the intervention programme is given in Table 9. It is clear from this table that there was a general, and in some cases a marked, improvement in relative performance for all but one of the students.

Table 9. Students' Relative Positions Before and After the Intervention Programme

STUDENT	CLASSIFICATION	TEST 1	EXAM	MOVEMENT
1st yrs				
C1	AVE	15	19	-4 FAIL
D1	AT RISK	8	7	+1
H1	AT RISK	4	3	+1
R1	AT RISK	2	1	+1
T1	AVE	5	2	+3
T2	AT RISK	17	12	+5
2nd yrs				
C1	STAR	23	15	+8
M1	AT RISK	35	15	+20
K1	AT RISK	28	2	+26

First-Years n=24
Second-Years n=53

The question of the benefit of the intervention programme for students categorized as "at risk" deserves further comment. The three students "at risk" who performed badly in the first test (T2, M1, K1) showed a marked improvement in their relative positions. From the results of the previous studies discussed in Chapter Three, in which evidence was presented that, in the absence of intervention, students' performance generally reflects that theoretically associated with their classification, there seems to be some inferential evidence that the improved performance of these students was due, at least in part, to the effects of the intervention programme. It could also be inferred on the basis of their improved performance that the model on which the intervention programme was based appears to be valid. It would also appear that there was only marginal benefit for those "at risk" students who performed well in the first test (D1, H1, R1). Their position, however, needs to be assessed in the light of evidence from the studies discussed in Chapter Three, which suggests that the performance of students categorized as "at risk" may, over time, come more and more into line with that expected from a poor study orchestration: the performance of such students, in the absence of any intervention, generally deteriorates. The fact that the position of these students has not deteriorated suggests that the value of the present intervention programme for such students may be greater than the marginal improvement reflected by their relative positions.

The quantitative results alone would provide reasonably suggestive evidence for the benefit of an intervention programme based on the relationships between perceptions of certain key elements in the learning context and approaches to studying constructs. Supportive evidence of this benefit is derived from a qualitative perspective by analysing the structured interviews conducted with students upon completion of the course, but before the final examination results were known. These interviews provide evidence that qualitative changes in perceptions did occur concerning the key contextual elements that the intervention programme addressed, as well as evidence of a qualitative change in approach to studying.

CONCLUSIONS BASED ON THE RESULTS OF THE PILOT INTERVENTION PROGRAMME

In the pilot study it was not possible, on the basis of the quantitative data alone, to determine statistically the success of the intervention programme described. Questions about the ability of the assessment procedures to reflect adequately qualitative changes in perception remained. In addition, there was the anomalous situation of some students "at risk" who improved their performance in the absence of any intervention. However, the <u>general trend</u> reflected by the relative performance of students who participated in the programme was very encouraging.

The qualitative changes in perceptions and consequent changes in approaches to studying have been inferred from improved examination results and from the interview data presented. It needs to be asked whether more direct evidence as to these changes could have been obtained.

Two possibilities present themselves. Firstly, students could have been asked to complete a second administration of the two inventories and the study orchestrations so derived could have been compared with the original orchestrations. Secondly, students could have been interviewed about their approaches to studying and contextual perceptions in terms of changes which might have been brought about as a result of the intervention programme. While both methods are appealing, it is clear from an understanding of the second and third stages of the intervention programme that such methods could, in fact, produce results which were distinctly biased to favour the intervention programme. Since students had been made aware of the conceptual structure of the ASI and in particular the meaning of and association between those concepts which were considered to be desirable, it is highly likely that they would have responded to a second administration of the ASI in terms of this awareness, which may or may not have reflected their actual (as opposed to what they now knew was desirable) approach to studying. This subsequent orchestration may, therefore, not have reflected an actual change in approach but rather an awareness that such a change was desirable, and any conclusions drawn on the basis of apparent changes would have been misleading.

It is pertinent at this stage to refer back to evidence presented in Chapter Three. The evidence presented there was that in situations where no intervention took place students displayed a marked consistency of orchestration over time, and that their learning outcome was qualitatively linked to this orchestration. Taken together, the empirical support for the contention that study reorchestration has taken place on the evidence of improved performance over time is, in the view of the author, more convincing than evidence presented which compares directly (but not necessarily validly) the results of two inventory administrations over a relatively short space of time.

An appeal to interview data which directly addresses the students' study orchestrations would be open to similar methodological criticisms. Fleming, in his incisive critique of the use of interviews in research on student learning, warns of the danger of structuring interviews to provide evidence of some inferred entity:

> "To be primarily concerned with the interview as an indicator or manifestation of some entity held to be beyond the interview, (the respondents' actions, beliefs or perceptions), systematically neglects the practices, methods and performative work undertaken in the interview to produce descriptions of apparently 'real' actions, beliefs or perceptions." (Fleming, 1986 p558)

For this reason the interviews were structured in such a way that they did not address the conceptual framework of the intervention programme directly, but rather required students to conceptualise for themselves the benefits of the programme.

For these reasons methods of obtaining direct information about changes to students' qualitative contextual perceptions and their approaches to studying were avoided. Inferential information was rather obtained by means of structured interviews which focussed in general on the benefits of the programme and the effects it produced on students' approaches to studying within a framework which did not specifically refer to the constructs of the ASI or the QCI. These responses, analysed and linked to the concepts of the intervention programme where appropriate, can therefore be considered as supporting evidence for qualitative changes in contextual awareness and for changes in study orchestrations.

Despite the limitations of the evidence presented in this pilot study, it appeared, therefore, that intervention to assist students to change qualitatively impoverished perceptions of elements of the learning context (considered to be keys to successful study in higher education) was one which held the prospect of being able to effect real improvement in these perceptions resulting in measurable improvement in indicators of performance.

There was encouraging evidence, provided by the pilot intervention programme, that the conceptual framework upon which the intervention programme was based was a valid and potentially powerful one within which the average practitioner might introduce meaningful changes to assist students who would otherwise be "at risk". It was felt that such a programme could be introduced on a wider scale especially in view of the fact that such an approach required of the student neither extra work in the subject nor a specialized course in general study methods. It was felt, on this basis, that it would be worthwhile to engage in a larger scale study involving a number of different student groups taught by different lecturers, to see whether this would further illuminate the benefits and possible limitations of the programme and provide guidelines for how it could be incorporated into the routine activities of teachers in higher education.

CHAPTER SIX

AN INTERVENTION PROGRAMME AIMED AT IMPROVING THE QUALITATIVE PERCEPTIONS OF THE LEARNING CONTEXT OF STUDENTS IDENTIFIED AS "AT RISK"

For the final investigation it was decided to use four student groups enrolled in the first semester of 1990 in the School of Electrical Engineering, since most of the earlier investigations, as well as the pilot intervention programme, had been carried out within this context. It was unfortunately not possible to extend the scope of the programme to include additional groups. This was because the time required by the intervention programme (five forty-five minute sessions) meant that each programme occupied a full week, since the only time at which all the students were free was during the luncheon recess.

Another factor was that the combined Inventory could not be administered before the students had had a reasonable exposure to the subject (since many of the questions were subject-specific) and the programme could not commence before the results of the first test were known. In addition, sufficient time had to be allowed for students to reorchestrate their approaches to studying following the intervention programme. For these reasons the intervention was limited to the four groups identified in Table 10.

Table 10. Description of the intervention groups

YEAR	LANGUAGE	TEACHER	CLASS SIZE	DESIGNATION
1st	English	A	34	E1EVID
1st	English	B	30	E1EDEB
1st	Afrikaans	B	46	E1ADEB
2nd	Afrikaans	A	22	E2AVID

The groups were selected to include Afrikaans-speaking, as well as English-speaking, students in order to explore potential differences which might exist between the two language groups on the basis of culture and prior educational experience (Parsons, 1988b; Meyer & Parsons, 1989b). Although English- and Afrikaans-speaking first year groups wrote different tests during the semester, as they were taught by different teachers, they wrote the same final examination, which was set by Teacher B and moderated internally by Teacher A.

Teacher A was selected to participate in the intervention since he had participated in the pilot programme (see Chapter Five) and was thus fully conversant with the conceptual framework on which it was based. Teacher B had expressed interest in the programme, had an excellent working relationship with Teacher A, and was willing to familiarise himself with the conceptual background to the intervention. This choice provided three different first year classes in the same subject and one second year class. It was felt that this would allow the effectiveness of the intervention to be assessed, while at the same time ensuring that there was a valid basis of comparison between the three first year groups.

CHOICE OF INSTRUMENTATION

It was decided to use a modified version of the original ASI for the final study. As the result of earlier work on the original ASI (Meyer & Parsons, 1989a; 1989b) and work subsequently undertaken and reported by Meyer (Meyer & Watson, 1991), a modified version of the ASI was employed which overcame some of the earlier criticisms. These criticisms related specifically to the composition of the subscale "surface approach" and the absence of processes associated with a reproducing orchestration.

Conceptual and empirical reservations had been expressed about the subscale "surface approach" from the outset (see Entwistle & Ramsden, 1983, p43; Meyer & Parsons, 1989a; Richardson, 1990). Meyer proposed that the existing subscale be divided into two, namely "<u>memorising approach</u>" (ma) and "<u>fragmentation</u>" (fa).

The subscale "memorising approach", it was felt, more accurately reflected the intention of the student to memorise rather than to understand (the antithesis of "deep approach"), an aspect which had constituted a major part of the original subscale "surface approach". Three of the original items were retained, although the wording of these items was changed slightly to reflect greater conceptual consistency. Two new items were added. [Item 23: "I often have to learn some things several times in order to understand them" and Item 63: "I learn things by writing them over and over or by saying them to myself".] Conceptual consistency was considered to be particularly important, since the empirical manifestation of the division of the original subscale "surface approach", identified in the factor analytic studies of the individual items (Meyer & Parsons, 1989a, 1989b), appeared to parallel the conceptual ambiguity reflected in the item composition.

The subscale "fragmentation" attempted to capture "a particular converse aspect of the process of relating ideas" (Meyer & Watson, 1991). Three of the original items from the subscale "surface approach" which were conceptually consistent with the definition of the new subscale were included, although the wording of these items was slightly altered. Two new items were added to this subscale. [Item 8: "Much of what I am studying seems to consist of unrelated bits and pieces" and Item 49: "Much of what I have to learn seems to be unrelated".] Conceptually this division "is similar to the two facets of what Svensson (1984) has termed an 'atomistic' approach, namely the memorization of detail and the lack of an organizing principle with which to integrate parts (of learning material) into wholes" (Meyer & Watson, 1991).

Meyer also included a new conceptual subscale "reflection" (RE) based on the work of Boud (Boud, et al., 1985). This subscale, comprising five items, attempted to capture the active awareness of the nature and significance of prior learning experiences. Preliminary work which had included this subscale in a number of unfolding analyses had indicated that its empirical and conceptual associations with other subscales added a significant dimension to the understanding of factors related to qualitatively different learning outcomes.

In order to reduce the length of the two inventories, (the new version of the ASI, and the QCI), which were now combined, the subscale "negative attitudes to studying", which had not proved of much diagnostic value in earlier studies, nor in the study with the pilot intervention programme, was dropped. The final version of the combined inventories contained 104 items divided into twenty-five subscales. The subscales and a sample item from each is given in Table 11. (The complete instrument is given in Appendix D.)

Table 11. Subscales of the combined ASI/QCI

DEEP APPROACH
I usually set out to understand thoroughly the meaning of what I am required to learn.

MEMORISING APPROACH
I find I have to concentrate on memorising a lot of what I have to learn.

STRATEGIC APPROACH
When I am doing a piece of work, I try to bear in mind exactly what that particular teacher seems to want.

USE OF EVIDENCE
When I'm reading an article or research report, I generally examine the evidence carefully to decide whether the conclusion is justified.

RELATING IDEAS
I try to relate ideas in one subject to ideas in other subjects whenever possible.

FRAGMENTATION
Much of what I am studying seems to consist of unrelated bits and pieces.

REFLECTION
I often think about certain real life experiences I have had and how they have altered my view of life.

COMPREHENSION LEARNING
In trying to understand a puzzling idea, I let my imagination wander freely to begin with, even if I don't seem to be much nearer a solution.

OPERATION LEARNING
I find it better to start straight away with the details of a new topic or problem and build up a complete picture in that way.

INTRINSIC MOTIVATION
My main reason for being here is so that I can learn more about the subjects which really interest me.

ACHIEVEMENT MOTIVATION
It is important for me to do really well in my studies here.

EXTRINSIC MOTIVATION
I chose my present course of study mainly to give me a chance of a really good job afterwards.

SYLLABUS-BOUNDNESS
I like to be told exactly what to do in essays, assignments or projects.

FEAR OF FAILURE
I am scared that I might fail some of my courses this year.

DISORGANISED STUDY METHODS
I find it difficult to organise my study time effectively.

WORKLOAD
There is so much written work to be done, that I find it very difficult to get down to private studying.

GLOBETROTTING
Although I have a fairly good general idea of things, my knowledge of the details is fairly weak.

IMPROVIDENCE
Although I generally remember facts and details, I find it difficult to fit them together into an overall picture.

DEEP PERCEPTIONS OF BOOKS
When using books for study purposes, I usually notice the manner in which the subject matter is organised in them.

DEEP PERCEPTIONS OF LEARNING ENVIRONMENT
I am conscious of where I sit in the classroom.

DEEP PERCEPTIONS OF ASSESSMENT
I am aware that being tested can sometimes help me to learn.

DEEP PERCEPTIONS OF TEACHER/STUDENT RELATIONSHIP
I am conscious of the way that my attitudes towards teaching and learning affect my relationship with others.

SURFACE PERCEPTIONS OF LEARNING ENVIRONMENT
I usually notice the noise level in classrooms.

SURFACE PERCEPTIONS OF LEARNING CONTENT
The structure of the content in the subjects I am studying is usually clear to me.

SURFACE PERCEPTIONS OF TEACHER/STUDENT RELATIONSHIP
In class I usually write down what the teacher says or writes on the board.

CATEGORIZATION ON THE BASIS OF STUDY ORCHESTRATION AND CONTEXTUAL PERCEPTIONS

The combined ASI (revised version) and QCI were given out to students in all four classes early in the semester and study orchestration profiles were produced, enabling students to be categorised on this basis. It was decided to use a slightly different system of categorisation in the light of the results obtained on the pilot programme. Increasingly it had become apparent that students who performed well on traditional tests and examinations included not only those classified as "star" students, but also a number of students who had been classified as "average". When the orchestrations of these successful "average" students were examined, it was evident that a distinct sub-category could be identified. Students associated with this sub-category exhibited an orchestration that was not as theoretically desirable or as coherent as students classified as "stars". Although their orchestration profiles showed a preference for meaning orchestration subscales (such as "deep approach", "use of evidence", "relating ideas") they were characterised by a strongly observed preference for subscales such as "syllabus-boundness", "achievement motivation", "strategic approach", "deep perceptions of assessment" and to a lesser extent "fear of failure". The presence of these subscales, in close association in terms of observed preferences, and in conjunction with a <u>restricted</u>, though coherent meaning orchestration and a rich, holistic perception of learning context, was conceptually interpretable as an extreme strategic orchestration. Such an orchestration could be expected, on the basis of empirical evidence and theoretical considerations, to lead to success in tests and examinations. Students with this orchestration were placed in a category "<u>average +</u>". This designation was intended to indicate the basis of the classification: it was "average" in terms of the theoretically desirable orchestration of subscales, but in terms of anticipated performance, students were expected to perform better than average.

The category "average" was therefore restricted to those students who exhibited a contaminated or disintegrated meaning orchestration together with the loss of "deep" perceptions of the learning context.

The revised classification did not materially affect the intervention programme, since the majority of students involved in it would have been categorised as "at risk". However, it did allow the association between study orchestration and learning outcome to be examined from a revised perspective. It appeared that, for the first time, at the level of the individual student, it might be possible to identify individual students who adopted what Ramsden had described as a <u>strategic approach</u> (Entwistle & Ramsden, 1983 p154-159; Entwistle & Waterston, 1988). This approach described the strategic management of time and intellectual resources in line with the perceived reward criteria of the course in order to maximise the grades obtained. It is significant that the original study by Entwistle and Ramsden (1983) posited the existence of such a strategic orientation on the basis of the factor structure of the ASI subscales and on the basis of interviews with students. However, subsequent factor analytic studies (see Meyer & Parsons, 1989a; Harper & Kember, 1989; Richardson, 1989) had failed to reproduce a clear strategic factor. Biggs (1979) identified a similar approach on the part of students, designating it "achieving". (Strong support for the existence of this approach was provided by O'Neil and Child (1984) in their first order factor study of the internal structure of Biggs' Study Process Questionnaire.) On the basis of both theoretical and empirical considerations it was felt that the introduction of this categorisation (Ave+) would extend the possible usefulness of the classification based on study orchestration and perceptions of context.

THE INTERVENTION PROGRAMME

The intervention followed the four stages of the pilot intervention, described in Chapter Five.

<u>Stages one and two</u> involved identifying those students categorised as "at risk" on the basis of their study orchestrations and perceptions of context who performed badly on their first class test. 21 such students were

invited to join the programme, although 4 students subsequently withdrew from the Electrical Engineering Course altogether and their details have not been included in the analyses. As in the pilot intervention programme, other students who wished to participate were not excluded, and 14 asked to attend the programme. Although in total 31 students participated in the intervention programme, a full set of results was not available for 4 of the students who were not allowed to write the final examination because their course work was not up to the required minimum standard. Their results have not been included in the final analyses. (Their results are, however, given, together with the full results of each class group, in Appendix E.)

Stage three involved the implementation of the five intervention sessions as fully described in Chapter Five. Two additional features were introduced. Firstly the students were provided with a printed overview of the intervention programme (see Appendix F). Secondly, following comments made in interviews conducted as part of the pilot intervention, students were provided with a printed summary of the meaning of the subscales employed in the ASI and QCI. The view had been expressed by students in the pilot intervention that such a printed summary would assist in the interpretation of the individual study orchestration profiles and would facilitate the understanding of the conceptual framework which formed the subject of the first two sessions. This summary is given in Appendix G.

The <u>fourth stage</u> of the intervention involved monitoring the performance of all students in the four classes and the conducting of interviews with selected students in order to illuminate further in a qualitative way both the validity of the classification and the value of the intervention.

ANALYSIS OF THE DATA

Before proceeding to the results obtained from the intervention programme, it is necessary to state the manner in which the data analysis was approached. Two sets of data were available: quantitative data in the form of test and exam scores, and qualitative data in the form of student and staff interviews. The success of the intervention programme in improving the results of students who participated, and in particular those students classified as "at risk", rests on the quantitative data and the extent to which this can demonstrate a positive effect in terms of the performance measures used. The <u>reason</u> for the success of the intervention programme can only be inferred by careful analysis of the qualitative data. The two sets of data will therefore be treated in this way. Conclusions drawn on the basis of the quantitative data will be explained and illustrated by way of the qualitative data obtained from the interviews.

It is clear that it is impossible to validly infer the success of the intervention as a cause of the improvement on the basis of a comparison of self-selected rather than randomly allocated individuals.

In addition to this limitation, the small numbers of individuals in the intervention groups (9;4;4 and 10) make it highly unlikely that statistically significant evidence will be found to support the envisaged intervention effect on final marks.

The data obtained for each group, therefore, is examined for an indication of a consistent trend in the observed results. Such a trend, in the absence of statistical tests of significance, would provide evidence upon which to base conclusions regarding the perceived effectiveness of the programme. In order to eliminate differences between class groups, the position of each student relative to the group was used as a measure of learning outcome (as in Chapter Five). In a further exploratory analysis, comparisons between the mean test and examination marks of the intervention and non-intervention groups within each class were made employing limited tests of statistical significance .

QUANTITATIVE RESULTS OF THE INTERVENTION PROGRAMME

Table 12 reports the relative movement (in terms of class position) of all students involved in the intervention programme. Results on the first test, taken before the intervention, were compared with test and examination results obtained after the completion of the intervention programme. This comparison was made in terms of the relative change in position (differences in ranks) of the student with respect to the class group. The student with the highest mark was ranked 1. A positive sign, therefore, indicates an improvement in relative performance and a negative sign indicates a deterioration in relative performance. [For example: Student 23 in the 2nd year class E2AVID was categorized as a "star" student and participated in the intervention programme. His relative position was 17 (out of 22 students) on test 1. In the examination his relative position was 7. This indicates a <u>relative</u> improvement of +10 class positions from test 1 to the examination.]

TABLE 12. Relative movement of intervention students: test 1 to examination

CLASS	STUDENT	STAR	AVE+	AVE	AT RISK
1ST YR	[22]			+7	
[E1EDEB]	[26]				+8
(n=30)	[15]				+2
	[02]				-1
1ST YR	[16]				-4
[E1ADEB]	[39]				-1
(n=46)	[08]				+12
	[14]				+16
1ST YR	[07]	+8			
[E1EVID]	[11]	+32			
(n=34)	[22]		+1		
	[40]		+5		
	[26]			+10	
	[19]			+7	
	[08]			+3	
	[37]				+26
	[10]				+13
	[21]				+22
2ND YR	[23]	+10			
[E2AVID]	[17]		-3		
(n=22)	[24]			+16	
	[07]			-4	
	[13]				+2
	[26]				+7
	[11]				+3
	[14]				+10
	[21]				+3

It is evident that by far the greater proportion of students (22 out of 27) improved their performance relative to the rest of the class group (as given by their relative movement from Test 1 to the examination). The performance of only 5 out of the 27 deteriorated. The degree of improvement in many cases was quite dramatic, ranging up to 32 places in a class group of 34.

It is clear from Table 12 that most of the students who participated benefitted insofar as they were able to perform more successfully <u>relative to the class group as a whole</u> in the final examination than they had in the first test.

Table 12 examined the performance of the <u>individuals</u> who participated in the intervention programme. Since this reports only the change in rank of the individuals it might be presenting a falsely optimistic picture in terms of actual performance. For this reason, further evidence for the effect of the intervention can be obtained by examining the performance within <u>each class group</u> of the sub-group of students who participated in the intervention programme relative to the sub-group who did not participate. The test and examination means for these subgroups are given in Table 13, together with the levels of significance of the differences between them. Because of the small sample sizes for some of the groups the t-test values should be taken as guides only and the confidence levels as merely an indication of the significance of the difference between the means.

Table 13. Test and examination means for the intervention and non-intervention sub-groups, by class.

CLASS GROUP	TEST1	TEST2	TEST3	EXAM
E1EDEB				
INTERVENTION (n=4)	22	52	50	25
NON-INTERVENTION (n=26)	52	66	45	47
t-test	1.87	1.22	-0.52	2.39
significance				**0.02**
E1ADEB				
INTERVENTION (n=4)	39	72	48	36
NON-INTERVENTION (n=42)	66	73	50	46
t-test	2.27	0.15	0.18	1.08
significance	**0.05**			
E1EVID				
INTERVENTION (n=10)	43	59	63	50
NON-INTERVENTION (n=24)	65	63	63	42
t-test	3.40	0.23	0.00	-1.73
significance	**0.01**			
E2AVID				
INTERVENTION (n=9)	46	78	89	63
NON-INTERVENTION (n=13)	43	57	68	41
t-test	-0.49	-4.28	-4.10	-4.61
significance		**0.001**	**0.001**	**0.001**

Note: 1. Means are percentages, rounded to the nearest whole number.
2. t-test values are for two-tailed test.

Table 13 provides additional insights into the effect of the intervention programme. For two of the three first year classes (E1ADEB and E1EVID) there is a statistically significant difference between the means of the two sub-groups for test 1. (The difference between the means of the third group, E1EDEB, is not significant because the t-test value is affected by the high degree of variance in the intervention sample, occasioned by the anomalous performance of one student, who obtained 0 on the first test. Without this anomaly it is highly probable that the difference between the mean scores of the two sub-groups would have reflected the same level of significance as the other two groups.

The results of all three of the first year sub-groups show no statistically significant difference on test 2 or test 3, which is interpreted as reflecting the extent to which the performance of the intervention sub-group has improved in absolute terms (as opposed to the relative terms of Table 12). All three intervention sub-groups improve their performance to the extent that their mean scores equal (and in the case of E1EDEB actually exceed) the mean scores of the non-intervention sub-groups.

When the means of the sub-groups for the final examination are compared, the picture is not quite so simple. For two of the intervention sub-groups (E1EDEB and E1ADEB) the difference between the means of the intervention and non-intervention sub-groups increases, and the difference is significant for E1EDEB. This indicates that the real improvement in performance of the intervention sub-groups in these two classes was not sustained in the examination. The class group, E1EVID, shows a very interesting result. Not only is the statistically significant difference between the intervention and non-intervention groups on test 1 not apparent for tests 2 and 3; for the examination the intervention sub-group mean is <u>higher</u> than the non-intervention sub-group mean (although this difference is not quite statistically significant at the 5% level).

The difference in the examination performance of the three first year groups requires further explanation. If the composition of the three intervention sub-groups is compared, it is apparent from Table 12 that the sub-groups for E1EDEB and E1ADEB contain almost exclusively students classified as "at risk", whereas the sub-group for E1EVID is composed of a majority of students drawn from theoretically more desirable categories who <u>volunteered</u> to join the programme. It would seem, therefore, that the intervention sub-groups in E1EDEB and E1ADEB are fundamentally different in composition and their failure to show evidence of sustained benefit must be explained in relation to their composition. Given the small sample size of these two groups and their homogeneous composition in terms of "at risk" students, it is easier to explain why the beneficial effect of the intervention programme, evident in tests 2 and 3, was not sustained. Students experience considerable pressure for the final examinations, when they write six subjects over a period of approximately two weeks. Evidence from other studies (for example, Entwistle & Ramsden, 1983) has highlighted the negative effects that workload and fear of failure have on students' approaches to studying. Ramsden (1987) found that intervention aimed at changing students' approach to learning from a surface to a deep approach was not successful in improving students' final grades. While the evidence for the two sub-groups of exclusively "at risk" students is similar, the present intervention was successful in improving their test performances. Interview data supported the view that this improvement was accompanied by the sorts of qualitative change in contextual perceptions that the intervention sought to bring about.

Table 13 provides evidence for the difficulty of effecting a sustained improvement in the performance of first year students categorized as "at risk", an aspect which will be examined from a qualitative perspective later. At the same time it does provide evidence for the qualified success of the intervention programme across all three intervention sub-groups. The implications of this finding will be addressed in Chapter Seven.

Evidence of the beneficial effect of the intervention programme at the second year level is provided if the means of the second year sub-groups (E2AVID) are compared. For these sub-groups there is no statistically significant difference in the means for the first test. However, for test 2, test 3 and the examination the performance of the intervention sub-group is <u>significantly better</u> than the non-intervention sub-group. This supports the evidence from the first year groups that the intervention programme improved the mean test performance of individual participants. In addition, this beneficial effect was sustained for the examination for the second year group, a feature which will be dealt with more fully in Chapter Seven.

The results presented in Table 12 and Table 13, at both the individual and the group level, suggest a possible consistent trend of improved performance of most individuals who participated in the intervention programme, although for two of the groups this improvement is not sustained in the examination. Figures 12 to 15 allow the visual impression of such a trend.

Figure 12. Test and examination means for intervention and non-intervention subgroup for class E1EDEB

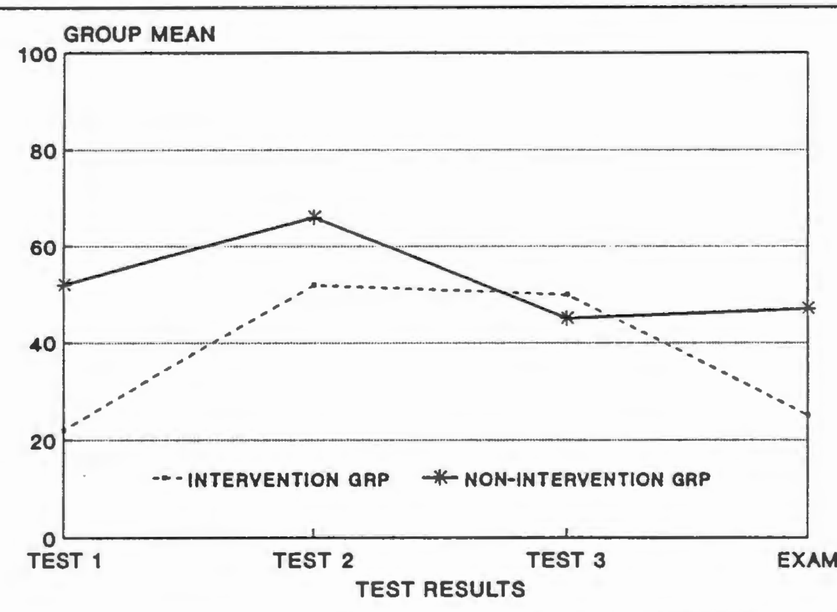


Figure 13. Test and examination means for intervention and non-intervention subgroup for class E1ADEB

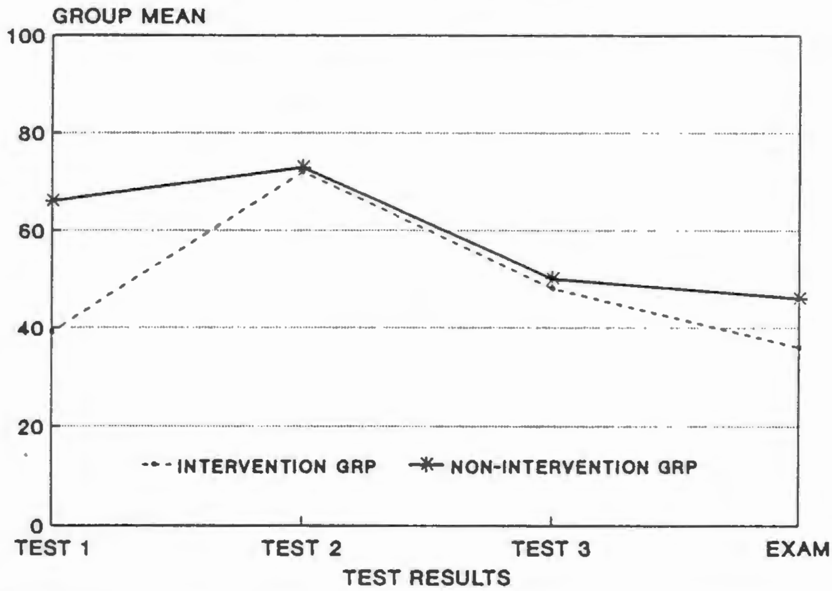


Figure 14. Test and examination means for intervention and non-intervention subgroup for class E1EVID

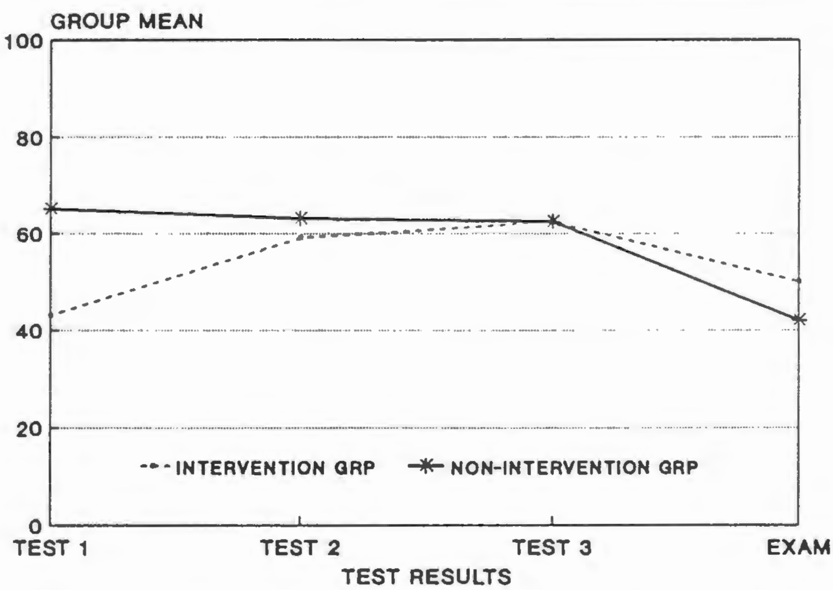
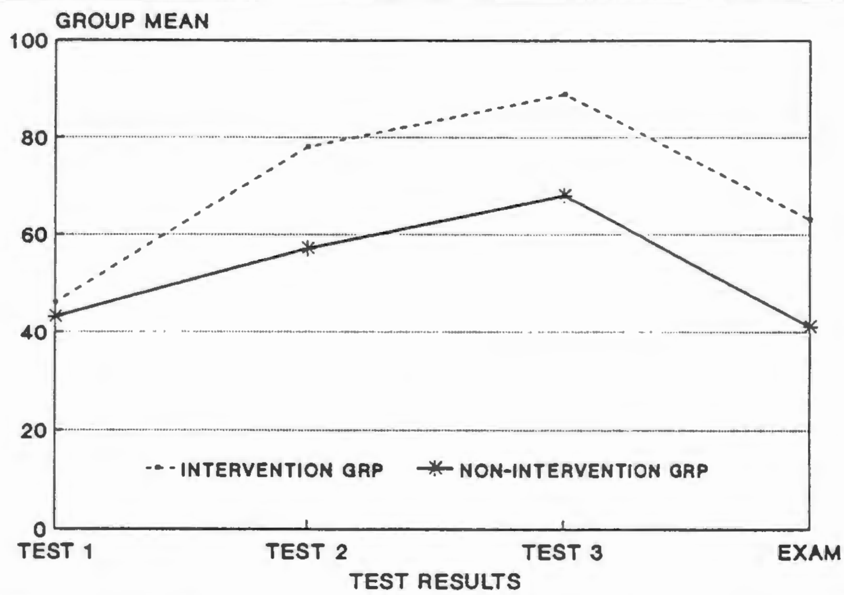


Figure 15. Test and examination means for intervention and non-intervention subgroup for class E2AVID



QUALITATIVE EVIDENCE OF THE BENEFIT OF THE INTERVENTION PROGRAMME

One reason for selecting both English speaking and Afrikaans speaking students was to investigate if there were any evident differences in the way in which qualitatively different approaches were manifested at the individual level within the different language groups, as had been suggested by an earlier study (Meyer & Parsons, 1989b). The more detailed level of analysis provided for in the present study, namely the individual study orchestration profiles, gave no indication that these earlier differences were in fact observed at the level of the individual. The results of the intervention programme similarly provided no evidence of inherent difference in the way in which English and

Afrikaans speaking students responded to an intervention which assumed that the qualitative differences were perceived in essentially similar terms by both population groups. For this reason, further quantitative investigation into possible differences was discounted. (However, the possibility that phenomenographic investigations might reveal subtle differences in qualitative perceptions to which the present analytic methods are not sensitive is not discounted.)

Nevertheless, the similarities in the quantitative and interview data for all the groups supports the view that qualitative perceptions are (at least) broadly held by both language groups and that Afrikaans speaking students can respond to the items of both Inventories in conceptually consistent and meaningful ways. This assurance further extends the useful application of both instruments.

The evidence presented in Table 11 and Table 12 does not, in itself, provide evidence that students improved the quality of their learning; it simply reflects that they were more successful in the traditional test and examination system. Bearing in mind the limitations expressed in Chapter Five with respect to methods of obtaining such evidence, typical comments by students will be used to support the contention that improved performance may be attributable to qualitative improvements in the perceptions of those aspects which the intervention addressed. At the same time, there is considerable evidence (see, for example, Ramsden, et al.,

1986) that students extract from such intervention programmes <u>what is useful to them</u>, and that what they deem "useful" is a function of their perceptions of the teaching and assessment requirements. One student, categorised as "Ave+" who voluntarily attended the programme, expressed his attitude to the intervention in these terms:

> Student 12 (E1EDEB): "I did recognise most of the important aspects of it [the individual study orchestration profile]. It wasn't something new to me - I did know about these things. For me, I was hoping to get out of the course some form of study methods, like rigid study methods that I could perhaps apply. That's the main reason I attended. And that I didn't get from the course. ... It just highlighted some of the aspects which I could have used and which I wasn't using to the full."

The evidence presented by way of interview data, therefore, must not be held to provide conclusive evidence of qualitative changes in perception. Rather it is <u>supportive</u> of the general theoretical relationships upon which the intervention was based.

Students typically expressed the value of the programme in general terms such as attitude or approach.

> Interviewer: "Do you think the intervention programme we ran had any benefit for you?"

> Student 22 (E1EDEB): "Most definitely. In the first instance would be my Electronics mark which went from 0 [his actual mark] to 52 to 58. It greatly improved my attitude to the subject and towards the lecturers, but didn't actually do very much as in helping with the work. It sort of changed your attitude towards the work, which is probably more important, because with a good attitude you can approach any work."

Interviewer: "How did you change your approach? Can you describe that for me?"

Student: "Well, by adopting a better study routine and also by changing my attitude to my work; putting more time into my work and asking the lecturer questions and using him to guide you and ask what is important."

Student 39 (E1ADEB): "I was more motivated. I could never get started. I wanted to study but could never get started. The sessions helped me to realise that I have to motivate myself to study."

Interviewer: "Did you find any benefit in the programme?"

Student 26 (E2AVID): "Yes, definitely."

Interviewer: "Can you perhaps describe for me the benefit."

Student: "As you said - don't work harder, work smarter. This I applied, and this helped me a lot, in all my subjects."

Interviewer: "In all your subjects?"

Student: "Yes, definitely. I didn't spend more time studying, and I studied for the same amount of time, but my marks improved significantly."

Interviewer: "Did you benefit from the programme?"

Student 21 (E2AVID): "Definitely. I became aware that I had completely the wrong conception of what was expected in terms of how I had to approach the work, and I realised I must not only work harder, pay more attention to what the lecturer was saying

> and also do more personal research by looking things up in the book. ... I applied it to all my subjects. I worked harder, asked more questions of the lecturer in connection with the work if I didn't understand something. In general, my marks improved in all my subjects."

A number of interesting comments were made that indicated that students were aware of changed perceptions about specific aspects of the context. Student 22 (quoted above) highlighted the change in perceived teacher-student relationship as did student 21 (quoted above). Another aspect mentioned by a number of students was the qualitatively different perception of textbooks, illustrated by comments such as these:

> Interviewer: "Do you think the session we ran on how to use textbooks helped?"
>
> Student 26 (E1EDEB): "Yes, I reckon it did, because I didn't know half the things about textbooks. I mean, I knew at the beginning of the chapter was the index, but the preview test and the test yourself, I really didn't notice them. Maybe just because they had a 'test' on them I skipped them. I'm working through those now and it helped me in digits [part of the electronics course] especially."
>
> Student 08 (E1ADEB): "It made you more aware. I use textbooks more and more effectively now."

These students were categorised at being "at risk", and their comments are more significant in the light of comments made by two students, categorised as "Ave+" who voluntarily attended the intervention.

> Student 12 (E1EDEB): "I feel that if a guy has made it as far as the technikon, I think most of the guys would know about these things. I don't know, maybe it's just because it's common sense to me and I assume that everybody just knows about these things."

> Interviewer: "Did you feel there was any value in the programme?"

> Student 22 (E1EVID): "Well, I didn't actually need the programme all that much. I did feel it helped me in some ways to be more aware of certain factors that affected my studying. ... As far as the actual ability to assist you in changing, um, I don't know. If you're more aware you probably have more of a good way of approaching something if you know what it is you're approaching. Thus making it more possible to change things that are preventing you from doing well."

Some students spoke of the benefits of the programme in terms of "understanding":

> Interviewer: "Do you think you now understand more what you are studying?"

> Student 39 (E1ADEB): "Yes, I think so, because I realised it doesn't help if you don't understand what you read even if you pass. Now I understand the work and it's better to understand when you learn."

There is evident here a new conception of the term "learn" which is closely related to the concept of understanding. From the comment made it is clear that this new conception is qualitatively "better", from a theoretical perspective, than his original conception. Although not using the same terminology, the following extract shows a similar qualitative change in the conception of learning:

> Student 21 (E2AVID): "In the past I didn't do this [ask the lecturer to assist and explain again]. I just accepted it and said, 'I don't know what's going on'. But I came to realise, as the list [of subscale explanations] shows, everything relates. You have to use everything in order to improve."

The insights gained from these interviews serve to confirm the evidence obtained on the pilot intervention programme. Not only did students express appreciation for the value of the programme in terms of improving their performance, they also expressed qualitatively enriched perceptions both of learning and the learning context. The interviews were, of necessity, held before the students had written their final examinations and obtained their final results, and it was, therefore, not possible to ask certain students for the reasons for the apparent failure of the programme to improve their examination results.

IMMEDIATE AND LONGER-TERM RESULTS OF THE INTERVENTION FOR STUDENTS CATEGORIZED AS "AT RISK"

We can now examine the effect of the intervention programme on those students for whom it was specifically designed, those categorized as "at risk". Because of the small numbers involved (ten first year students spread over three classes and five second year students), the use of statistical tests is inappropriate. An alternative way of establishing the effect of the intervention for these students is to consider together all those "at risk" first year students who participated in the intervention programme and compare their performance with those "at risk" first year students who did not participate. For the reasons cited earlier in this chapter, statistical comparisons are not used. Instead indicators of performance which suggest trends in the data are sought which are interpretable in terms of the intentions of the programme. For the purpose of this discussion first and second year groups will be considered separately.

If a comparison is made between the two groups of first year students in terms of their final results (final results are the published results based on a 40% allocation to class test marks and a 60% allocation to final examination marks) (Table 14) a number of interesting features emerge.

In terms of absolute results (as distinct from results relative to the rest of the class group as presented in Table 9 and Table 12) the picture presented by the two groups of students is very interesting. Relative to their marks on the first test, of the 15 "at risk" students who participated in the various intervention programmes (marked by asterisks), 12 improved their performance as reflected by their final mark, and the performance of 3 deteriorated. By contrast, of the 16 "at risk" students who did not participate in the intervention, only 3 improved their performance and the performance of 7 deteriorated (the 5 students who withdrew before the intervention programme was completed have been excluded, as has 1 student who obtained

TABLE 14. Comparative performance of first year "at risk" intervention and non-intervention programme students.

CLASS	STUDENT	FINAL MARK FIRST YR	FINAL MARK SECOND YR
1ST YR [1989]	[D1]*	65 (54)	56
	[H1]*	80 (59)	
	[R1]*	86 (62)	50
	[T2]*	56 (46)	
	[B1]	55 (50)	
	[T3]	73 (53)	51
1ST YR [E1EDEB] [1990]	[26]*	44 (37) /54	51
	[15]*	38 (31)	
	[02]*	25 (21)	
	[29]	60 (50)	68
	[11]	35 (58)	
	[21]	44 (53) /51	40 /52
	[18]#	0 (45)	
	[19]#	0 (24) /35 /42	
	[32]	0 (0)	
1ST YR [E1ADEB] [1990]	[16]*	39 (43)	
	[39]*	42 (43) /67	
	[08]*	48 (40)	
	[14]*	44 (31)	
	[25]	54 (69)	45 /58
	[11]	57 (89)	
	[07]	37 (69)	
1ST YR [E1EVID] [1990]	[37]*	57 (28)	
	[10]*	44 (43)	
	[21]*	53 (10)	
	[15]*	0 (30)	
	[39]	48 (95) /85	45
	[30]	41 (68) /55	44
	[27]#	0 (43)	
	[28]#	0 (25)	
	[18]#	0 (20)	

Note:
1. * Denotes participants in intervention programme.
2. All marks are percentages. Marks in parenthesis are for test 1.
3. / Separates the results of the same subject when written more than once.
4. # Indicates students who participated in part of the intervention but withdrew from the course before the programme was completed.

zero for the first test and was not allowed to write the examination).

This analysis confirms the beneficial short term effect of the intervention programme for the majority of "at risk" students. However, since most of the students who participated started with a very low test score, improvements in subsequent test scores were not sufficient to compensate for poor results in the final examination (see Table 13). So although there was improvement as a result of the intervention, this was insufficient to ensure that these students passed the course.

By contrast, the performance of "at risk" students (who initially did well in the course) in the absence of intervention showed a marked deterioration, thereby supporting the contention that the results of such students over time tend to reflect the anticipated outcome of a presumably stable orchestration.

A detailed examination of the progress of two first year students may help to illustrate the phenomenon and suggest possible reasons for it. They were among students categorised as being "at risk" on the basis of their study orchestration. Student 39 (see Appendix E, E1EVID) obtained 95% on his first class test and was ranked second out of the forty students in the class. Student 11 (see Appendix E, E1ADEB) obtained 89% and was ranked sixth out of forty six students in the class. On the basis of their excellent test result neither of these students was invited to attend the intervention, nor did either volunteer to attend. However, the performance of both deteriorated (as would have been predicted on the basis of the theoretical categorisation). Student 39 failed the final examination with a mark of 33%, placing him twenty-second out of the thirty-four students who completed the course. Student 11 failed the final examination with 31%, placing him thirty-third out of forty-six students who completed the course.

When interviewed after the first test, which was taken near the beginning of the course, they described their approach in terms which (at least partially) supported their categorisation. (At no stage were they shown their orchestration profiles or told that they appeared to be theoretically "at risk".)

> Interviewer: "How do you go about studying in order to give you this sort of success?"
>
> Student 39: "Pretty much panic the day before and in the morning and ask everybody all the questions again and go through my notes."
>
> Interviewer: "Do you take down things he [the teacher] says in class? Do you take down what he writes on the board?"
>
> Student: "Yes, yes. Particularly when it's something I haven't seen before."
>
> Interviewer: "Do you go over it when you get home?"
>
> Student: "No. If I go over it it's before a test."

> Interviewer: "How do you use your text book in helping you to understand?"
>
> Student: "So far I haven't been using it much."
>
> Interviewer: "So have you found the notes Mr A gives you and you take in class to be adequate?"
>
> Student: "Yes."
>
> Student 11: "Suppose I'm learning Electronics. Most times, if I go through the work I understand it. For subjects which are just learning subjects, which you can't understand you just learn - there I would just read through and simply memorize."
>
> Interviewer: "Are there sections like that in Electronics?"
>
> Student: "No, definitely not. In other subjects, such as [he named another subject] which are very confusing, there I learn like a parrot, everything. But in Electronics and [he named two other subjects] you just have to know the basic equations and apply them."

The extracts given above suggest the presence of perceptions of the role and use of notes and tests, as well as approaches to understanding the content of the subject which support the theoretical categorisation of "at risk" based on their study orchestration profiles. (While student 11 did not admit to the use of a memorising approach at that time in Electronics, nevertheless his application of rote learning to overcome difficulty in understanding in other subjects indicates his acceptance of this approach as one likely to be successful in higher education.) The approach evidenced by these two students is undesirable from a theoretical point of view, and yet the test results they obtained reinforce the view that this approach can, and will, yield satisfactory results - a phenomenon that has been commented on by other researchers (see, for example, Watkins, 1986).

If we now return to Table 14 we see that although at the commencement of the first year the performance of those "at risk" students who were invited (or who asked) to join the intervention programme was very different from the other "at risk" students, by the end of the course both groups achieve similar results. Few of the total number of "at risk" students passed the course (12 out of 31 - 5 intervention and 7 non-intervention students) and those who did, with the exception of three students who participated in the pilot intervention, did so with marks less than 60 per cent.

Their subsequent performance is also interesting. Very few of these students returned for their second year since many of them <u>failed a large number of other subjects</u>; the average failure rate for the entire "at risk" group was 4 out of 6 subjects. Those who did return either to redo their first year, or to attempt their second year, performed very badly (with the exception of student 29).

Viewed as a whole, these results point to a definite, but limited benefit for intervention at the first year level with "at risk" students. Significantly, they also serve to confirm the association between categorization and examination performance at the first year level. These aspects will be dealt with again in Chapter Seven.

If we now examine the performance of second year students categorized as "at risk", we find confirmation of some of the features identified in the first year group. Table 15 sets out the results of the second year group.

TABLE 15. Comparative performance of second year "at risk" intervention and non-intervention programme students.

CLASS	STUDENT	FINAL MARK FIRST YR	FINAL MARK SECOND YR
2ND YR [1989]	[25]	52	31 /50
	[04]	58	51
	[15]	51	65
2ND YR [1989]	[M1]*	51	65
	[K1]*	50	76
	[M2]	52	45 /48 /57
	[A2]	69	40
	[S2]	50	34 /55
	[M5]	86	60
	[H6]	81	59
2ND YR [E2AVID]	[13]*	51	66
	[26]*	$	67
	[11]*	57	61
	[14]*	51	74
	[21]*	$	80

Note: 1. * Denotes participants in intervention programme.
2. All marks are percentages.
3. / Separates the results of the same subject when written more than once.
4. $ Indicates results not available.

Table 14 presented evidence that very few "at risk" students proceed to the second year of study, and that those who do advance on the basis of relatively poor performance. Table 15 confirms this retrospectively. Very few students categorized as "at risk" in their second year did well in their first year. Eight of these students passed only marginally (50-52%), while only 3 out of the 13 students for whom first year results were available obtained a final first year mark above 60%. In their second year 9 students obtained higher than 60% out of 19 results (some students attempted the second year more than once), and of these 9 students, 7 were involved in the intervention programme during their second year.

Table 15 provides additional confirmation of the benefit of the intervention programme for "at risk" students at the second year level. There was an improvement for all such students whether that improvement was measured in relative terms (see Table 12), in absolute terms from Test 1 to the examination (Table 13) or first year to second year final results (Table 15).

As stated earlier, care should be taken in interpreting the results of Table 14 and Table 15 because of the small numbers involved and the fact that between group comparisons have doubtful validity, since final results were not obtained on comparable assessments. Nevertheless, trends are apparent in these Tables which complement the conclusions drawn on the basis of the quantitative results for the full intervention groups and which are consistent with the qualitative evidence presented. The implications of these conclusions for student support and curriculum design will be discussed in Chapter Seven.

THE INTERVENTION PROGRAMME FROM THE PERSPECTIVE OF THE TEACHERS INVOLVED

Another view of the benefit of the intervention programme is provided by the general perceptions of the teachers involved in the programme. They expressed views on the perceived benefit to the students as well as its effects on their own teaching. They both perceived an apparent change in approach and awareness on the part of students who participated:

> Teacher A: "[The best] example was one chap we had in the second year class last semester. I can't even remember his name now, but he was totally in pain, from day one. You could see, he was one of those honest students who put in a hard day's work; he really tried. No luck. And then after this programme he completely switched. He's the one guy who moved right from the bottom to right to the top, remember. Now that, to me, was the best result, or the best reward, we've had with the programme so far. It's one of the best rewards we've seen. Because this little chap completely opened up, and I could understand why. I could understand he was becoming aware of the things he should be doing and wasn't doing. He was becoming aware of his approach being wrong, and he applied the principles simply without working harder, and he became a person with a deep approach."

Teacher A expressed similar comments about the group as a whole:

Interviewer: Could you see a marked difference in those students?

Lecturer: Oh yes. Oh yes. Especially last semester's second year class is one of the best examples we've had of this. It completely changed. Even from day one after this programme had been introduced the guys were going to form, were forming, study groups. They were sitting and working after lunch. You walk around and see them sitting and working. ... You see a marked difference. Definitely, you see the big difference. "

Teacher B expressed the benefit of the programme in more qualified terms:

Interviewer: "Do you think that the students benefitted from the programme?"

Teacher B: "Yes, definitely. I think if they paid attention to what we've discussed, they actually went back and concentrated on that, they will definitely benefit. Definitely.

Interviewer: "Do you think they did that?"

Teacher B: "I definitely think some of them did it. In saying that I could definitely pick up that the attitude of the student towards me changed, in a sense. So in that way I definitely felt that something that we did did actually make an impression on them, and they used that. Whereas some others, I think, didn't really think it would help them. Although they might have listened to what we've said they didn't really have confidence because they stayed where they were, they didn't really make much progress."

Interviewer: "Would you like to speculate why it might be, you think, some of them didn't see any benefit in it."

Teacher B: "I would say in trying to explain my answer that the poorer students definitely didn't make any progress. ... Whereas some of them, I feel that I could really pick up that their attitude changed, some of the better students in the class.

> Especially one guy. He wasn't one of the best, he was more a troublemaker. He's academically one of the better students now."

The apparent change observed by the teachers in individuals and groups within a class cannot be taken as more than supportive evidence for the qualitative improvements that the intervention was attempting to accomplish, since the teachers themselves were intimately involved with the students and the programme. Nevertheless, their comments provide an additional perspective on the perceived effectiveness of the intervention.

THE EFFECT OF THE INTERVENTION ON THE TEACHERS CONCERNED

Another area of interest concerns the effect that involvement in the programme might have on the teachers concerned. This was particularly important if the principles of the intervention were ultimately to be incorporated into the regular teaching programme, and not simply form part of a separate intervention.

Because the intervention provided a relatively simple yet coherent theoretical framework, it was felt that for the educational practitioner it might provide a conceptual framework which would allow him to incorporate the principles and practices into his regular teaching programme. This was certainly apparent from the enthusiastic response from Teacher A, who had been involved with the programme from the outset. [Note that the home language of both teachers is Afrikaans, which accounts for the unusual choice of English idiom with which some of their ideas are expressed.]

> Teacher A: " The way I can put it in layman's language is "falling into place". That's what happened to me. It made sense; everything made sense. I became aware, but look, there are different approaches."
>
> "One of the many things that this programme helped me was realizing where they [the students] go wrong, and that was pretty important because now I know what is wrong and can try and tackle it. My whole lecturing style was now becoming adapted to this programme. What I mean by that is that at the beginning of each semester it's no longer "here we go again with the same old story", now ... it's I must make sure I am doing the right things. In other words, <u>it's being aware of the student's problems</u> and knowing how to attack them was one, and two was you start the semester new. Because you are aware all the time of this (the conceptual framework of the intervention programme) in your subconscious mind. The side product of this, that both of us never thought of, <u>is my own awareness</u> that changed totally."
>
> "I go into a classroom and I know something exciting is going to happen. We're going to give something to a student - I'm not saying this is the final answer - but anyway this is what we have - this I know is going to be exciting and that excites the lecturer and that goes through, it really does, you can see it get through to the class."

Teacher B was far more reserved in describing the personal benefit of the programme. It was clear from his comments that he was less likely to change his methods to incorporate the principles of the programme; rather he was going to take those which he felt were relevant and introduce these in a limited way.

> Teacher B: "There was definitely for me something to learn, which definitely will help me. Sometimes it's not so practical that I can use it right away in class. An example would be the book story, because we don't use a textbook as such. In most of the subjects I make use of full detailed notes so they don't have to really know about the book as such. So in that aspect I can't really use it in my class."
>
> "I think that my attitude always was to the student to have an ear for him. I think the programme in a sense also showed me that they can have problems, not necessarily that they are bad students but they have problems that can be solved and make them better students in the end. So I think that my attitude also definitely changed towards the students in the sense that I would be more lenient to first hear their problems before I would make a decision."
>
> "But if I look at the programme, it just confirmed that what I think I want to show to the students is the right way. It didn't really make significant changes to me but it actually confirmed that I was right in believing that that's the way to do it.

There seems to be less of an awareness on the part of Teacher B that the conceptual framework of the programme offered any new insights into the teaching learning process. This may well be due to the fact that his view of learning is more restricted, possibly reflected by his extensive reliance on "full detailed notes" and his view that (at least part) of the teacher-student relationship rests on the teacher's role as the maker of decisions on behalf of the student. It may be conjectured, (although no evidence is presented to support this) that the more limited success of the intervention in the two classes taught by Teacher B, as reflected in Table 12 and Table 13, may be attributable (at least in part) to the limited application of the principles of the intervention programme on a sustained basis.

It would seem apparent that a necessary condition for the reorchestration of individual approaches to studying is a supportive teaching environment in which the qualitative aspects of the context are reinforced in a way in which students are able to perceive the commitment of the teacher and the rewards that are derived from the adoption of a meaning orchestration.

The wholehearted commitment on the part of the teacher and the perceived benefit on the part of the student are aspects which were further illuminated when Teacher A commented on the different effect that the programme had on first and second year students. (Teacher B taught two first year groups only.) The level of commitment required from both teacher and student was identified by him as a determining factor in the success of the programme:

> "You feel something is going to happen. ...But it only works if they want it to, that's the main thing. If they really feel that they can benefit from it. In some cases, and I think last year's first year class was such an example, they feel, "Where's the magic? The magic must come to me." And it doesn't work like that.

This feeling of perceived need on the part of the student undoubtedly plays a significant role in the success of the programme. Despite the efforts made, by way of the individual study orchestration profiles and the evidence provided of the past success of students who participated in the programme, Teacher A felt that second year students were more likely to perceive the benefits of the programme than first year students:

> "They (first year students) don't realise their need, maybe. They don't realise their need for a thing like this until they've really been in trouble. ...A student in the first year comes out of matric [the final year of secondary education] and the most common words you hear are, "I never studied at school and I passed". That's the most common comment you can get from a first year student; and "I never had to work and I passed and got Cs" and they think that's it. Now they come here and it doesn't work like that. And a programme like this, after the first test, they would still say, "Ah, it's not really necessary", and in the end they realise they should have. Come second year, they're more open maybe, something like that."

The results presented above, together with the supportive and illuminative interview data from both students and teachers, indicate that although the intervention programme is beneficial for the majority of students, the relationship between the various factors involved is indeed complex and not fully understood. While the principles upon which the intervention was based have received both quantitative and qualitative support, their successful implementation and integration into the regular teaching activities in higher education is dependent on the interrelationship between factors such as teacher commitment, the willingness (and indeed ability) of teachers to introduce fundamental changes and to provide a learning environment which will promote and support a qualitatively desirable approach to learning. Linked to these factors is the students' perceived need to change and their ability to pursue qualitative strategies that have not been, and may not immediately appear to be, rewarded in the context of higher education. The exploration of these factors, which have appeared on the basis of the analysis of the results of the intervention programme, awaits further investigation.

CHAPTER SEVEN

THEORETICAL AND PRACTICAL IMPLICATIONS OF THE INTERVENTION PROGRAMME

The results obtained on the basis of the intervention programme have a number of implications for our understanding of the conceptual issues relating to students' approaches to studying. There are also implications which can directly affect the practice of higher education. In addition, a number of areas for further research are indicated.

THE INTERVENTION PROGRAMME - AN EVALUATION

I - AN EVALUATION OF THE CONCEPTUAL BASIS FOR THE INTERVENTION

One of the most significant aspects to emerge from this study has been the integration of a more adequate conceptualisation of learning context into the process of intervention. Students who were presented with their individual study orchestration profiles as part of the intervention programme described in Chapter Five and Chapter

Six were able to interpret the qualitatively different descriptions of aspects of the learning context and to confirm that these did, indeed, adequately reflect their perceptions of the specific aspects embodied in the QCI.

A number of students who participated in the intervention programme were characterised by a perceptual insensitivity to the qualitative dimensions of the learning context which, in turn, is associated with an inability to construct a meaning orchestration. Unless such students are <u>helped</u> to develop holistic perceptions of the learning context, together with a meaning orchestration, the evidence presented in Chapter Three, Chapter Five and Chapter Six suggests that they will have little chance of success in higher education.

The evidence presented in Chapter Five and Chapter Six has established that it is possible to develop and implement an intervention programme based on the theoretical model proposed in Chapter Four. The model is seen as providing clear direction as to aspects that should be introduced into any form of intervention.

II - A CRITICAL EVALUATION OF THE INTERVENTION MODEL

Clearly, the model for intervention (see Figure 10) described and implemented in this study is not set out as adequate to remediate the complex problems which are associated with academic failure. The intervention model sought to apply such current insights as were available <u>at the time of the study</u> and, using these, hypothesize a specific relationship between the qualitatively different perceptions of certain key dimensions of two of the elements of the learning process (contextual perceptions and approaches to studying).

Patently, there are aspects affecting the success of students in higher education which have emerged from recent research (such as locus of control) that the model did not seek to address, and there are other aspects, only tentatively identified (such as the role of the teacher and the form of the tests and examinations), that might further illuminate the complex relationships existing in the learning situation.

However, the model does begin to illuminate at a more specific level than has hitherto been possible the important relationship between qualitative perceptions of learning context, approaches to studying and academic performance. It is nevertheless true that the results obtained on the basis of this model are not as clear-cut as might have been predicted (or desired). The difficulty of bringing about desired change, even on the basis of a conceptually consistent model, has been recognized by other researchers using different forms of intervention (see Biggs & Rihn, 1984; Martin & Ramsden, 1987; Ramsden, Beswick & Bowden, 1986; Van Overwalle, Segebarth & Goldchstein, 1989). The factors that affect student success are manifold (see Figure 11), and it is not to be expected that a careful examination of the relationships between a limited number of these factors would produce strong empirical evidence that these are the exclusively determining relationships for academic success. However, the results of such an investigation (by way of the intervention programme described in this thesis research) provide both quantitative and qualitative evidence for consistent trends which are conceptually interpretable within the framework of the posited relationship.

These results need to be evaluated critically against the background of other contemporary and subsequent studies in order that a more conceptually adequate understanding of the inter-relationships between the various factors can be extended and validated for different student groups, with different teachers and at different institutions. It may be observed that such research is already well under way in a number of studies being conducted at the University of Cape Town.

III - THE DISTINCTIVES OF THE INTERVENTION PROGRAMME

The author is aware that even the qualified success of the intervention programme could be attributed to factors not directly associated with the content of the programme, such as the desire on the part of the lecturer for these students to succeed. It is for this reason that the empirical results were independently supported by interviews with students who participated in the intervention programme. It must be stressed that the research design cannot conclusively eliminate all extraneous factors which might have had a bearing on the success of the students. However, an attempt has been made to provide cumulative and supporting evidence from a number of sources. The intervention model was based on an established and independently verified theoretical perspective. In order to examine the effects of intervention empirical results were obtained from a number of student groups in the absence of intervention as well as from those involved in the intervention programme. Following intervention, interview data was obtained from students to reinforce the empirical results. Longitudinal data was then examined to establish whether the effects of the intervention programme (or the absence thereof) could be observed over time.

The impressions of the staff members involved in the intervention formed another important basis for determining the effectiveness of the programme. A deliberate and systematic attempt was made in terms of the experimental design to ensure that a number of sources contributed to the final evaluation of the effectiveness of the intervention.

The results and conclusions presented in Chapter Five and Chapter Six have helped to shed some light on the important question of whether changes to the subjective perceptions of students concerning the context in which their learning was taking place (without any changes to the real "objective" context) would prove beneficial in terms of bringing about more desirable approaches to studying and an attendant improvement in academic performance in traditional tests and examinations.

Despite its limitations, the model on which the intervention was based, as well as the form that the it took, exhibit a number of features which make <u>the intervention programme</u> significantly different from other intervention programmes. Although there are shared features, no contemporary published programme incorporates the <u>range</u> of distinctives that are present in the programme that formed the basis for this study. These distinctives are:

- The intervention programme systematically integrates contextual variables in a manner which is informed and underpinned by an increasingly substantial (and sophisticated) body of relevant theory.

- The process of intervention is firmly located in the teaching and curriculum of the subject discipline and addresses a number of key dimensions of the learning context which are uniquely defined in terms of a specific subject and teacher.

- Diagnosis rather than prescription is a distinctive feature of all aspects of the programme, and at no stage are students required to adopt a particular technique or pattern of study behaviour.

- The design of the intervention programme intentionally emphasizes the uniqueness of the individual, while at the same time allowing for programme presentation and interaction to take place in a group setting.

- While the intervention programme is almost entirely non-prescriptive, it is nevertheless considerably more structured than similar "learning to learn" programmes, since it is based on an empirically validated model of student learning in higher education.

- The intervention has demonstrated that verbal persuasion in a context which is characterised by factors such as individual diagnosis and group-teacher interaction could be an effective instrument in providing the basis for change.

- Ultimately, the intervention programme itself has the potential to improve the quality of teaching and learning for all students, not simply those identified as being "at risk". It also has potential benefits for the teachers involved.

IV - DIFFERENT RESULTS FROM FIRST YEAR AND SECOND YEAR LEVEL INTERVENTION

The evidence presented in Chapter Five and Chapter Six suggests that the intervention programme was more successful (whatever measure is taken to indicate success) at the second year level than at the first year level. Although first year students involved in the programme improved their test performance, this improvement was not sustained for the majority of students who were categorized as being "at risk". Although students reported qualitative improvements in perceptions and approaches to studying these were not reflected in examination results. All but four of the nineteen "at risk" students who attended the intervention did sufficiently well to be allowed to write the examination in the specific subject, whereas a higher proportion (7 out of 17) of "at risk" students who did not attend performed so poorly in tests that they were not allowed to write the final examination. (It should be noted that many, although not all, of the "at risk" students who did not attend the intervention programme performed very well in their first test, and for that reason were not specifically invited to attend, although they were free to do so.)

This thesis study was not able to establish why the intervention programme failed to demonstrate sustained improvement. As was suggested in Chapter Six, it may be that the heavy workload for examinations promoted a reversion to "proven" but undesirable approaches to studying on the part of these students. It may be that for two of the groups the context established by the teacher was insufficiently supportive of a meaning orchestration. The fact that these two groups were made up exclusively of "at risk" students, thereby excluding favorable role models may have contributed to their lack of sustained success. (In this thesis study it was unfortunately not possible to explore answers to these question since the examination results of these students were not known until after they had left the institution. This is clearly an area requiring further study.)

The result of the intervention with second year "at risk" students was considerably more successful. Not only did they sustain their improved performance, this improvement was reflected in subsequent years while the performance of those second year "at risk" students who did not participate deteriorated.

Unfortunately numbers in all cases were small, which makes it very difficult to generalize with any confidence. However, the trends presented for the second year group indicate that, viewed from a number of different perspectives, the intervention did achieve the objectives set for it and that the intervention model has proved to be successful at the second year level.

V - THE ROLE OF THE TEACHER IN THE SUCCESS OF THE INTERVENTION PROGRAMME

The primary objective of this study was to investigate the adequacy of the model upon which the intervention was based, and to determine the effectiveness of the intervention on the performance of students. At the same time it was possible to explore the effects of the intervention programme on the teachers involved. The purpose of this aspect was to suggest ways in which the <u>principles</u> and <u>methods</u> of the intervention programme could subsequently be incorporated into the regular programme of teachers in higher education.

The role of the subject teacher and the stress placed on the subject content derived essentially from the theoretical basis for the intervention, that is, that approaches to studying are associated with perceptions of a <u>specific</u> context determined (at least in part) by the subject discipline and the teacher. There are, however, important implications for the broadening of the programme to enhance the quality of student learning in an entire course or at an entire institution.

The effect of the intervention on the teachers concerned has been discussed in Chapter Six, but the converse effect of the teacher on the intervention needs comment. Although both staff members were carefully chosen (see Chapter Six), it is readily apparent from comments quoted that their attitude towards both the content and the form of the intervention was very different. Teacher A perceived the theoretical framework of the programme as providing a coherent model within which he was able to interpret the observed reality of teaching and learning in higher education. On that basis the model and the programme were enthusiastically embraced and his whole approach was changed on the basis of it. Teacher B, by contrast, although very willing to participate, seemed to have reservations about changing his approach to teaching on the basis of the proposed model.

IMPLICATIONS OF THE RESULTS OF THE INTERVENTION PROGRAMME

I - IMPLICATIONS FOR STUDENT SUPPORT

Transferring the insights gained from this thesis study into practical support for students would imply at least the following:

- Time should be spent within each first year subject discussing with students the nature of higher education and the demands that this will place upon them in terms of adopting an approach to studying that is appropriate to meet these demands.

- First year courses should ensure that students are given an early indication of how successful their approach to studying is likely to be (in terms of assessment results) so that they can be referred timeously to some form of intervention programme.

- Departmentally-based and subject-specific intervention programmes need to be available to assist students who feel they are (or who are identified as being) "at risk". Subject teachers themselves need to be involved in presenting these courses. It might be possible to begin with existing tutorial support and simply extend the conceptual framework to cover aspects identified as beneficial by this (and possibly other subsequent) intervention programmes.

- Greater support needs to be provided at the second year level, where students may be more aware of their need. Generally, because of limited resources (and perhaps because most research into students' learning problems has been conducted at the first year level), help by way of intervention is limited to students' first year. This thesis research clearly indicates the beneficial effect of providing it at the second year level. Indeed, if a choice had to be made where to deploy limited resources, it appears that investing these at the second year level is likely to be more productive.

- It may not be necessary to establish elaborate units for student learning support. Fairly modest programmes, based within departments and incorporating the results of recent research, may produce beneficial results out of proportion to the limited resources that they would require.

Both the pilot intervention and the large scale intervention programmes were carried out with groups of first and second year students. In both cases, the improvement in performance of those students categorised as "at risk" was markedly greater for second year students than for those enrolled in their first year. Given the nature of the investigation, it was impossible to determine why this was so. However, a number of factors, taken together, would give support to the view that this observed trend might well be more than an isolated occurrence.

The first factor is that students who enter higher education, whatever their approach to studying, have been relatively successful in the secondary education system. They are, at that stage, unlikely to be aware that tertiary education may make different demands upon them; demands that require a different approach to studying to that required in secondary education. "While many students are apparently capable of using 'deep' or 'surface' strategies, it may be that the current demands of the examination system at school level are interpreted by them as requiring mainly the recall of factual information to the detriment of a deeper level of understanding." (Marton & Säljö, 1976b p125) The effect of the perceived school environment on pupils' learning has been described by Ramsden (Ramsden, Martin & Bowden, 1989) and their findings are consistent with the views expressed by Marton and Säljö.

Students who enter higher education do so, therefore, with an orchestration that may be the product of the perceived school environment and which has been successful in producing good results within that system. Some students may not perceive the need to change their approach on entering higher education. On the basis of the limited evidence available from the four student groups (presented earlier), it might be suggested that some students with similar orchestrations <u>do not believe that they are "at risk" even when they are presented with the "evidence" by way of their orchestration profile</u>. A similar conclusion has been arrived at independently by Meyer (1991) who has reported that some such students appear unable to comprehend the significance of their study orchestrations. It is also highly probable that such students, when faced with the pressure of examinations (in six subjects), revert to an approach that has proved successful in the past, rather than relying on a new approach whose success has not been demonstrated over any length of time. Evidence in support of this view was presented in Chapter Six. The performance of students involved in the intervention showed a marked improvement when test results were compared, but that improvement was not sustained in the examination. This finding is consistent with the findings of Martin and Ramsden (1987) that an integrated learning skills course improved course work grades significantly, but that this improvement was not sustained in the examination.

This inability to employ new approaches effectively may well be exacerbated by the known detrimental influence of a perceived heavy workload on approach to studying. A perceived heavy workload is invariably associated at both a group and at an individual level with a disintegrated meaning orchestration (Entwistle & Ramsden, 1983; Meyer & Parsons, 1989a; Meyer & Muller, 1990a; Meyer, Parsons & Dunne, 1990a). It is also evident that the trend outlined above is more marked in the first year groups that formed part of the present study. This finding is in line with the reasoning outlined above.

The second factor is that most first year students with an "at risk" orchestration do not perform well on the course. Evidence to support this was presented in Chapter Three, Chapter Five and Chapter Six (see also, Meyer, Parsons & Dunne, 1990a, 1990b). On the basis of the results of the first year students who were categorised as being "at risk", it appears that most students categorised as "at risk" in their second year are students who have not performed well in their first year (see Table 14 and Table 15). In the majority of cases, they would have passed with a low mark. Such students, in their second year, would be much more open to attempting an alternative approach to studying based on their experience that their approach, successful in the past, had not been particularly successful in the first year of higher education. Such students may well have a greater sense of perceived need and would see the course as being much more relevant than their first year counterparts.

Indirect support for this view is given by the observations of the teacher of the second year group. He noted that the approach of the students who participated in the intervention programme was more noticeably changed than those in the first year class. While other factors, such as the smaller class group may be contributing to the observed effect, it is nevertheless consistent with the contention that second year students may take the guidelines of the intervention programme more seriously and may follow more assiduously the principles and practices that are advocated.

II - IMPLICATIONS FOR STAFF DEVELOPMENT

What are the practical implications of the model of intervention and the results achieved by the programme for staff development in higher education? At present, many higher education institutions (in South Africa, at least) would like to shift the responsibility of supplying support to students identified as being academically at risk to a specialized "study skills unit". Not only is it extremely difficult from a practical point of view to provide a comprehensive service to students across an entire institution by means of a specialized unit, it is becoming more and more indefensible from a theoretical perspective. The more evidence we glean from research into student learning and from theoretically robust intervention programmes, the more it is confirmed that such intervention requires the active involvement of a subject specialist, since such a person is responsible for establishing the dimensions of the perceived learning context. Without the involvement of the subject teacher it appears logically impossible to offer effective intervention.

On the basis of the evidence presented in Chapter Six, relating to the effect of the intervention programme on the staff members concerned, it would appear that the <u>principles</u> upon which the intervention programme was based may well be conveyed by the subject teacher alone (ie. in the absence of a "professional" facilitator). Indeed, the role of the author in the intervention programme was limited to supplying both teacher and students with the individual study orchestration profiles, explaining the theoretical framework upon which the programme was based and structuring the group sessions.

In Chapter Six evidence was provided to show that as a result of participating in the preparation for, and the implementation of, the intervention programme, the staff members concerned underwent changes in their understanding of the factors affecting the quality of students' learning.

(It must be emphasized, however, that <u>the teachers involved perceived the benefits to different degrees</u>, and that this might well have influenced the success of the intervention, as outlined earlier. For this reason it is imperative that effective staff development strategies ensure that teachers understand and are fully committed to effecting the changes that the intervention principles would require.) They were themselves able to understand the theoretical basis for the programme and were therefore in a position to convey this conceptual framework to their students. The teachers were also intimately involved in the <u>process</u> whereby the intervention sought to change students' perceptions of the learning context and their approaches to studying, and they observed the effects of the intervention in terms of changed approaches to studying and ultimately in terms of improved results for those who participated.

An added dimension was that staff members were made aware of their active role in constructing the context which their students perceived. <u>Their</u> understanding of the dimensions of the learning context provided them with new insights into how these dimensions were perceived in qualitatively different terms by different students. They were enabled to see that approaches to teaching and attitudes which they displayed contributed to the construction of the learning context. The interactive and dynamic nature of the process, as well as their role in it, was made explicit.

Given the relative simplicity of the conceptual model and the intimate relationship that exists between subject content, subject teacher and intervention programme principles, it would appear that the aim of integrating the principles into regular teaching activities is not only necessary but also attainable. The implications of the above conclusions for staff development in a number of areas are clear.

It might justifiably be claimed that the relatively complex procedure of categorizing students and offering specialized intervention programmes is not practicable for all students in all subjects across an institution. Evidence has been presented which indicates that all students benefit from the intervention, not simply those categorized as being "at risk". This would suggest that even at the level of the group, in the absence of diagnostic evaluation at the individual level, the theoretical principles could be beneficially incorporated, in a subject specific and context specific manner. This could be achieved by way of activities paralleling those which formed part of the intervention programme, with minimal additional time or effort. Incorporating these principles could have a very positive effect not only on the manner in which teachers considered making certain aspects of the course more explicit, but also in emphasizing their evident concern to assist students in approaching the task of studying.

Certainly staff must be made aware of the major advances that have been made in terms of our understanding of how students learn in a naturalistic setting and of the attendant factors that are associated with the qualitative differences that students exhibit. This might be effectively achieved through internal publications (see Ramsden, 1988b, 1988c for excellent examples of this type of communication), through faculty-based workshops or through more formal educational courses. There is a definite sense of urgency in this regard. Far too many teachers in higher education hold views about the dynamics of the educational process that are based on outmoded concepts from behavioural psychology or on their own experiences of teaching and learning in higher education. There is a growing body of knowledge which offers a coherent and verified alternative perspective which gives significantly greater meaning to the various dimensions of the educational process and the relationships that exist between the these dimensions.

There are well established and accepted mechanisms already in operation in many institutions that could be used as a vehicle for implementing the basis of an intervention programme. For example, most teachers already accept the principle of course evaluation, from which it is but a relatively short step to producing orchestration profiles of students' learning. Thus informed, teachers and students would be in a position to examine the dynamics of the learning situation within which they are operating (indeed, which they are in part creating), and jointly discuss desirable changes to aspects such as approach, strategy, content and assessment and help to bring these about. Indeed, such an approach has been reported (Meyer & Watson, 1991) with interesting results.

Strategies to impact staff through development programmes, in addition to those suggested above, might include making available videotaped material of teachers integrating the intervention principles into their normal class activities (since many teachers, though accepting the theoretical justification, may be unsure about how to apply these in a normal teaching situation). Evidence from students as to the beneficial effect of the intervention principles, by way of transcript or interviews, might provide additional motivation to teachers. The endorsement by significant teachers in the institution would undoubtedly go a long way to encouraging others to adopt the principles and methods that were being advocated. High profile presentations, attended by the institution's decision-makers, might assist in raising the awareness of the seriousness with which the institution regards the improvement of the quality of student learning.

While the author is not aware of staff development programmes which incorporate all (or even many) of these features, all have been tried with some success in isolation. What is needed is an urgent and concerted attempt to transfer the insights gained from extensive international research efforts to the teaching practice of higher education classrooms and lecture halls.

To effect such changes staff developers need themselves to be abreast of developments in the field of student learning, not only taking cognizance of the work of others, but engaging in research in their own institutions which can lend credibility to the ideas that they wish to propagate.

III - IMPLICATIONS FOR COURSE AND CURRICULUM DESIGN

We certainly know enough about the influence of course and curriculum design on students' approaches to studying, from this and other published studies (for example, Coles, 1989; Coles 1990; Meyer & Watson, 1991) to make effective changes which will promote desirable approaches on the part of students. We know that it is not easy to produce these changes (Ramsden, Beswick & Bowden, 1986), and the present study confirms that intervention programmes, particularly at the entry level to higher education, may be unsuccessful in producing these desired changes without evident support from the system (the teacher and the curriculum).

Although the thesis study did not directly address curriculum or course design changes, changes to the structure and content of courses aimed at fostering desirable changes in students' approaches to studying has been reported (see Clarke, 1986; Newble & Clarke, 1987

Coles, 1989). Among these would be the organization of material proceeding from concrete to abstract, the integration of knowledge and application and the conscious inclusion of methods which ensure that the learners are actively involved in what Coles (1989, p49) terms "relating-together new information both to itself and to other related stored information in the light of the learning context". A problem-based curriculum (Newble & Clarke, 1987; Coles 1989) appears to be one design which incorporates many of these desirable features.

At least this is clear. Unless structural changes are made to curricula it is unlikely that the efforts that are made to encourage desirable approaches to studying will meet with much success. A very important aspect of the learning context is the organization of the learning content and the learning experiences which expose students to that content. If we operate on parts of the system (as in the intervention programme, in terms of student perceptions of teacher-student relationships, books and printed material and methods of assessment) and ignore the role of the curriculum, we will have limited success. We have opportunities, when drawing up new curricula or modifying existing courses to draw on the existing body of knowledge to ensure that the learning system as a whole reflects those principles that we know are associated with the quality of learning that is supposed to characterize higher education.

AREAS FOR FURTHER RESEARCH

I - THE APPLICATION OF A SYNTHESIS OF GENERAL SYSTEMS THEORY AND PHENOMENOGRAPHY TO OTHER AREAS OF EDUCATION

The synthesis of General Systems Theory and phenomenographic methods to explore students' perceptions of the learning context has significant implications for future research into other aspects of teaching and learning. Whereas phenomenography has provided us with a perspective from which to explore qualitatively different perceptions of <u>specific</u> aspects of reality, general systems theory provides a conceptual tool for systematically investigating perceptions of <u>broader</u> aspects of reality. These broader aspects can then be further analysed in terms of interpretable conceptual sub-categories which retain qualitative distinctions within each sub-category. Phenomenography is eminently suited to the exploration of perceptions and conceptions of discrete aspects of a discipline (such as the examples cited by Säljö, 1988, of "price", "life", "evolution", "force" and "motion"). However, few aspects of teaching and learning are this discrete and most subsume a number of other aspects which may not readily be discerned without some more systematic conceptual tool. This is admitted by Marton when he says:

> "When phenomenographers present their findings, someone usually asks: Would another researcher working independently arrive at the same set of categories if he or she were studying the same data? ...Would other researchers find the same conceptions

> or categories if they were doing the study for the first time? (Analogously, we might ask, would two botanists discover the same plants and species if they independently explored the same island?) The other issue concerns whether a conception or category can be found or recognised by others once it has been described to them by the original researcher. The point I want to make is that replicability in the second sense is reasonable to expect, but in the first sense it is not. The original finding of the categories of description is a form of discovery, and discoveries do not have to be replicable." (Marton, 1986 p35)

If Marton's premise is true, then the study of a complex human system such as education promises to be a protracted and frustrating one (if the history of scientific investigation in other disciplines is to serve as an example). However, pure as well as social scientists have found the application of general systems theory to be of inestimable value as a conceptual tool in their respective fields of enquiry.

A synthesis of general systems theory and phenomenography may well offer to researchers in social sciences (and particularly in education) a paradigm with which to explore perceptions of reality that is more powerful than either used alone. A great deal of phenomenographic research is being conducted into subject-specific concepts and this could beneficially be extended to include concepts fundamental to education.

II - THE EXTENSION OF THE CONCEPTUAL FRAMEWORKS OF THE ASI AND THE QCI

As suggested in Chapter Two, there is an argument for the extension of the ASI so that the concepts that are included are represented by a more comprehensive set of category responses than at present. Certain of the subscales in the versions of the ASI used in this thesis research do not reflect qualitatively different categories of perception, for example, relating ideas and use of evidence (two cognitive processes associated with a meaning orchestration), syllabus-boundness, negative attitudes to studying and disorganized study methods. Indeed, in the early development of the ASI, certain of these subscales were represented by qualitatively different categories, but these were not derived from phenomenographic-type studies and were subsequently dropped. However, if approach to learning can be represented by three qualitatively different categories, learning style by two, learning pathology by two and motivation by four categories, it seems reasonable to suggest that a phenomenographic-type investigation into the qualitative perceptions of cognitive processes, approaches to studying, attitude to studying and study methods might reveal a qualitative range of perceptions which could be similarly categorized. (To imply that a unidimensional scale represents at least two qualitatively distinct categories may be to overlook qualitative distinctions to these categories that might advance our understanding of how students perceive these constructs.) Further qualitative investigation might extend our understanding in this area and enhance the usefulness of the ASI, particularly as a diagnostic instrument from which to determine the intervention strategy most suited to the needs of the individual.

A similar limitation with respect to certain dimensions of the QCI was expressed in Chapter Two. The QCI, in its present form, does not represent "surface" perceptions of books, handouts and notes, methods of assessment, nor "deep" perceptions of the learning environment or the course content. Some of these formed part of the earlier studies using the Awareness of Context Inventory (AOC), but were not included in the QCI because they failed to accentuate differences between students adopting qualitatively different approaches to studying.

Two possible research strategies are indicated. Firstly, it might be possible to establish conceptual categories for the "surface" and "deep" perceptions not presently represented in the QCI, using a more truly phenomenograhic method with students (as distinct from teachers, whose perceptions informed much of the early development of the QCI). Such categories could then be explored for their empirical association with different approaches to learning. There seems to be some logical basis, at least, for suggesting, for example, that if students do not have "deep" perceptions about books, they may have other qualitatively poorer perceptions (and indeed interviews with students have revealed initial evidence of qualitative differences in their perceptions of these dimensions). Research is indicated which will allow for these sorts of perceptions to be established and verified.

A second possibility, which has gained support in the research literature (see, for example, Entwistle, Meyer & Tait, 1990) is to extend our understanding of what perceptions students lack in more specific contexts in higher education than to try to provide a more comprehensive range of qualitative perceptions. This has been undertaken in a limited range of specific contexts (see Meyer & Dunne, 1991, for an extension of the context in the nursing profession) and could be extended to include dimensions specific to other discipline-specific contexts.

The methodology employed in the development of the QCI would seem to be appropriate to carry out this extension. A systematic investigation of the dimensions unique to particular contexts would allow for the development of qualitative different categories to describe these dimensions, using a phenomenographic approach. Clearly, there are contextual dimensions that are unique to certain disciplines. One only has to think of the role played by laboratories in Science, workshops in Engineering, studios in Architecture and Art, the library in History, to appreciate that there are many unique features of the learning context which have, as yet, not been investigated.

III - THE INVESTIGATION OF FACTORS ASSOCIATED WITH ACADEMIC SUCCESS

Part of the investigation which preceded the design of an intervention programme was the establishment of associations between study orchestration categories and examination performance (see Table 5 and Table 6). Appendix E provides additional insights into the relationship between examination success and categorization. What is evident from these, and other studies for which detailed results are not given, is that the top performers in almost all class groups are predominantly those categorized as "star" or "ave+". Since these are both theoretically desirable categorizations this is not surprising.

However, what is equally significant is that many students, particularly those categorized as "star" students, perform very badly in tests and examinations (see Appendix E). These results support the contention (made in Chapter Four) that the meaning orchestration and "deep" perceptions of the learning context (the basis for categorizing students as either "star" or "ave+") are a necessary prerequisite, <u>but not a guarantee</u>, of success in higher education.

If these students can be identified (and the results of this research project indicate that they can) and the <u>cause</u> of their failure determined (something which was outside the scope of the present study), then it might be possible to provide such students with appropriate remediation which addresses the cause rather than providing general help at the level of study methods. Such students may well be deficient in the necessary background knowledge in the subject field; they may be putting in insufficient effort to ensure success; there may be intellectual, emotional, financial or physical reasons that militate against success. It is an evident waste in the educational system that such students, who have a necessary prerequisite for successful study in higher education, should be admitted without enough attention being paid to these other factors, either during the selection process or in terms of support during their time in higher education. The identification of these factors and the provision of the necessary support is an area that certainly warrants investigation.

IV - FACTORS AFFECTING THE DEVELOPMENT OF STUDY ORCHESTRATIONS

This study (and other published studies) has drawn attention to the inescapable fact that students, even in their first year of higher education, exhibit qualitatively different study orchestrations. These orchestrations are characterized by aspects of stability (both over time and in different learning contexts) and aspects of modifiability (as demonstrated by the effects of the intervention programme).

As yet we have little direct evidence to suggest how different approaches to studying develop. Marton and Säljö (1976b) speculated that the current secondary examination system might be perceived by students as requiring factual recall rather than a deeper level of understanding. While that may be true to a certain extent, it does not explain how students who all come through the various systems of primary and secondary education in this country, enter higher education with very different qualitative perceptions of what constitutes a desirable approach to studying. Equally disturbing is the fact that many students are apparently unable to perceive the need to adopt an approach that is more appropriate to the demands of the tertiary system.

While certain investigations have been conducted into the approaches to studying of students in secondary education (see Entwistle & Kozèki, 1985; Ramsden, Martin & Bowden, 1989) with a view to establishing whether similar qualitative differences are evident, nothing has been done to establish <u>when</u> and <u>how</u> these qualitative perceptions were formed. (The study by Thomas, Rohwer & Wilson, 1989, looks at the question from a traditional psychological perspective, and does not really inform the present debate.) It should be of paramount interest for the education system as a whole to establish what factors influence the development of these perceptions and when they are most influential. This would allow us to move from a palliative situation to one which addresses the root causes of a very evident malady in our educational system.

CONCLUSION

In order to bring about significant changes in the quality of learning in higher education we need to focus and integrate the results of ongoing research into how students approach the task of learning. We know without equivocation that structural modifications to the content and methods of assessment will be necessary because of the vital role they play in determining the approach to studying adopted by students. Practical modifications in the approach adopted by teachers and the integration of methods to raise the perceptual awareness of students of key elements in the learning context will need to be made. If we seriously wish to address the quality of student learning in higher education, these changes must be introduced as early as possible in the first year; they must be integrated into the teaching of every subject and they must not be seen as peripheral "add-on" activities that have no part of the formal system. Attendant on these changes may well come the perceived need to effect fundamental changes to curriculum designs and strategies and to the educational ethos of departments and, indeed, even of institutions.

There are tremendous challenges inherent in the findings presented in this study. On the one hand there is the challenge to extend and amplify our understanding of the complex interplay of personological and contextual factors which are associated with qualitatively different approaches to studying. At the same time there is the challenge to expand and to illuminate the qualitative dimensions of approaches to studying adopted by individual students in higher education. These are challenges for the educational researcher.

For the educational practitioner there is the challenge to take what is presently known and effect desirable changes to key elements of the existing system as well as to classroom practice. Seriously facing this challenge must mean that higher education can never be the same again.

APPENDIX A

Approaches to Studying

In this section we would like you to show whether you agree or disagree with each of the statements listed below. We are concerned here with your approaches to studying in general. If your answer would be different for different subjects, however, you should reply in relation to your main course or subject.

Please circle the number beside each statement which best conforms with your view.

4 (✓✓) means Definitely agree

3 (✓) means Agree with reservations

1 (x) means Disagree with reservations

0 (xx) means Definitely disagree

2 (?) is only to be used if the item doesn't apply to you or if you find it impossible to give a definite answer.

	✓✓	✓	x	xx	?
1. I find it difficult to organise my study time effectively.	4	3	1	0	2
2. I try to relate ideas in one subject to those in others, whenever possible	4	3	1	0	2
3. Although I have a fairly good general idea of many things, my knowledge of the details is fairly weak.	4	3	1	0	2
4. I enjoy competition: I find it stimulating.	4	3	1	0	2
5. I usually set out to understand thoroughly the meaning of what I am asked to read.	4	3	1	0	2
6. Ideas in books often set me off on long chains of thought of my own, only tenuously related to what I was reading.	4	3	1	0	2
7. I chose my present courses mainly to give me a chance of a really good job afterwards.	4	3	1	0	2
8. Continuing my education was something which happened to me, rather than something I really wanted for myself.	4	3	1	0	2
9. I like to be told precisely what to do in essays or other assignments.	4	3	1	0	2
10. I often find myself questioning things that I hear in lectures or read in books.	4	3	1	0	2
11. I generally prefer to tackle each part of a topic or problem in order, working out one at a time.	4	3	1	0	2

	√√	√	x	xx	?
12. The continual pressure of work—assignments, deadlines and competition—often makes me tense and depressed.	4	3	1	0	2
13. I find it difficult to "switch tracks" when working on a problem: I prefer to follow each line of thought as far as it will go.	4	3	1	0	2
14. My habit of putting off work leaves me with far too much to do at the end of term.	4	3	1	0	2
15. It's important to me to do really well in the courses here.	4	3	1	0	2
16. Lecturers seem to delight in making the simple truth unnecessarily complicated.	4	3	1	0	2
17. Distractions make it difficult for me to do much effective work in the evenings.	4	3	1	0	2
18. When I'm doing a piece of work, I try to bear in mind exactly what that particular lecturer seems to want.	4	3	1	0	2
19. I usually don't have time to think about the implications of what I have read.	4	3	1	0	2
20. Lecturers sometimes give indications of what is likely to come up in exams, so I look out for what may be hints.	4	3	1	0	2
21. In trying to understand a puzzling idea, I let my imagination wander freely to begin with, even if I don't seem to be much nearer a solution.	4	3	1	0	2
22. My main reason for being here is that it will help me to get a better job.	4	3	1	0	2
23. Often I find myself wondering whether the work I am doing here is really worthwhile.	4	3	1	0	2
24. I generally put a lot of effort into trying to understand things which initially seem difficult.	4	3	1	0	2
25. I prefer courses to be clearly structured and highly organised.	4	3	1	0	2
26. A poor first answer in an exam makes me panic.	4	3	1	0	2
27. I prefer to follow well tried approaches to problems rather than anything too adventurous.	4	3	1	0	2
28. I'm rather slow at starting work in the evenings.	4	3	1	0	2
29. In trying to understand new ideas, I often try to relate them to real life situations to which they might apply.	4	3	1	0	2

	✓✓	✓	x	xx	?
30. When I'm reading I try to memorise important facts which may come in useful later.	4	3	1	0	2
31. I like to play around with ideas of my own even if they don't get me very far.	4	3	1	0	2
32. I generally choose courses more from the way they fit in with career plans than from my own interests.	4	3	1	0	2
33. I am usually cautious in drawing conclusions unless they are well supported by evidence.	4	3	1	0	2
34. When I'm tackling a new topic, I often ask myself questions about it which the new information should answer.	4	3	1	0	2
35. I suppose I am more interested in the qualifications I'll get than in the courses I'm taking.	4	3	1	0	2
36. Often I find I have to read things without having a chance to really understand them.	4	3	1	0	2
37. If conditions aren't right for me to study, I generally manage to do something to change them.	4	3	1	0	2
38. In reporting practical work, I like to try to work out several alternative ways of interpreting the findings.	4	3	1	0	2
39. My main reason for being here is so that I can learn more about the subjects which really interest me.	4	3	1	0	2
40. In trying to understand new topics, I often explain them to myself in ways that other people don't seem to follow.	4	3	1	0	2
41. I find I have to concentrate on memorising a good deal of what we have to learn.	4	3	1	0	2
42. It is important to me to do things better than my friends, if I possibly can.	4	3	1	0	2
43. I find it better to start straight away with the details of a new topic and build up an overall picture in that way.	4	3	1	0	2
44. Often when I'm reading books, the ideas produce vivid images which sometimes take on a life of their own.	4	3	1	0	2
45. One way or another I manage to get hold of the books I need for studying.	4	3	1	0	2
46. I often get criticised for introducing irrelevant material into my essays or tutorials.	4	3	1	0	2
47. I find that studying academic topics can often be really exciting and gripping.	4	3	1	0	2
48. The best way for me to understand what technical terms mean is to remember the text-book definitions.	4	3	1	0	2

		√√	√	x	xx	?
49.	I certainly want to pass the next set of exams, but it doesn't really matter if I only just scrape through.	4	3	1	0	2
50.	I need to read around a subject pretty widely before I'm ready to put my ideas down on paper.	4	3	1	0	2
51.	Although I generally remember facts and details, I find it difficult to fit them together into an overall picture.	4	3	1	0	2
52.	I tend to read very little beyond what's required for completing assignments.	4	3	1	0	2
53.	Having to speak in tutorials is quite an ordeal for me.	4	3	1	0	2
54.	Puzzles or problems fascinate me, particularly where you have to work through the material to reach a logical conclusion.	4	3	1	0	2
55.	I spend a good deal of my spare time in finding out more about interesting topics which have been discussed in classes.	4	3	1	0	2
56.	I find it helpful to 'map out' a new topic for myself by seeing how the ideas fit together.	4	3	1	0	2
57.	I seem to be a bit too ready to jump to conclusions without waiting for all the evidence.	4	3	1	0	2
58.	I hate admitting defeat, even in trivial matters.	4	3	1	0	2
59.	I think it is important to look at problems rationally and logically without making intuitive jumps.	4	3	1	0	2
60.	I find I tend to remember things best if I concentrate on the order in which the lecturer presented them.	4	3	1	0	2
61.	When I'm reading an article or research report, I generally examine the evidence carefully to decide whether the conclusion is justified.	4	3	1	0	2
62.	Tutors seem to want me to be more adventurous in making use of my own ideas.	4	3	1	0	2
63.	When I look back, I sometimes wonder why I ever decided to come here.	4	3	1	0	2
64.	I find academic topics so interesting, I should like to continue with them after I finish this course.	4	3	1	0	2

APPENDIX B

Teaching Methods Unit, University of Cape Town c 1988

1.	I am conscious of my attitudes towards teaching and learning.	4	3	1	0	2
2.	When I sit in a lecture room, I usually notice the fittings and equipment in it.	4	3	1	0	2
3.	When I take notes, I try to combine ideas and concepts together.	4	3	1	0	2
4.	I usually notice how lecturers interpret their subjects.	4	3	1	0	2
5.	I am conscious of the value of different types of teaching methods (such as lectures, working in groups, doing practicals, seminars, tutorials, laboratory work and so on.)	4	3	1	0	2
6.	The educational purpose of tests is usually clear to me.	4	3	1	0	2
7.	I take notes to serve me as a reminder of what is important.	4	3	1	0	2
8.	I know what the values or beliefs of my fellow students are.	4	3	1	0	2
9.	I am conscious of trying to understand what I am being taught.	4	3	1	0	2
10.	In class I usually write down what the lecturer says or writes on the board.	4	3	1	0	2
11.	There seems to be too much work to get through in the courses here.	4	3	1	0	2
12.	I usually notice handouts that contain new information.	4	3	1	0	2
13.	I enjoy some learning experiences more than others.	4	3	1	0	2
14.	The subject matter that tests actually cover is usually clear to me.	4	3	1	0	2
15.	I enjoy finding something out for myself, rather than having it explained to me.	4	3	1	0	2
16.	I usually notice the noise level in lecture rooms.	4	3	1	0	2
17.	My notes are often summaries of information taken from different sources.	4	3	1	0	2
18.	The relevance of books to my courses is usually clear to me.	4	3	1	0	2

19. My notes are usually summaries of lectures. 4 3 1 0 2

20. I usually prepare for tests and examinations by going over old test or examination papers. 4 3 1 0 2

21. I am conscious of the way in which I manage my time. 4 3 1 0 2

22. I think that the workload here is too heavy. 4 3 1 0 2

23. I am conscious of the overall 'character' or 'image' of this institution. 4 3 1 0 2

24. I usually try to guess or anticipate the questions that will be asked in tests or examinations. 4 3 1 0 2

25. I often copy notes out of a textbook. 4 3 1 0 2

26. I usually notice handouts that contain information that might be tested. 4 3 1 0 2

27. The structure of the content in the subjects that I am studying is usually clear to me. 4 3 1 0 2

28. I usually notice the sense of humour, or lack of it, that my lecturers possess. 4 3 1 0 2

29. I often wonder how much knowledge my lecturers possess about their subjects. 4 3 1 0 2

30. I usually notice how chalkboards are used in lecture theatres. 4 3 1 0 2

31. I value guidance given to me by my lecturers. 4 3 1 0 2

32. I usually notice handouts that are summaries of lectures. 4 3 1 0 2

33. I think there is a lot of pressure on me as a student here. 4 3 1 0 2

34. When reading or using books, I usually notice the manner in which subject matter is organised in them. 4 3 1 0 2

35. I am conscious of the admission requirements of this institution. 4 3 1 0 2

36. I usually question the relevance of the content of the subjects I am studying. 4 3 1 0 2

37. I usually notice the legibility of what is presented on the chalkboard or on a slide or transparency. 4 3 1 0 2

38. When reading or using books, I usually notice the manner in which they are illustrated. 4 3 1 0 2

19.	My notes are usually summaries of lectures.	4	3	1	0	2
20.	I usually prepare for tests and examinations by going over old test or examination papers.	4	3	1	0	2
21.	I am conscious of the way in which I manage my time.	4	3	1	0	2
22.	I think that the workload here is too heavy.	4	3	1	0	2
23.	I am conscious of the overall 'character' or 'image' of this institution.	4	3	1	0	2
24.	I usually try to guess or anticipate the questions that will be asked in tests or examinations.	4	3	1	0	2
25.	I often copy notes out of a textbook.	4	3	1	0	2
26.	I usually notice handouts that contain information that might be tested.	4	3	1	0	2
27.	The structure of the content in the subjects that I am studying is usually clear to me.	4	3	1	0	2
28.	I usually notice the sense of humour, or lack of it, that my lecturers possess.	4	3	1	0	2
29.	I often wonder how much knowledge my lecturers possess about their subjects.	4	3	1	0	2
30.	I usually notice how chalkboards are used in lecture theatres.	4	3	1	0	2
31.	I value guidance given to me by my lecturers.	4	3	1	0	2
32.	I usually notice handouts that are summaries of lectures.	4	3	1	0	2
33.	I think there is a lot of pressure on me as a student here.	4	3	1	0	2
34.	When reading or using books, I usually notice the manner in which subject matter is organised in them.	4	3	1	0	2
35.	I am conscious of the admission requirements of this institution.	4	3	1	0	2
36.	I usually question the relevance of the content of the subjects I am studying.	4	3	1	0	2
37.	I usually notice the legibility of what is presented on the chalkboard or on a slide or transparency.	4	3	1	0	2
38.	When reading or using books, I usually notice the manner in which they are illustrated.	4	3	1	0	2

39.	I am conscious of the principles this institution stands for.	4	3	1	0	2
40.	I usually notice when I am not being allowed to think for myself.	4	3	1	0	2
41.	I am conscious of the amount of course content I have to study.	4	3	1	0	2
42.	I am conscious of the academic standards of this institution.	4	3	1	0	2
43.	I usually notice handouts that contain vital information for understanding a subject.	4	3	1	0	2
44.	There is so much written work to be done, that I find it very difficult to get down to independent reading.	4	3	1	0	2
45.	I try to participate in discussions during lectures, tutorials or seminars.	4	3	1	0	2
46.	I am aware that some tests can help me to learn.	4	3	1	0	2
47.	When reading or using books, I often make use of their 'search apparatus' (such as the index, list of contents, chapter headings, cross references).	4	3	1	0	2
48.	I usually notice the different applications of teaching aids (such as the chalkboard, overhead projector, television and so on).	4	3	1	0	2
49.	I usually notice handouts that contain information taken from different sources.	4	3	1	0	2
50.	I am aware of the existence of different types of tests (for example essays, multiple choice, problem solving, orals and so on).	4	3	1	0	2
51.	I am conscious of the time I spend studying.	4	3	1	0	2
52.	I usually notice the overall composition or characteristics of the students who make up my classes.	4	3	1	0	2
53.	I am conscious of where I sit in a lecture room.	4	3	1	0	2
54.	It sometimes seems to me that the syllabus tries to cover too many topics.	4	3	1	0	2

Appendix: A Procedure for Multidimensional Unfolding

The unfolding procedure used in this paper was developed for use with preference data. Coombs (1964) defines preference data in an abstract way in terms of a model involving order relations between distances in a *joint space*, which is a Euclidean space containing points from two distinct sets. One set of points represents *stimuli*, such as ASI subscales, and the other set of points, called *ideal points*, usually represents individual people or sometimes groups of people who are to be treated as a single entity in the analysis. An ideal point indicates the location in the joint space of a person's hypothetical ideal stimulus, that is, the stimulus he would prefer over all other stimuli which could be represented in the space. According to this model of preference behaviour the closer a stimulus point is to a person's ideal point in the joint space, the greater is his preference for that stimulus. From the abstract definition it follows that the model is applicable to other situations besides preference, for example degree of interest or awareness. In these cases an ideal point would correspond to the location in the space of the stimulus in which the person is most intensely interested or of which he is most aware. This is a relatively simple model and excludes cases where a person has several separated regions of maximum preference. No procedure based on a mathematical model can hope to explain complex human behaviour completely, however, and a sound approach to the use of such models is to start with the simplest model and see to what extent it proves useful before trying to use more involved models.

An Unfolding Procedure which Minimises a Discrete Stress Function

Evers-Kiebooms & Delbeke (1982) give an unfolding procedure for ranked data which is appealingly simple in concept. It is based on the direct minimisation of a stress function which measures for each individual the discrepancy between the data and the ranked distances in the joint space from the ideal point to the stimulus points. For any such pair of rankings of the stimuli, a measure of the disagreement between them is the number of transpositions of adjacent stimuli which is needed to transform the one ranking into the other. For example, with four stimuli consider the observed ranking 2, 3, 1, 4 with stimulus two liked best and stimulus four liked least. If the rank order of distances in the joint space is 3, 2, 4, 1 then the disagreement is two, since two transposition steps 2, 3, 1, 4 to 3, 2, 1, 4 and 3, 2, 1, 4 to 3, 2, 4, 1 are needed to move from the one to the other. The measure of stress is standardised by dividing the number of transpositions by the maximum number of transpositions which could be needed. For p stimuli this maximum is given by $p(p-1)/2$. In the example the maximum for four stimuli is six and the measure of stress is 2/6, or 0.33 to two decimal places.

A severe practical problem with procedures based on the minimisation of discrete functions such as this one is that the time taken to produce a solution becomes excessive very quickly as the number of points increases. One way of overcoming this problem would be to look for a procedure based on a continuous function which could approximate the behaviour of the discrete procedure.

An Unfolding Procedure which Minimises a Continuous Function

The procedure used in this paper was developed from a completely different line of research starting with the metric unfolding model of Schönemann & Wang (1972b) and a computational procedure for this model given by Wang *et al.* (1975). This procedure was originally developed for paired comparison preference data and is based on the maximisation of a continuous likelihood function. Metric models of this type explicitly specify a continuous function linking distances in the joint space to observed choice probabilities. This can greatly simplify the computational aspects of an unfolding procedure. In using this approach it is important to select a functional form which can appropriately mirror empirical choice behaviour. The function used in the present procedure was selected after a lengthy process of experimentation, the earlier part of which has been reported in Muller (1983). Some technical details of this procedure are now given. A more detailed version of this presentation may be found in Meyer & Muller (1990).

Consider an experiment in which a paired comparison design for p stimuli is administered to q individuals. At each trial an individual indicates his preference for one of the two stimuli presented. Let

- S_j denote the stimuli $(j=1,2,\ldots,p)$,
- I_i denote the individuals $(i=1,2,\ldots,q)$,
- n_{ijk} be the number of presentations of the unordered stimulus pair (S_j, S_k) to individual I_i,
- m_{ijk} be the number of times that I_i chooses S_j over S_k, and
- π_{ijk} be the probability that I_i chooses S_j over S_k.

It is assumed that the stimuli and individuals can be represented by points in an r-dimensional Euclidean space. Let

- ξ_i' denote the row-vector of co-ordinates for I_i $(i=1,2,\ldots,q)$, and
- ζ_j' be the row-vector of co-ordinates for S_j $(j=1,2,\ldots,p)$.

The squared Euclidean distance between ideal point I_i and stimulus point S_j is given by

$$\delta_{ij}^2=(\xi_i-\zeta_j)'(\xi_i-\zeta_j),\ (i=1,2,\ldots,q,\ j=1,2,\ldots,p),$$

$$=\eta_{ij}'\,\eta_{ij},$$

where $\eta_{ij}=(\xi_i-\zeta_j)$.

If it is further assumed that for each individual the choice probabilities satisfy a Bradley–Terry model (Bradley & Terry, 1952) then

$$\pi_{ijk}=\lambda_{ij}/(\lambda_{ij}+\lambda_{ik}), \tag{1}$$

where for each individual I_i the λ_{ij} $(j=1,2,\ldots,p)$ are positive scale values determined up to a multiplicative constant κ_i. The new model specifies that the scale values are related to distances between ideal points and stimulus points in the Euclidean space according to

$$\kappa_i\lambda_{ij}=(\delta_{ij}^2)^{-\alpha}$$

where α is a positive number. The constants κ_i cancel out when obtaining the π_{ijk} from (1) giving, after a little algebra,

$$\pi_{ijk}=\frac{(\delta_{ik}^2)^\alpha}{(\delta_{ij}^2)^\alpha+(\delta_{ik}^2)^\alpha}, \tag{2}$$

for $\delta_{ij}\neq 0$ and $\delta_{ik}\neq 0$.

For the new model π_{ijk} is *defined* by (2) so that a singularity affecting the model occurs only if *both* $\delta_{ij}=0$ and $\delta_{ik}=0$.

If each paired comparison is assumed to be independently binomially distributed then the likelihood function for the new model is given by

$$L' = \prod_{i=1}^{q} \prod_{j=2}^{p} \prod_{k=1}^{j-1} \left(\frac{n_{ijk}}{m_{ijk}} \right) (\pi_{ijk})^{m_{ijk}} (\pi_{ikj})^{m_{ikj}},$$

where π_{ijk} is given by (2). The probabilities π_{ijk} are functions of the co-ordinates of the stimulus points and ideal points, and of the parameter α. (For example, if $\alpha=1$, $\delta_{ij}^2=1$ and $\delta_{ik}^2=2$, then $\pi_{ijk}=2/(1+2)=2/3$.) Estimates for the point co-ordinates can be obtained by maximum likelihood. This makes efficient use of the limited amount of information available. The parameter α can be regarded as a measure of the ease with which the correct stimulus can be chosen in a paired comparison trial. As α tends to infinity the probability of choosing the closer of the two stimulus points tends to unity. As α decreases to zero the probability tends to a half, irrespective of the relative distances of the two stimulus points from the ideal point. The model can thus be used in a variety of choice situations in which choices can be made with varying degrees of confidence.

Applicability of the Continuous Model

The model described above is formulated in terms of paired comparison data but the same approach can be applied to ranked data using a specified model for ranking, and multinomial instead of binomial distributions, to obtain a likelihood function appropriate to this type of data. Muller (1983) compared the results obtained by such a procedure with the results obtained by using a paired comparison procedure with the (transitive) paired comparisons implied by the rankings. It was found that identical estimates of the point co-ordinates were obtained but that the estimated standard errors of the coordinates were greater. That is, the use of the implied paired comparisons did not bias the estimates but made them appear to be more precise than they should have been. This is intuitively reasonable since the added paired comparisons are *generated* so as to be consistent with the ranking information but are treated by the procedure as providing additional *independent* information, which they do not do. As the procedure using ranks is very significantly more complex and expensive to run it seemed reasonable to use implied paired comparisons in the present study, even though the model used has been modified somewhat from the one used by Muller. The standard errors are not quoted in any case as they are not likely to be of much use unless a large enough number of repeated (independent) observations is taken from each person to justify reliance on the asymptotic properties of maximum likelihood estimates.

The value of the stress function can be printed after each iteration and it has been noted over many analyses that as the value of the likelihood function increases the value of the stress function tends to fall. The product-moment correlation between the negative log-likelihood function and the stress function is typically over 0.95, thus maximising the likelihood function will result in a solution with a low stress value. If the model holds, the likelihood function is more informative than the stress value, but as has been seen, minimising the stress function is itself an established and intuitively attractive nonparametric unfolding method. It is accordingly suggested that the maximum likelihood unfolding procedure can be treated as an approximate computational method for minimising the stress criterion as well as a model-based procedure in its own right. This argument is intended to increase confidence in the applicability of this procedure, even in circumstances where the metric assumptions of the model may be hard to justify rigorously, as is often the case in practice, especially with regard to the independence of the successive judgements assumed to underlie the ranking process. It should be noted, however, that this is a *probabilistic* model so that if an individual prefers stimulus *A* to stimulus *B* and stimulus *B* to stimulus *C* there is no ***obligation*** for him to choose *A* over *C* in any particular trial. The chances of him doing so will be high if the corresponding probability estimate in the model is high, but the trials can still be considered to be independent unless there is some reason to suppose that some recent memories of ***actually*** choosing *A* over *B* or *B* over *C* affect the probability of choosing *A* over *C* in a way not captured by the model probabilities. A more detailed description of the maximum likelihood procedure is in preparation, but as multidimensional unfolding by the minimisation of the stress function is not a novel procedure it was felt that these details are not essential to an understanding or evaluation of the present application.

Meyer & Muller (1990).

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APPENDIX D

Experiences of Teaching and Learning

INSTRUCTION SHEET

The following comments have been made by students about their experiences of teaching and learning. We should like to know to what extent you agree or disagree with what they have said. The comments are necessarily rather general but each of them covers a particular aspect of teaching and learning to which we would like your personal reaction.

It is possible that your feelings may vary from one subject to another. Where the questions are specific we are interested in your experience of studying the particular subject indicated.

Please go through all the comments quickly indicating your immediate reaction by marking the appropriate response on the card provided. This is not a test and there are no "right" or "wrong" answers. We are simply interested in your own experiences and feelings about teaching and learning.

DO NOT BEND OR FOLD THE CARD.
Mark the card in the following way.

A	if you definitely agree
B	if you agree, but with reservation
C	if you are not sure or that it doesn't apply
D	if you tend to disagree
E	if you definitely disagree

Please print you name and initials clearly in the space provided on the card

IF YOU DONT UNDERSTAND THE WORDING OF A SENTENCE, PLEASE ASK FOR HELP.

1. I find it difficult to organise my study time effectively.

2. I try to relate ideas in one subject to ideas in other subjects whenever possible.

3. Although I have a fairly good general idea of things, my knowledge of the details is fairly weak.

4. I enjoy competition: I find it exciting.

5. I usually set out to understand thoroughly the meaning of what I am required to learn.

6. Ideas in books often set me off on many thoughts of my own, which are not always related to what I was reading.

7. I chose my present course of study mainly to give me a chance of a really good job afterwards.

8. Much of what I am studying seems to consist of unrelated bits and pieces.

9 I like to be told exactly what to do in essays, assignments or projects.

10. I often find myself questioning things that I hear in class or read in books.

11. I generally prefer to tackle each part of a topic or problem in order, working out one step at a time.

12. The continual pressure of work - assignments, deadlines and competition - often makes me tense and depressed.

13. I find it difficult to consider different ways of approaching a problem; I prefer to follow each line of thought as far as it will go.

14. My habit of putting off work leaves me with far too much to do before tests or exams.

15. It is important to me to do really well in my studies here.

16. Teachers seem to present things in such complicated ways.

17. Distractions make it difficult for me to do much effective work in my study time.

18. When I am doing a piece of work, I try to bear in mind exactly what that particular teacher seems to want.

19. I don't usually think about the things I have learned.

20. I look out for hints about what is likely to come up in tests or exams.

21. In trying to understand a puzzling idea, I left my imagination wander freely to begin with, even if I don't seem to be much nearer a solution.

22. My main reason for being here is that it will help me to get a better job.

23. I often have to learn some things several times in order to understand them.

24. I generally put a lot of effort into trying to understand things which at first seem difficult.

25. I prefer learning experiences to be clearly structured and highly organised.

26. A poor first answer in an exam makes we panic.

27. I prefer to follow usual or common approaches to solving problems rather than anything too adventurous.

28. I am rather slow at starting work that has to be done.

29 In trying to understand new ideas I often try to relate them to real life situations to which they might apply.

30. When I am learning I try to memorise important facts.

31. I like to play around with ideas of my own even if they don't get me very far.

32. I generally choose courses more from the way they fit in with career plans than from my own interests.

33. I am usually cautious in drawing conclusions unless they are well supported by evidence.

34. When starting on a new topic, I often ask myself questions about it which the new information should answer.

35. I suppose I am more interested in the qualifications I get than in the subjects I am studying.

36. I often find I have to learn things that I don't really understand.

37. If conditions aren't right for me to study, I can generally make a plan to change them so that work is still possible.

38. In reporting practical work I like to try to work out several different ways of interpreting the results.

39. My main reason for being here is so that I can learn more about the subjects which really interest me.

40. In trying to understand new topics, I often explain them to myself in ways that other people wouldn't understand.

41. I find I have to concentrate on memorising a lot of what I have to learn.

42. It is important to me to do things better than other people, if I possibly can.

43. I find it better to start straight away with the details of a new topic or problem and build up a complete picture in that way.

44. Often when I'm reading books, the ideas produce pictures in my mind which sometimes take on a life of their own.

45. One way or another I manage to get hold of the books I need for studying.

46. I often get criticised for introducing irrelevant material into my answers.

47. I find that studying subjects here can often be really exciting.

48. The best way for me to understand difficult concepts is to memorize their definitions.

49. Much of what I have to learn seems to be unrelated.

50. I need to read a lot about a subject before I'm ready to put my ideas down on paper.

51. Although I generally remember facts and details, I find it difficult to fit them together into an overall picture.

52. I tend to read very little beyond what's required for completing assignments.

53. I do not enjoy speaking in class in front of other people.

54. Puzzles or problems fascinate me, particularly where I have to work through the material to reach a logical conclusion.

55. I spend a good deal of my spare time in finding out more about interesting topics that we have been told about in class.

56. When I am presented with a new topic, I find it helpful to see in my own mind how all the ideas fit together.

57. I seem to be a bit too ready to jump to conclusion without thinking about all the evidence.

58. I hate admitting defeat, even in small matters.

59. I think it is important to look at problems rationally and logically without jumping to conclusions.

60. I find I tend to remember things better if I concentrate on the order in which they were taught or given to us.

61. When I'm reading an article or research report, I generally examine the evidence carefully to decide whether the conclusion is justified.

62. Some people think I should be more adventurous in making use of my own ideas.

63. I learn things by writing them over and over or by saying them to myself.

64. I find academic topics so interesting, I should like to continue with them in the future.

65. I am conscious of the way that my attitudes towards teaching and learning affect my relationships with others.

66. When I sit in a classroom or laboratory, I usually notice the fittings and equipment in it.

67. When selecting books for study purposes I try to find those that contain important information for understanding a topic.

68. Sometimes I don't really pay much attention to what is being said in class.

69. I sometimes think about things I have previously learned and change my mind about their meaning.

70. The educational purpose of tests is usually clear to me.

71. In class I usually write down what the teacher says or writes on the board.

72. There seems to be too much work to get through in the courses here.

73. I enjoy some learning experiences, such as those involving learning things from other people, more than others.

74. The subject matter that tests actually cover is usually clear to me.

75. I enjoy finding things out for myself.

76. I usually notice the noise level in classrooms.

77. I don't usually have any trouble finding information in books.

78. I think that the workload here is too heavy.

79. I usually try to guess or anticipate the questions that will be asked in tests or examinations.

80. When I think back to some things that I did not enjoy learning at the time, I realize that they were worth learning after all.

81. I often copy notes out of a textbook.

82. The structure of the content in the subjects I am studying is usually clear to me.

83. I usually notice how the teacher uses the blackboards.

84. I appreciated guidance given to me by others.

85. I think there is a lot of pressure on me as a student here.

86. When using books for study purposes, I usually notice the manner in which subject matter is organised in them.

87. I usually question the relevance of the content of the subject I am studying.

88. I usually notice the legibility of what is written on the blackboard or on an overhead transparency.

89. When using books for study purposes, I usually notice the manner in which they are illustrated.

90. I am conscious of the amount of subject content I have to study.

91. I often think about certain real life experiences I have had and how they have altered my view of life.

92. There is so much written work to be done, that I find it very difficult to get down to private studying.

93. I try to participate in discussions whenever possible.

94. I am aware that being tested can sometimes help me to learn.

95. When selecting books for study purposes, I often examine their 'search apparatus' (such as the index, list of contents, chapter headings, cross references).

96. I usually notice the different uses of teaching aids (such as the blackboard, overhead projector, television and so on).

97. I am aware of the different ways in which we can be tested (for example by writing essays, answering multiple choice questions, solving problems, giving orals and so on).

98. I usually notice the individual characteristics of the students who make up my classes.

99. I am conscious of where I sit in the classroom.

100. It sometimes seems to me that the syllabus tries to cover too many topics.

101. I usually think very carefully about the comments the teacher made about my answers to test or exam questions.

102. When faced with real life problems I often think about experiences I may have had, or which my friends may have had, that might help me to find a solution.

103. I am scared that I might fail some of my courses this year.

104. I never seem to have enough time to catch up on my homework.

Thank you for your responses to the comments. Please check that you have not left any out.

APPENDIX E

NO	CLASSIF	TEST1	R1	TEST2	R2	TEST3	R3	EXAM	R4
20	STAR	87	6	100	1	33	1	81	1
06	AVE +	100	1	85	6	26	4	79	2
33	AVE	0	36	98	3	26	4	75	3
28	STAR	82	7	64	15	30	3	72	4
16	STAR	100	1	85	6	33	1	70	5
37	AVE	53	16	94	5	22	8	66	6
36	AVE +	92	3	73	10			61	7
29	AT RISK	50	18	85	6	15	22	60	8
08	AVE +	82	7	30	35	24	6	54	9
14	AVE	90	5	100	1	21	10	51	10
05	AVE	37	24	67	14	9	29	48	11
25	AVE +	21	29	55	23	16	17	43	12
10	STAR	55	14	42	29	16	17	41	13
13	AVE +	68	10	61	16	8	31	40	14
03	AVE +	5	34	48	26	14	23	39	15
11	AT RISK	58	13	61	16	23	7	38	16
07	AVE	5	34	52	24	10	28	37	18
21	AT RISK	53	16	58	20	14	23	36	19
38	AVE	55	14	97	4	16	17	35	20
35	AVE +	16	31	45	28	14	23	35	20
23	STAR	92	3	58	20	9	29	35	20
01	AVE	24	27	70	11	16	17	35	20
04	AVE +	8	33	27	37	22	8	31	25
30	AVE +	71	9	61	16	16	17	30	26
09	STAR	50	18	61	16	19	14	28	27
31	AVE	45	21	42	29	7	32	19	28
19	AT RISK	24	27	33	33	5	33		
27	STAR	47	20	30	35				
18	AT RISK	45	21	70	11	11	26		
24	STAR	45	21	0	38				
32	AT RISK	0	36	39	32				
34	AVE	60	12	52	24	11	26		
17	STAR	13	32	42	29				
12	AVE +	68	10	85	6	21	10		
22	AVE	0	36	58	20	21	10	16	29
02	AT RISK	21	29	33	33	19	14	15	30
26	AT RISK	37	24	70	11	18	16	38	16
15	AT RISK	31	26	48	26	20	13	32	24

[E1EDEB FEB 1990]

NO	CLASSIF	T1	R1	T2 MAR20	R2	T3 APRIL30	R3	EXAM	R4
04	AVE +	83	10	83	9	60	15	79	1
36	AVE +	80	15	83	9	60	15	76	2
43	STAR	100	1	83	9	95	1	75	3
20	AVE	34	42	78	15	88	2	74	4
29	STAR	97	3	87	4	80	3	69	5
47	STAR	74	18	65	31			67	6
38	AVE +	71	20	74	22	43	26	64	7
01	AVE	74	18	87	4	60	15	64	7
33	AVE +	97	3	87	4	55	18	63	9
22	AVE +	100	1	78	15	75	5	61	10
17	AVE +	69	21	91	2	68	7	57	11
31	AVE +	46	32	61	35	63	9	56	12
19	AVE	86	8	78	15	40	28	56	12
37	AVE	40	37	74	22	45	24	55	14
12	AVE	60	27	70	27			55	14
21	AVE	83	14	83	9	78	4	55	14
26	AVE	43	33	96	1	65	9	55	14
06	AVE	77	17	87	4	33	37	51	19
25	AT RISK	69	21	74	22	28	38	50	20
24	AVE	86	8	65	31	68	7	47	21
45	AVE +	89	6	70	27	73	6	47	21
09	AVE +	83	10	91	2	35	35	47	21
27	STAR	51	30	57	41	63	9	47	21
46	AVE +	83	10	61	35	63	9	43	26
41	AVE +	69	21	83	9	50	20	43	26
32	AVE	40	37	87	4	25	41	35	29
34	STAR	69	21	61	35	13	44	34	30
13	AVE	40	37	83	9	48	21	34	30
42	AVE	54	29	78	15	48	21	33	32
11	AT RISK	89	6	70	27	40	28	31	33
10	AVE +	60	27	61	35	43	26	30	34
15	AVE	63	26	74	22	48	21	30	34
18	AVE +	97	3	65	31	40	28	29	37
23	STAR	83	10	65	31	40	28	29	37
07	AT RISK	69	21	48	45	28	38	25	40
02	AVE	49	31	78	15	23	42	24	41
44	STAR	23	45	70	27	45	24	22	42
35	AVE	80	15	61	35	28	38	21	43
30	AVE	34	42	48	45	38	33	21	43
03	AVE +	6	47	61	35	20	43	14	45
28	AVE	17	46	39	47	38	33	5	46
40	AVE	37	41	57	41				

08	AT RISK	40	37	78	15	40	28	44	25
14	AT RISK	31	44	78	15	35	35	39	28
39	AT RISK	43	33	74	22	63	9	30	34
16	AT RISK	43	33	57	41	52	19	29	37

[E1ADEB FEB1990]

NO	CLASSIF	T1 FEB7	R1	T2 MAR13	R2	T3 MAY	R3	EXAM	R4
38	STAR :	80	4	45	24	24	17	62	2
14	AVE +	40	31	93	2	38	2	61	3
36	STAR	80	4	68	14	38	2	60	5
41	AVE +	45	24	73	11	24	17	57	6
25	AVE +	70	11	68	14	33	5	57	6
20	AVE +	75	9	80	5	27	14	52	11
35	STAR	85	3	80	5	37	4	51	12
04	AVE	47	23	70	13	21	24	50	13
01	AVE +	100	1	100	1	40	1	49	14
13	AVE	58	15	45	24	27	14	48	16
34	STAR	70	11	83	3	31	10	47	18
16	AVE +	45	24	55	23	23	20	46	19
17	STAR	80	4	57	22	23	20	45	20
09	AVE +	70	11	75	8	28	11	45	20
02	STAR	53	16	73	11	11	33	40	23
03	AVE	75	9	45	24	16	27	37	24
23	AVE	50	19	60	20	14	31	33	27
39	AT RISK	95	2	ABS		17	26	33	27
06	AVE	45	24	39	29	23	20	31	29
29	AVE	50	19	19	36	16	27	26	30
05	STAR	53	16	45	24	11	33	25	31
12	STAR	50	19	45	24	13	32	21	32
30	AT RISK	68	14	65	17	22	23	21	32
24	AVE +	80	4	68	14	33	5	19	34
27	AT RISK	43	27	19	36	left			
18	AT RISK	20	37	28	31	left			
28	AT RISK	25	36	25	33	left			
15	AT RISK	30	34	25	33	7	35		

07	STAR	53	16	83	3	32	7	55	8
11	STAR	35	33	80	5	32	7	64	1
22	AVE +	80	4	65	17	28	11	61	3
26	AVE	50	19	75	8	26	16	54	9
37	AT RISK	28	35	60	20	32	7	54	9
10	AT RISK	43	27	25	33	28	11	49	14
21	AT RISK	10	38	28	31	24	17	48	16
19	AVE	43	27	35	30	16	27	45	20
08	AVE	43	27	75	8	16	27	37	24
40	AVE +	40	31	63	19	18	25	34	26

[E1EVID FEB 1990]

NO	CLASSIF	T1 FEB8	R1	T2 MAR14	R2	T3 MAY10	R3	EXAM	R4
10	STAR	70	2	55	17	30	22	62	5
06	AVE	45	8	85	3	75	13	54	8
25	AVE	38	16	50	19	83	7	45	12
03	STAR	43	10	50	19	70	15	44	13
27	AVE +	58	4	58	14	70	15	42	14
28	AVE +	25	22	30	22	80	8	42	14
12	AVE	35	17	63	12	75	13	41	16
18	AVE	65	3	63	12	80	8	41	16
09	AVE	43	10	58	14	70	15	41	16
22	AVE	35	17	50	19	58	21	40	19
08	AVE +	53	6	70	8	68	18	33	20
02	AVE	35	17	55	17	60	20	24	21
16	AVE	20	23	58	14	62	19	19	22
20	AT RISK	45	8	23	23	WITHDRAWN			
24	AVE	35	17	83	4	93	3	80	1
21	AT RISK	55	5	90	1	80	8	78	2
14	AT RISK	40	13	78	6	80	8	70	3
17	AVE +	75	1	90	1	100	1	64	4
26	AT RISK	40	13	80	5	88	5	61	6
23	STAR	35	17	70	8	100	1	60	7
13	AT RISK	43	10	78	6	92	4	54	8
07	AVE	53	6	68	10	85	6	51	10
11	AT RISK	40	13	65	11	80	8	51	10

[E2AVID FEB 1990]

APPENDIX F

TEACHING DEVELOPMENT UNIT
Room 4.51 Engineering Building

MARCH 1990

INTERVENTION PROGRAMME
(5 X 45 MINUTE SESSIONS)

SESSION 1: INTRODUCTION

Give past results to back up validity of classification.
Give "at risk" students their individual orchestrations and summary of the subscales of the ASI and QCI.
Explain in broad terms how the orchestration can be interpreted.

SESSION 2: PROCESSES REQUIRED FOR UNDERSTANDING

Illustrate the link between motivation, approach, process and outcome using the subscale summary.
Explain the link between perceptions of context and approaches to studying.

SESSION 3: CONTEXTUAL PERCEPTIONS - RELATIONSHIPS

What constitutes "deep" teacher-student and student-student relationships.
What are the relative roles of teacher and student.
What to expect and what not to expect from the teacher.

SESSION 4: CONTEXTUAL PERCEPTIONS - BOOKS AND NOTES

The role of books, handouts and notes.
Their distinctive features and how these can aid learning
- structure, index, contents, bibliography, references, typeface, colour, diagrams and illustrations.

SESSION 5: CONTEXTUAL PERCEPTIONS - ASSESSMENT

The purpose of assessment and the interpretation of test results.
The demands of different types of test - what they are testing.
What you can learn from tests when they are returned.
How to prepare for tests and exams.

[P Parsons - home telephone 5316148]

APPENDIX G

1990.02.23

ASI/QCI SUBSCALE COMPOSITION AND MEANING

DEEP APPROACH
(DA) 24,10,5,34
A conscious attempt to set out to understand new material even if this requires considerable effort.

MEMORISING APPROACH
(ma) 23,30,41,48,63
An approach to understanding characterised by the strategy that most of what has to be learnt has to be memorised (important information such as facts and definitions) by way of repeated rehearsal.

STRATEGIC APPROACH
(St) 18,20,37,45
A concern for outcomes and the willingness to manipulate circumstances (such as availability of books, poor study environment) in order to achieve these. Applicable particularly to examinations and assignments.

USE OF EVIDENCE
(UE) 38,33,54,61
Use of evidence critically in order to draw conclusions (particularly in practical work) and an examination of evidence where this is used to support an argument. An awareness of and interest in the logical structure of things.

RELATING IDEAS
(RI) 2,29,50,56
Relating ideas between and within subjects, as well as a conscious attempt to relate material to real life situations. Concern with building a related framework into which new ideas can be integrated.

FRAGMENTED APPROACH
(fa) 8,16,19,36,49
An inability to see the relationships between ideas or to think about or understand what has been learned. Teachers are blamed for making work complicated.

REFLECTION
(RE) 69,80,91,102
The process of thinking back on learning experiences or real life experiences with an open mind and with a view to using these to solve problems. An awareness of the dynamic aspect of one's own learning.

COMPREHENSION LEARNING
(CL) 6,21,31,44
An awareness that a broader focus on the learning task (sometimes even unrelated directly to the specifics and even involving imagination) is often helpful and necessary in reaching understanding.

OPERATION LEARNING
(Ol) 11,27,43,59
A approach to learning which excludes the role of imagination, is essentially conservative and relies on order and detail to produce a complete picture.

INTRINSIC MOTIVATION
(IM) 39,47,55,64
A strong interest and even excitement in the subject which predates the formal study programme and goes beyond the demands made in class . An ongoing motivation which may ultimately determine future direction.

ACHIEVEMENT MOTIVATION
(Am) 4,15,42,58
A personal need to do well as well as the satisfaction derived from beating others. A competetive spirit which hates defeat even in small matters.

EXTRINSIC MOTIVATION
(em) 7,22,32,35
Studying is seen as specifically career-related and as a means to obtaining a good job.

SYLLABUS-BOUNDNESS
(sb) 9,25,52
A narrow focus on the requirements of the task and a preference for clear boundaries and imposed structure.

FEAR OF FAILURE
(ff) 12,26,53,103
A general concern with failing (particularly the course), but linked to exam tension, speaking in public, and pressure of work resulting in tension, anxiety and even panic.

DISORGANISED STUDY METHODS
(ds) 1,14,17,28,104
A general disorganisation reflected in poor time management (including putting off work), distractions and a backlog of important work.

WORKLOAD
(wl) 72,78,85,92,100
A feeling that too much work is covered and expected, reflected in too many topics and too much written work, giving rise to a feeling of pressure.

GLOBETROTTING
(gl) 3,40,46,57
An inability to back up a general picture with the necessary detail, leading to unsubstantiated conclusions and the introduction of irrelevant material.

IMPROVIDENCE
(ip) 13,51,60,62
A failure to integrate detail into an overall picture, characterised by a rigid following of established thought patterns and an excessive concentration on given structures.

DEEP PERCEPTIONS OF BOOKS
(BD) 67,77,86,89,95
An ease of use, based on an awareness of the organisational features of books. Books are selected on this basis and in relation to the value of the information they contain.

DEEP PERCEPTIONS OF LEARNING ENVIRONMENT
(LD) 66,83,99
An appreciation that one's position in the classroom, the relational (rather than the functional) use of chalkboards and the equipment in classrooms or laboratories all impact the effectiveness of learning.

DEEP PERCEPTIONS OF ASSESSMENT
(AD) 70,74,94,97,101
An awareness of the content, purpose, types and benefits of tests and exams, as well as the information available by way of written feedback from teachers.

DEEP PERCEPTIONS OF TEACHER/STUDENT RELATIONSHIPS
(RD) 65,73,84,93,98
An appreciation that one can be helped and guided by teachers, fellow students and others, resulting in a deliberate effort to maximise the benefit of this.

SURFACE PERCEPTIONS OF LEARNING ENVIRONMENT
(ls) 76,88,96
A concentration on those aspects of the learning environment (noise, legibility, equipment) which affect the ease and accuracy of information transfer.

SURFACE PERCEPTIONS OF LEARNING CONTENT
(cs) 82,87,90
Attention specifically on the detail of the content in terms of its volume, structure and perceived relevance.

SURFACE PERCEPTIONS OF TEACHER/STUDENT RELATIONSHIPS
(rs) 68,71,79,81
An uncritical reliance on the words of teacher or textbook while ignoring other aspects of the teaching/learning relationship, linked to guessing possible exam questions.

APPENDIX H

Higher Education 20: 323–334, 1990.

The academically 'at risk' student: a pilot intervention programme and its observed effects on learning outcome

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Abstract. Previous research has indicated that there is a strong relationship between the approaches to studying adopted by individual students and their qualitative perceptions of the context in which learning takes place. This study identified students who were considered to be academically 'at risk' and involved them in an intervention programme whose aim was to produce a qualitative change in perceptions of certain key elements of the learning context.

The intervention programme consisted of five forty-five minute sessions in which the focus was on three elements of the learning context, namely, the teacher/student relationship, perceptions of textbooks and notes, and the nature and role of tests and examinations.

Subsequent interviews indicated that most of the participating students had experienced a qualitative improvement in their perceptions of these contextual elements and that they perceived an attendant improvement in the quality of their learning. Quantitative analysis of the relative class positions before and after the intervention suggests that these changes were accompanied by improved performance. The implications of these findings for teaching practice in higher education are discussed.

Introduction

Concern for the plight of students who fail to cope with the demands of higher education is expressed in many forms. The rise of Academic Support Programmes in South Africa, modelled on those implemented for a number of years in other countries, has focussed this concern on those students who enter higher education disadvantaged by virtue of their being part of an inferior secondary school system and/or having come from an economically and culturally deprived environment (Hofmeyer and Spence, 1989).

In a wider context, the rise of conferences dealing specifically with the problem of first year students (Oldham, 1988) indicates the level of concern that educational practitioners share, and the awareness that failure at tertiary level (however that failure is defined) is not simply a product of inadequate intellectual capabilities coupled with insufficient effort on the part of the student.

Attempts to remediate the problem, always well-meaning, often well funded and sometimes reasonably successful, have tried to single out groups of students 'at risk' and to offer them an extensive network of educational, psychological and social support and/or a reduced formal programme (Hofmeyer and Spence, 1989). Alternatively, they have offered general study skills courses on a voluntary basis, with very dissapointing results when the amount of time and effort required is taken into account (Ramsden, 1987; Oldham, 1988; Coles, 1990). Why do such programmes not live up to the expectations of their advocates and certainly not to the needs of students 'at risk'? Certainly the dedication, enthusiasm and expertise of the practitioners cannot be called into question. The reason is more plausibly that such programmes are based on at best an inadequate conceptualisation of *why* students are 'at risk', and, at worst, on an incorrect conceptualisation of the interplay of factors that are associated with academic success or failure. (See Van Overwalle, 1989, for a summary of traditional research into factors affecting the success or failure of first year university students.)

The basis for an intervention programme

Recently a paradigm has emerged which has attempted to synthesize phenomenographic, cognitive psychological and empirical studies of student learning to provide new insights into how students in tertiary education approach the task of studying (Entwistle and Ramsden, 1983; Ramsden, 1985; Entwistle and Tait, 1990). Relationships between motivation, approach and study processes have been established at the group level in a number of large-scale studies (Meyer and Parsons, 1989). These empirical relationships have been extended, furthermore, to the level of the individual student (Meyer and Muller, 1990a; 1990b).

The important role of the learning *context* in relation to students' approaches to studying has been recognized from the outset and the focus of research has recently concentrated more and more on exploring approaches to studying as a product of the complex interaction between the characteristics of individual students and their perceptions of the educational context (Entwistle and Waterston, 1988; Ramsden, 1988; Coles, 1990; Entwistle *et al.*, forthcoming). An inevitable consequence of these emphases has been the need to conceptualise and describe qualitatively different individual approaches to studying which are a response to a perceived contextual setting in terms of the concept of *orchestration* (Meyer *et al.*, 1990).

Concurrent with the investigation into the study orchestrations of individual students, and using a similar paradigm, explanatory factors relating to the learning context have also been identified (Meyer, 1988) and empirically verified (Meyer and Muller, 1990b). These factors identified *qualitatively* different perceptions of key elements in the learning context, such as teacher-student relationships, perceptions of books and printed learning materials and the use and role of tests and examinations. These qualitatively different perceptions have been consistently associated with qualitatively different study orchestrations (Meyer and Muller, 1990a; 1990b; Entwistle *et al.*, forthcoming).

These studies have provided researchers and practitioners with a coherent conceptual framework within which to operate. Using the results of two inventories developed to obtain students' self-perception of these factors, namely the Approaches to Studying Inventory (ASI) (Entwistle and Ramsden, 1983) and the Qualitative Context Inventory (QCI) (Meyer, 1988), individual students can be identified as being 'at risk' in terms of undesirable study orchestration and qualitatively poor contextual perceptions (Meyer and Muller, 1990b; Meyer *et al.*, 1990; forthcoming). The procedure for performing this classification is fully explained in Meyer, *et al.* (1990) and will not be dealt with here.

The results of such analyses provide a basis for identifying students who are potentially 'at risk' and a number of independent studies (Meyer *et al.*, 1990a; 1990b), as well as a number of other (as yet unpublished) studies undertaken by the authors, have demonstrated that such students are unlikely to be successful in traditional examinations. In addition, these analyses provide diagnostic evidence that the cause of such failure can be interpreted in terms that are entirely consistent with the process model of student learning on which the conceptual framework is based (Entwistle and Tait, 1990).

Based on a number of pilot studies involving over 200 students, the conceptual framework and the methods of analysis that have been described have yielded consistent results. The question that obviously required investigation is: 'Can an intervention programme be designed and implemented, based on the conceptual framework outlined above, that will take an 'at risk' student and change his qualitative perceptions of context in such a way that he can successfully *reorchestrate* his approaches to studying, thereby improving his performance in the traditional examination?' (The term 'reorchestrate' is used to imply the change in approach to studying brought about as a response to qualitative changes in perceptions of the learning context.)

Intervention programmes to assist students academically 'at risk', based broadly on the process model of student learning, have emerged recently in the literature and have shown promising results (Ramsden, 1988; Van Overwalle, 1989; Coles, 1990). These have focussed on making students more aware of their own approaches to studying and those factors which are theoretically linked to a more desirable approach to studying, particularly those factors over which the student has direct control. However, apart from contextualizing the intervention, they have not directly addressed the original general proposition of Entwistle and Ramsden (1983) that learning outcome is affected by the perceived context in which learning occurs.

Ramsden (1985), in reporting a number of such programmes, stresses the importance of addressing contextual factors at the same time as making students more aware of their own learning processes within particular subject areas. He makes the point even more forcibly (Ramsden, 1988, p. 180) when he says: 'If the student-context interaction is the source of variation in approaches, then practical educational solutions must tackle both individual and contextual aspects of student learning concurrently.'

Based on the earlier investigations conducted into individual perceptions of learning context, the authors felt that it was now possible to design a pilot intervention programme based on the original proposition that learning outcome might be influenced by *alterations* to the context in which it occurs. It was hoped that an intervention programme based more firmly on empirically demonstrated relationships between qualitative perceptions of learning context and study orchestration and acting directly to produce a qualitative change in these contextual perceptions, would be more effective in producing qualitative changes in approaches to studying and in learning outcome.

The present study

The intervention programme had to be consistent with the conceptual framework, simple to implement (since it required the active involvement of the subject teacher) and context-specific. A first and second year class were selected in the School of Electrical Engineering at the Cape Technikon. Both groups were enrolled for the second semester of the year in a course whose duration was six months. The ASI and QCI were given out to students in both classes early in the semester and individual study orchestrations were produced, enabling students to be categorized on this basis (the method is described fully in Meyer *et al.*, 1990). Students who were identified as 'at risk', based on the administration and analysis of the ASI and QCI given out before the first class test of the semester was written in the subject, and who subsequently performed badly in this first test, were identified as possible subjects for the intervention programme.

Method

The intervention programme involved four distinct stages. Stage one involved the categorisation of students on the basis of their study orchestrations and perceptions of context. Those students categorized as 'at risk' and who failed the first test were invited to participate in the intervention programme. For moral reasons it was felt that any other students who wished to join the programme should be allowed to do so. Students were given feedback on the results of previous studies (for results see Meyer *et al.*, 1990) and were told that no guarantee could be given that the intervention programme would improve their position at all.

Six first year and three second year students agreed or asked to participate in the intervention programme. Of these nine students, three were categorized as 'at risk' and failed the first test, three were 'at risk' and passed the first test and three were 'average' or better. The two year groups were dealt with in separate sessions.

The second stage of the programme involved two sessions at which the participating students were shown their individual study orchestrations. In addition, they were given the conceptual overview of the ASI and the QCI to enable them to interpret their orchestrations. Also outlined to them was the posited relationship between their qualitative perceptions of context and their individual study orchestrations. This relationship was illustrated by way of Figure 1, and emphasized as the rationale for the remainder of the programme. The principles underlying this approach are consistent with those advocated by Biggs (1987, pp. 109–116), Ramsden (1988), Van Overwalle, Segebarth and Goldchstein (1989) and Coles (1990).

The response of students at these initial sessions indicated that they were able to *interpret* their individual analyses and that they *perceived* an association between their lack of success and the concepts that they had ranked as primary in terms of their own perceptions. Two students, commenting at interviews conducted just before the final examinations were written, described the value of this stage in the following terms:

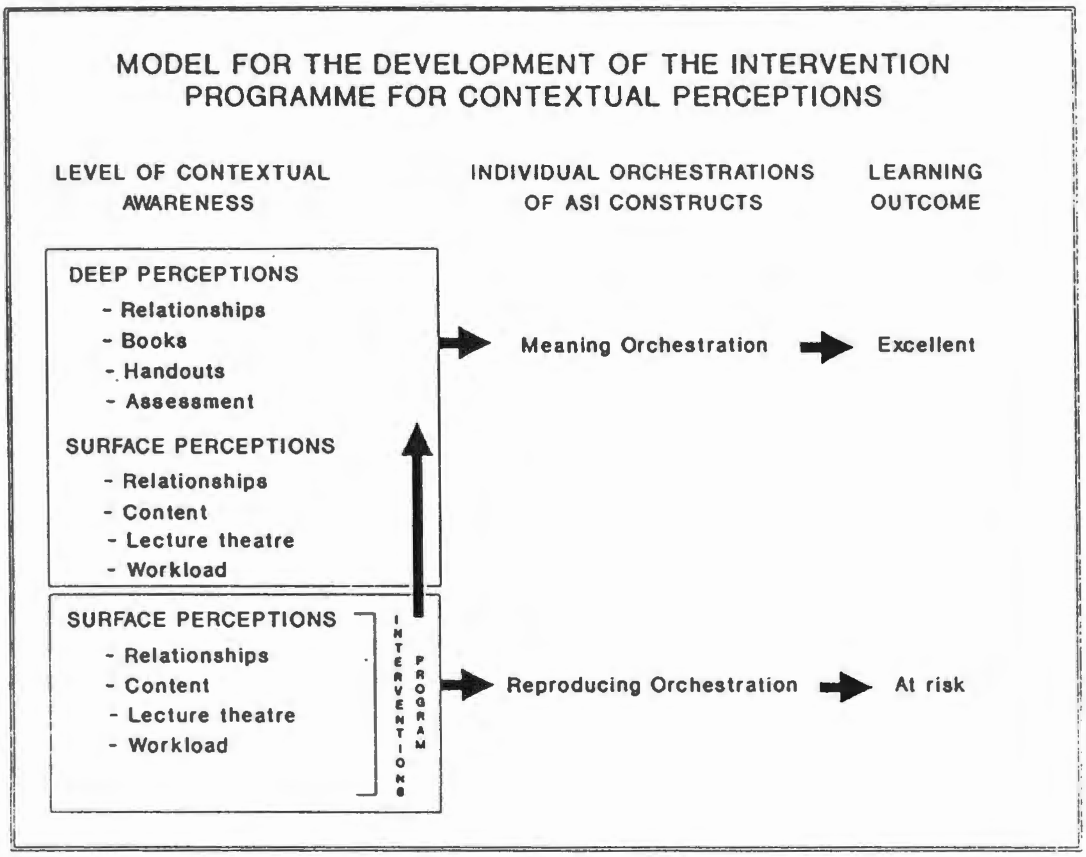

Fig. 1.

Student DI: '...that printout. That amazed me because it was so true; it actually frightened me. Because I had all the bad ones on the top, like sb (*sb stands for the construct 'syllabus-boundness'*) and the one where you're doing the subject not because you understand it, you just want to do it for the money...'
Interviewer: 'Did that picture help you to change your attitude?'
Student: 'It did in a way, yeah.'
Student K1: 'I think it told me basically where I was going wrong.'

While no direct attempt was made to change students' study orchestrations, the outline of the conceptual framework necessitated an explanation of the association between concepts that, from a theoretical as well as an empirical perspective, are linked to qualitatively desirable learning outcomes. The reason that the individual study orchestration concepts were not directly addessed is that the orchestration of these concepts is seen as a *response* to qualitative perceptions of key elements in the learning context, and without a qualitative change in contextual perceptions a desirable reorchestration would be difficult, if not impossible, to achieve.

Clearly this approach has much in common with the attributional theory employed by Van Overwalle (1989; Van Overwalle *et al.*, 1989) in the design of an intervention programme, although the conceptual framework is significantly different. Van Overwalle relied on successful senior students recounting the were under their control. The similarity in the approach is evident: in both programmes (Van Overwalle's and the authors) students were given to understand that their success was attributable to factors under their direct control. The significant difference is that, in the intervention programme which forms the basis for the present study, a conscious effort was made to change the *quality* of perceptions that students had formed about specific aspects of their learning context that, in terms of previous studies, had been identified empirically as being associated with desirable learning outcomes (Meyer *et al.*, 1990).

The third stage of the programme focussed on the social interaction, involving the lecturer in a 'consciousness raising' exercise intended to modify perceptions about the attributes of, and the interaction with, elements of the context, rather than the alteration of the elements themselves in an objective sense (Meyer *et al.*, 1990). These sessions were devoted to a discussion between students, the lecturer and the facilitator (the first author) of the three aspects of the context which were seen as being determining factors in the successful reorchestration of the ASI constructs. These three aspects were 'deep' relationships, 'deep' perceptions of textbooks and notes, and 'deep' perceptions of tests. While there was a measure of general discussion in these sessions, the focus was always on the *specific context* of the lecturer and the subject concerned. Thus, the relationship between the specific lecturer and the students was highlighted in terms of the lecturer's values, expectations and attitudes in terms which reflected the essential qualities of a 'deep' relationship. The lecturer, by way of guided discussion on the part of the facilitator, was able to explain that he saw his role as being to guide students through the subject material, to provide relevant examples of the concepts, to clarify the relationships between concepts, to distinguish between important and relatively unimportant concepts in order to facilitate understanding on the part of the students. He verbalised his concern for them as individuals and his willingness to help them reach understanding even if this made heavy demands on his time outside the formal lecture periods. The students, for their part, had an opportunity to enquire as to his expectations of them as students and what he required of them in order to ensure that this relationship was maintained.

The session that dealt with textbooks and notes focussed on those aspects which characterized qualitatively 'deep' perceptions. These included the awareness of the structure of the textbooks used in the course, their search and reference mechanisms, the value and role of examples, the visual signals used to indicate the relative importance of a section or sub-section, the way in which the writers expected the books to be used and how this was reflected in the layout (for example, the use of overview and review sections). The students were encouraged to apply the principles of textbook layout to their own notes so that structure, examples, visual signals and search mechanisms could be incorporated to make their own notes more valuable as aids to understanding.

The final session dealt with tests and the information that could be derived from work marked and graded by the lecturer. The system of norm-referenced assessment was explained to them as well as the information required in order to interpret test marks correctly. This was felt to be essential for students to judge accurately their progress throughout the semester. In addition, examples of marked answers were discussed to illustrate how students could obtain feedback on the level of their understanding and the reasons for incorrect answers.

The fourth and final stage of the intervention programme dealt with monitoring the progress of all the students in the two classes and conducting follow-up interviews with those involved in the programme to obtain qualitative feedback on its perceived effects.

Results

The intervention programme was targeted at students categorized as 'at risk' and who were performing badly in the subject on the basis of the first test. The three students who fell into this category *all passed the final examination.* The three students who were categorized as 'at risk' and who passed the first test all passed the final examination and maintained or improved their relative position. Of the remaining three students who were categorized as 'average' or 'above average' two passed and the one student who failed did so despite a year mark (contributing 40% to his final mark) of 75%. In general terms, then, it is clear from the position of each student relative to the performance of the class group as a whole, before and after the intervention programme (Table 1) that there was a general, and in some cases a marked, *improvement* in relative performance for all but one of the students.

The question of the benefit of the intervention programme for students categorized as 'at risk' deserves further comment. The three students 'at risk' who performed badly in the first test (T1, M1, K1) showed a marked improvement in their relative positions. It would appear that there was only marginal benefit for those 'at risk' students who performed well in the first test (D1, H1, R1). Their position, however, needs to assessed in the light of evidence from published (Meyer *et al.*, 1990a; 1990b) and unpublished studies which *suggests* that the performance of students categorized as 'at risk' may, over time, come more and more into line with that expected from a poor study orchestration: the performance of such students, in

Table 1. Students' relative positions before and after the intervention programme

Student	Classification	Test 1	Final	
C 1	AVE	10	5 (Fail)	
D 1	AR	16	18	First
H 1	AR	21	22	years
R 1	AR	23	24	(n=24)
T 1	AR	6	13	
T 2	AVE	20	23	
C 1	AVE	31	41	Second
M 1	AR	17	42	years
K 1	AR	21	50	(n=54)

Note: AR = at risk; AVE = average. The position given is the student's position relative to the rest of the group, with Position 1 being lowest.

the absence of any intervention, generally deteriorates. The fact that these students have more than maintained their original position indicates that the value of the present intervention programme for such students may be greater than the marginal improvement reflected by their relative positions.

These results alone would provide reasonably suggestive evidence for the benefit of an intervention programme based on the relationships between perceptions of certain key elements in the learning context and the successful orchestration of the approaches to studying constructs. Further supportive evidence of this benefit is derived from a qualitative perspective by analysing the structured interviews conducted with students upon completion of the course, but before the final examination results were known.

Not all students expressed a conscious appreciation for the benefit of the intervention programme. Comments were made that it was too short and that the benefits wore off over time. Others admitted that they were openly sceptical when embarking on the programme. However, those who felt that they were aware that they had benefitted expressed the value of the programme in terms which indicated that it had achieved at least some of its objectives of changing perceptions about key contextual elements. Students indicated that where changes had taken place in terms of their perceptions these were qualitative changes related to the specific aspects dealt with in the intervention programme. The change in perceptions of the relationship between lecturer and students was expressed in terms such as these:

Student M1: 'Perhaps the way in which I looked at the lecturers more than anything else. ...my approach towards the lecturers actually changed a bit.'

Student C1 (second year): 'He was putting across the sort of thing you told us we should expect from a lecturer and he made it much easier for me to pick up things that I didn't before, things that I didn't notice.'

Interviewer: 'How did your approach change?'
Student K1: 'As far as what he [the lecturer] said in class. You would pay more attention to little things he said. When he gave us examples and said things like "Now concentrate on this and that" '.

The effect on students' perceptions of books and the result of this qualitative change was described by one student in these terms:

Interviewer: 'How did it help you?'

Student C1 (second year): 'Well, it opened my eyes to a lot of points that at other times I thought weren't that important. Like, for example, the review at the end of the chapter and an overview at the beginning of a chapter. Things like that. ...The last couple of chapters I found I understood much better and I found my tests were much better as well because from the review I could see he [the lecturer] sort of highlighted points you should know, and I had them written down so I could refer back to them, and it was much easier. ...Study-wise it didn't change things but reading-wise it did. Before, I used to study, you know, that and that. I used to think that was important and that was important and I studied that. ...I saw from the piece of paper you gave me (***his individual orchestration***) that I like strategic-type studying, but that changed because I did more reading. Like I tried to get more of an overview of the chapter, like a broader grasp of it so I could fit it together with other chapters. In other words I spent more time trying to understand it rather than trying to learn something that was just there.'

The results of these changes in qualitative perceptions of key contextual elements is reflected in the comments that students made about the general effects of the intervention programme:

Student D1: 'I won't say I've worked harder, I've thought more about what I was doing.'

Student K1: 'I tried to take a more broader view of it (the subject), trying to see where everything fits in, like from a wider angle.'

Student M1: 'I won't necessarily say it's made me work harder.'
Interviewer: 'That was the other question I wanted to ask you. Did you put in more work?'
Student M1: 'No, I actually haven't. I haven't put in as much work this semester as last semester, but I think what I have done is the work that I have put in, it's been more effective than last semester.'

Student C1 (second year): 'If I think back I would understand it but not as well as now. Some things I learn now I have a better understanding of than I did before.'

Comments such as these suggest that a qualitative change in perceptions did take place along the lines that the intervention programme was designed to achieve and that associated with this was a resultant change in approach to studying. The quantitative results suggest that this qualitative change in perceptions was associated with improved performance on traditional assessment procedures.

Discussion

In the present pilot study it is not possible, on the basis of the quantitative data alone, to determine statistically the success of the intervention programme described. Questions about the ability of the assessment procedures to reflect adequately qualitative changes in perception remain. In addition, there is the anomalous situation of some students 'at risk' who improved their performance in the absence of any intervention. However, the general trend reflected by the relative performance of students who participated in the programme is very encouraging.

The qualitative changes in perceptions and consequent changes in approaches to studying have been *inferred* from improved examination results and from the interview data presented. We need to ask whether we can obtain more direct evidence as to the changes that have been inferred. Two possible ways present themselves. Firstly, we could ask students to complete a second administration of the two inventories and compare these orchestrations with the original orchestrations. Secondly, we could interview students about their approaches to studying and contextual perceptions in terms of changes which might have been brought about as a result of the intervention programme. While both methods are appealing, it is clear from an understanding of the second and third stages of the intervention programme that such methods could, in fact, produce results which were distinctly biased to favour the intervention programme. Since students had been made aware of the conceptual structure of the ASI and in particular the meaning of and association between those concepts which were considered to be desirable, it is highly likely that they would have responded to a second administration of the ASI in terms of this awareness, which may or may not have reflected their *actual* (as opposed to what they now knew was desirable) approach to studying. This subsequent orchestration may, therefore, not have reflected an actual change in approach but rather an awareness that such a change was desirable, and any conclusions drawn on the basis of apparent changes would have been suspect.

What is pertinent to the discussion at this stage, is the evidence that in situations where no intervention takes place students display a marked *consistency* of orchestration over time (Meyer *et al.*, 1990b). In an early study undertaken by the first author a number of students completed the ASI and the QCI during both their first and second semesters (when they were enrolled for first and second year courses respectively). The objective of the research programme was to investigate the association between study orchestration and academic performance, and therefore no intervention programme was implemented; students were simply categorised on the basis of their study orchestrations. Twelve students in the second year course had also completed the combined inventory in their first year. Of these twelve students, eleven exhibited stable orchestration categories. At the same time, the finding that in an academic climate which supports and encourages change, some students are able to change their study orchestrations (Meyer *et al.*, 1990b) supports the contention that while orchestrations are generally stable over time contextual factors may be used to effect a qualitative change in orchestration.

An appeal to interview data which directly addresses the students' study orchestrations would be open to similar methodological criticisms. Fleming, in his incisive critique of the use of interviews in research on student learning, warns of the danger of structuring interviews to provide evidence of some inferred entity: 'To be primarily concerned with the interview as an indicator or manifestation of some entity held to be beyond the interview, (the respondents' actions, beliefs or perceptions), systematically neglects the practices, methods and performative work undertaken in the interview to produce descriptions of apparently "real" actions, beliefs or perceptions.' (Fleming, 1986, p. 558). For this reason the interviews were structured in such a way that they did not address *directly* the conceptual framework of the intervention programme, but rather required students to conceptualise for themselves the benefits of the programme.

For these reasons methods of obtaining direct information about changes to students' qualitative contextual perceptions and their approaches to studying were avoided and rather inferential information was obtained by means of structured interviews which focussed in general on the benefits of the programme and the effects it produced on students' approaches to studying within a framework which did not *specifically* refer to the constructs of the ASI or the QCI. These responses, analysed and linked to the concepts of the intervention programme where appropriate, can therefore be considered as strong supporting evidence for qualitative changes in contextual awareness and for changes in study orchestrations.

It would appear, therefore, despite the limitations of the evidence presented in this pilot study, that intervention to assist students to change qualitatively impoverished perceptions of elements of the learning context considered to be keys to successful study in higher education is one which holds the prospect of being able to effect real improvement in these perceptions resulting in measurable improvement in indicators of performance.

The structure of the third stage of the intervention programme (designed to alter perceptions) is also of considerable interest. The intervention programme described by Van Overwalle relied on video intervention as a 'vivid and direct experience' of fellow students, because an earlier study had indicated that *verbal* persuasion was not able to influence causal attribution (Van Overwalle *et al.*, 1989). The present study indicates that within the conceptual framework employed, verbal persuasion which seeks to extend the qualitative perceptions of the learning context *is* successful in producing a qualitative change which in turn is reflected in improved performance.

Educators will be encouraged by these results because they offer a valid conceptual framework *within which the average practitioner* can introduce meaningful changes which will assist students who would otherwise be 'at risk' of failing. Indeed, it can be argued that every practitioner can and *should* incorporate the underlying principles of the intervention programme described into everyday practice, especially in view of the fact that such an approach requires neither extra work in the subject nor a specialised course in general study methods. Instead of focussing on *how much* learning takes place it makes students more aware of those relational elements of the learning context which to a large extent influence *how well* learning is accomplished.

While by no means conclusive, this pilot study offers possibilities for the qualitative improvement of learning in higher education which larger scale studies, presently under way, will serve to confirm or deny.

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Individual study orchestrations and their association with learning outcome

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Abstract. In this study a synthesis of research into student learning at the individual level is used to derive a general categorisation rule that can be applied to individual study orchestrations. The term 'orchestration' is introduced in this study to indicate that the association of constructs that represent approaches to studying at an individual level *is a context-specific response and is affected by the qualitative level of perception of the individual towards certain key elements of learning context.* In the first part of this study the association between context-dependent study orchestrations and learning outcome, and between 'deep' perceptions of learning context and learning outcome, is established. In the second part of this study the general categorisation rule is empirically validated by means of an unfolding analysis that sets out to illuminate the variability of individual study orchestrations as well as the group study orchestrations of academic achievers and failures.

It is concluded that learning outcome is associated with categorisations of individual study orchestrations/contextual perceptions. Furthermore, based on an unfolding analysis of academic achievers and failures, it is concluded that academic success is associated with a well defined meaning orchestration coupled with a holistic perception of learning context, while academic failure is associated with the disintegration of such an orchestration/perception.

Introduction

Fundamentally, and at an individual level, it is possible to distinguish between qualitatively different approaches to studying. These were originally termed 'deep' and 'surface' level processing by Marton & Säljö (1976a). Within the phenomenographic research perspective that has featured prominently in research into student learning, it has been possible to establish an association between these qualitatively different approaches and qualitatively different learning outcomes (Marton & Säljö, 1976a). Theoretically, and as a consequence of a more synthetic research perspective of student learning, approaches to studying may be more holistically conceptualised as being associated with other, equally important constructs, such as motivation and learning style (Entwistle & Ramsden, 1983). It is thus possible to conceptually define broader study 'orientations' that are also qualitatively different from one another. The consistent empirical manifestation of such 'orientations' (usually expressed in terms of factor structures) has also featured prominently in quantitative studies of student learning. (A comparative summary of several such studies is contained in Meyer & Parsons, 1989b.)

These 'orientations' are of considerable theoretical and empirical interest and their attributes have also been the focus of several quantitative studies. Watkins & Hattie (1985, p. 139) have explored changes in these 'orientations' over time in a longitudinal study and, based on this study, have concluded that research results of this nature cast doubt 'on the likelihood that a model which assumes purely sequential development and does not consider *individual differences* or the content and *context* of learning will ever be able to adequately account for the variety of students' approaches to learning during the course of their tertiary studies.' (Authors' emphasis.)

The important consideration of the *context* in which learning takes place and of its influence both on the approach taken and on learning outcome, has been recognised from the outset (Marton & Säljö, 1976b), but evidence of such empirical associations in quantitative studies have been obtained at a group, rather than at an individual, level (Entwistle & Ramsden, 1983; Entwistle, 1987). Numerous quantitative studies have explored the associations between context, approach and outcome. Important conclusions have been reached in these studies but, interestingly, they have tended to confirm the association between context and the reproducing 'orientation' and their joint influence on outcome, rather than the joint influence on outcome attributable to the context and the meaning 'orientation'.

At an *individual* level there remains a very real need to address what Ramsden (1985) has termed the largely unexplored 'complex personal equations linking individual students' approaches and outcomes'. That this is a fruitful area of enquiry is obvious, but to date no paradigm has emerged from the popular phenomenographic research perspective to guide an empirical exploration. While this research perspective has yielded a theoretical structure for conceptualising the learning process and learning outcomes, it has not yielded a theoretically robust interpretation of learning context or, indeed, an adequate conceptualisation of how it is perceived by individual students.

The development of the Approaches to Studying Inventory (ASI) (Entwistle & Ramsden, 1983) and its subsequent construct validation (Meyer & Parsons, 1989b) has provided a firm empirical perspective from which to investigate the approaches to studying adopted by individual students. The Course Perceptions Questionnaire (CPQ) (Entwistle & Ramsden, 1983), attempted to sample certain general aspects of departmental learning context, but this instrument has failed to demonstrate empirical associations with the ASI at the individual level in two large scale studies save for an association between 'workload' and the reproducing 'orientation' (Meyer & Parsons, 1989b). An instrument to investigate students' qualitatively different perceptions of aspects of their individual learning context, the Qualitative Context Inventory (QCI), has also been developed based on a general systems theory conceptualisation of learning context (Meyer, 1988a). Furthermore, empirical associations at an individual level between the constructs of the ASI and the QCI have been reported and illuminated (Meyer & Muller 1990a, 1990b).

The selection of a qualitative measure of *learning outcome* that can be represented in quantitative terms is more problematic. Phenomenographically inspired research into student learning has as its primary outcome the categorisation of students' descriptions. The contention, as Marton (1986, p. 34) puts it, is that '...these categories are the most important result of the phenomenographic research enterprise.' Its emphasis, then, is on the process of discovering and labelling these categories. In the case of learning outcomes, the categories represent *qualitative* differences that may be further described in terms of taxonomic level of outcome and the form of expression used (Ramsden, 1985). Traditional quantitative measures of academic achievement (such as test results) are assumed to reflect an inherent measure of qualitative learning outcome and their use, based on this assumption, has been reported in numerous quantitative studies aimed at investigating the associations between context, approach and outcome.

The association between outcome (in the form of conventional marks) and other variables is frequently explored using classical multivariate statistical methods and these, in turn, lead to a number of further assumptions concerning the nature of traditional measures of academic achievement. The most important of these concerns the treatment of learning outcome as a quasi-continuous variable that is linearly associated with academic ability across the range of measurement. These assumptions, and those of the general linear model that underpin classical multivariate statistical methods, are indispensible prerequisites for the calculation of the ubiquitous correlation coefficient that features so prominently (either directly or indirectly) in many studies that attempt to link quantitative measures of learning outcome to other variables. In particular, it must be emphasized that there are several important assumptions implicit in a correlational approach to data analysis:

a) The measurements are on a continuous scale and are rounded or truncated.
b) There are linear relationships between all the variables (measured or dummy) contributing to the analysis.
c) The joint distribution of the measured random variables is assumed to be multivariate normal.

In many applications an appeal to the Central Limit Theorem (CLT), justified on the basis of the sample size, is a presumed argument for allowing (c) to be violated, but it is in fact inadequate. One may argue that, historically, studies whose data have been subjected to analyses that focus on correlation, are selectively reported. Generally a study is published only if the method of analysis appears to expose structures in the data that have, at face value, some explanatory role or interventive consequence. Inasmuch as satisfactory structure is disclosed, the methods are successful as instruments of analysis, possibly (in part) because the requisite assumptions are not extensively violated. On the other hand, failure of the methodology to uncover presumed or acceptable structures of the type inherent in the assumptions is more likely to be ascribed to a lack of structure in the data, rather than to be inappropriateness of the assumptions. In the present study, the authors were not satisfied that the requisite assumptions underpinning classical correlational approaches were admissible for the measured variables under consideration, and consequently alternative statistical methods were adopted.

The present study

The important empirical association between perceptions of learning context and approaches to studying at *an individual level* has recently been investigated and confirmed within a relatively new methodological perspective (that of multidimensional unfolding analysis) and the work reported forms an important part of the background to the present study (Meyer & Muller, 1990a, 1990b). Using the research perspective provided by multidimensional unfolding it has been possible to represent the empirical manifestation of the association between context and approach at a group level and, simultaneously, at an individual level *within* the group. At an individual level it has thus been possible to illuminate the complex manner in which students *orchestrate* their approaches to studying in subtly different ways. The research perspective provided by multidimensional unfolding has facilitated, furthermore, the *evaluation* in qualitative terms, of each such individual at two levels; in a relative sense within a given group, and in a theoretical sense in terms of individual orchestration. At the same time, earlier empirical studies, and the conceptual assumptions that underpin them, have been subjected to critical review and debate (Meyer & Parsons, 1989b; Entwistle, 1989; Ramsden, 1989; Meyer & Muller, 1990b). A focal point of this debate is whether individual differences are adequately represented in aggregate level analyses. The authors believe that they are not, and this is a fundamental point of departure in the present study and previous studies that underpin it.

The term *orchestration* has been deliberately introduced in the present study as the term 'orientation' that has been used in numerous other studies implies that the associations between approaches to learning constructs (traditionally manifested in terms of factor structures) are to a degree fixed and stable. Entwistle & Kozéki (1985, p. 125), for example, use the term 'orientation' to indicate '...a combination of approaches to studying and styles of learning which is relatively stable across different educational tasks'. Although conceptually attractive, the stability of the various study 'orientations' has been called into question by the considerable fluctuations in the composition of the 'orientations' that have been reported and commented on (Entwistle, 1988; Meyer & Parsons, 1989a, 1989b). Phenomenographic research on student learning has repeatedly emphasized that approaches to studying are a response to a perceived situation rather than a personal characteristic of the individual. The term 'orchestration' has been chosen by the present authors since it indicates that the association of ASI constructs at an individual level is a *context-specific response that is affected by the qualitative level of perception of certain elements of learning context*. This choice is supported by Watkins (1984) who, in discussing the foundation of his own development model of learning outcomes, emphasizes that a student's approach (to study behaviour) '...is a function of his own individual characteristics (person) and his perception of his institution (environment)'. He also stresses that the unit of analysis should be the *individual.*

The work that has been reported by Meyer & Muller (1990a, 1990b) is based on an unfolding analysis of *individual differences* (or preferences) in which the uniqueness of the individual response is maintained. The fundamental assumptions made in group multivariate statistics, that individuals fit into a group, and that the characteristics of such a group adequately capture or represent the characteristics of the individuals in it, are not made in an unfolding analysis. The starting point of the analysis is based on individual responses to the stimuli represented by the constructs of the ASI and the QCI. A non-technical description of this conceptually simple (but mathematically complex) procedure is contained in Meyer & Muller (1990b), while a more technical description is given in Meyer & Muller (1990a). Both of these studies demonstrated an association between qualitatively different perceptions of learning context and approaches to studying at an individual level, and they also illuminated the uniqueness of what has been referred to and interpreted as *individual orchestration.*

In the present study a further important linkage is explored, namely, the association between perceptions of learning context, study approaches and learning outcomes. More specifically, the present study sets out to explore the associations between the constructs imbedded in the Approaches to Studying Inventory, those imbedded in the Qualitative Context Inventory, and traditional quantitative measures of student performance (test results). This study attempts, then, to get closer to articulating 'precise relationships' between these components, as well as their 'complex interactions' (Entwistle, 1987, p. 23) at the level of the individual student. The present study is based on a sample which was constituted by the entire set of first year English speaking Electrical Engineering students (n=40) at the Cape Technikon who were taught by a lecturer who had recently received a merit award for good teaching.

In the first part of the present study, a general decision making rule is used to categorise individual student orchestrations of approaches to studying and perceptions of learning context. The association between these categorisations and learning outcome is then explored using categorical data analysis. It is thus clear that a relatively conservative approach to data analysis has been adopted based on the judgement that correlational assumptions could not be justified. However, in order to establish a basis for an analysis that seeks evidence of structure it has been assumed that:

a) Categories on several ordinal scales can be defined with some objectivity and consistency.
b) Individuals observed can be reliably assigned to the ordinal categories by informed judges.
c) Relationships between two systems of categories will be evidenced by the consistent bivariate ordinal assignment of the subjects of the study.

It is proposed that evidence of ordinal structure of this type will emerge in an array of background scenarios, including those for which a correlational approach would be justified. However, it has to be conceded that adopting more conservative assumptions may give rise to several difficulties, especially when more specific assumptions would be admissible. The generality of application is traded for a sacrifice in the precision of conclusions arising from broadened application. The authors are satisfied that the diagnostic and interventive purposes for which the methodology described in the present study is ultimately intended, will not be prejudiced by such a lack of precision.

The response variable of learning outcome (as evidenced by test and examination results) is treated as a categorical variable, rather than as a quasi-continuous variable, and no linear association with other measures is assumed. The two other variables used as predictor variables in the present study are polytomies of individual orchestrations/perceptions of approaches to studying, and of 'deep' perceptions of learning context. (A 'polytomy' is simply an exhaustive set of mutually exclusive categories. The term is a generalization of the term 'dichotomy' and is used here as a convenient substitute for the term 'set of categories'.)

In the second part of the present study learning outcome is used as the measure to establish, ***retrospectively***, the group characteristics of 'achievers' and 'failures' in terms of orchestration and perceptions of learning context. It can thus be interpreted as a confirmatory validation of the initial general rule employed.

Part 1: The categorisation of student orchestration and 'deep' perceptions of context

The categorisation of individual orchestrations of approaches to studying and of perceptions of learning context requires the formulation of a decision making rule. Decision outcomes (in the form of categories) are based, in the present study, on both theoretical and empirical perspectives of research into student learning ***that are applicable at the individual level.*** The following sequence of arguments (which is not intended to be a comprehensive summary of relevant research into student learning) will serve to illustrate the substantive process whereby the general categorisation rule used in the present study was constructed:

a) In order to develop rules or procedures for classifying individual students on the basis of their orchestration of the constructs imbedded in the ASI, it is necessary to examine both the theoretical derivation of these constructs and their theoretically posited associations, as well as the empirical manifestation of these associations. From this examination it is possible to formulate procedural rules for categorising individual students. In this paper, a convention for labelling the constructs of the ASI with combinations of upper and lower case characters has been adopted. This convention reflects the association between ASI constructs, established on the basis of a number of empirical studies summarised in Meyer & Parsons (1989b). Constructs associated with the *meaning* 'orientation' are designated with two upper case characters, those associated with the *reproducing* 'orientation' with two lower case characters – the so-called 'primary subscales' – and those whose empirical associations are less well established are designated with an upper and lower case character, or a lower and upper case character according to their more commonly reported empirical association – the so-called 'secondary subscales' (Meyer & Parsons, 1989b). This convention is also applied to the constructs of the QCI in the discussion further on. Thus:

Deep Approach (DA) is associated with an intention to understand and search for meaning in what is studied (Marton & Säljö, 1976a). It is a prerequisite for understanding, although for understanding to be achieved it requires other conditions (Ramsden, 1985).

Surface Approach (sa) indicates an intention to concentrate on the 'signs' of learning thus implicitly excluding an intention to search for meaning (Marton & Säljö, 1976a). Such an approach cannot lead to understanding and must produce a qualitatively inferior outcome (Ramsden, 1985).

Strategic Approach (St), similar to what Miller & Parlett (1974) described as 'cue seeking', indicates an approach that focuses on marrying effort to the reward system as perceived by the student (Entwistle, 1988). It does not have firm theoretical associations with qualitative learning outcome as do the other two approaches and its position must be viewed as ambiguous when considering individual orchestrations.

Comprehension Learning (CL) is a strategy for building up an overview; it is a process necessary for complete understanding, although it has been hypothesised that in a naturalistic learning situation it is generally not sufficient alone to achieve understanding (Pask, 1976).

Operation Learning (Ol) is a step-by-step concentration on particulars and, as a strategy, cannot alone lead to complete understanding (Pask, 1976). However, in a naturalistic learning situation it has been hypothesised that both operation learning and comprehension learning are required – the so-called *versatile* style (Pask, 1976; Entwistle, 1988).

Improvidence (ip) and *Globetrotting (gL)* are extreme manifestations of the operation learning and comprehension learning styles respectively and their presence, by definition, excludes the achievement of complete understanding.

Use of Evidence (UE) and *Relating Ideas (RI)* are both concepts related to the processes required for the achievement of understanding (Entwistle, 1988).

Motivation is represented by a number of constructs in the ASI. There is a posited relationship between *Intrinsic Motivation (IM)* and deep approach, as well as between success and *Achievement Motivation (Am)* (Entwistle, 1988). *Extrinsic Motivation (eM)* is associated with a surface approach and is linked to lack of academic success while *Fear of Failure (ff)* may be linked to success although it is more typically associated with poor performance (Entwistle, 1988).

Negative Attitudes (na) and *Disorganised Study Methods (ds)* are, by definition, undesirable constructs while *Syllabus-Boundness (sb)* is not likely to be positively associated with constructs such as deep approach, intrinsic motivation and comprehension learning.

From the *theoretical* derivation of the constructs imbedded in the ASI it is clear that there are posited associations between constructs that would be desirable and other associations that would be undesirable at the level of an individual approach to studying. Together with this theoretical association we must consider the accumulated *empirical* evidence from a number of studies which have examined the second order factor structure of the ASI in different population samples. From this empirical perspective there is considerable support for the consistent manifestation of second order study 'orientations' (Entwistle & Ramsden, 1983; Meyer & Parsons, 1989a, 1989b). The precise nature of these study 'orientations' varies but certain features commonly recur. On the basis of these empirical studies we may posit an association of constructs consistent with the theoretical association detailed above.

Thus, Sub-rule (a) is that a *meaning orchestration* may be constituted in terms of deep approach (DA), use of evidence (UE), relating ideas (RI), intrinsic motivation (IM) and comprehension learning (CL). Associated with this orchestration at the level of the individual may be strategic approach (St), achievement motivation (Am) and operation learning (Ol). A *reproducing orchestration* may be constituted in terms of surface approach (sa), syllabus boundness (sb), negative attitudes (na), disorganised study methods (ds), improvidence (ip) and fear of failure (ff). Associated with this orchestration at the level of the individual may be globetrotting (gL) and extrinsic motivation (eM).

In considering how to interpret the association of constructs at the individual level – the unique *orchestration* of the individual – we may be guided by Entwistle & Marton's observation (1984, p. 218) relating specifically to the constructs of deep and surface approach: 'We thus have a *global concept* – approach to learning – which is recognisable across a wide range of content areas and learning contexts. The main defining features – emphasis on understanding or reproducing – are consistent, but the particular indicators of these categories vary in their relative importance from context to context. The basic meaning remains constant, but its expression is *variable.*' (Authors' emphasis.) In categorising students on the basis of the association of constructs in terms of orchestrations, the same premise holds true; the meanings of the orchestrations remain constant, but their expression is variable. The empirical manifestation of this variability *at an individual level* has recently been demonstrated within a quantitative research perspective (Meyer & Muller, 1990a, 1990b).

In sub-Rule (a), the distinction between theoretically desirable (or undesirable) 'orchestrations' is somewhat coarse. Ideally, it should indicate a finer degree of (categorical) fit to a more precise set of rules based on empirical studies at the individual level. This however, is an area for future research that has yet to be addressed.

b) Empirically, at an individual level, there is evidence to support the influence of study 'orientation' on learning outcome. The generalisability of this association is, however, critically dependent on the criteria used to determine academic achievement and the extent to which it reflects a qualitative learning outcome as discussed earlier. In two separate studies involving the ASI, Watkins (1982, 1983) has demonstrated that a factor analytic variation of the reproducing 'orientation' (a so-called 'surface/confusion' or 'surface/disorganised' factor) is negatively associated with academic achievement. There was moderate or little evidence to support the case for a corresponding general positive association between the meaning 'orientation' and academic achievement. In a third study involving the ASI, Watkins (1986) again reached similar conclusions and observed that high levels of academic achievement *might not require high quality learning strategies or outcomes.* More recently, and based on shortened and modified versions of the ASI, Entwistle and Tait (1990) have produced essentially similar results; in two separate studies there was clear evidence that academic performance was negatively associated with both reproducing and non-academic 'orientations' to a far greater extent than it was positively influenced by the meaning 'orientation'. However, in one of their two studies academic performance was also positively associated with an achieving 'orientation'. Further similar results have recently been reported based on a large-scale study of sixth form pupils' approaches to studying using Biggs' Learning Process Questionnaire (Ramsden, Martin & Bowden, 1989).

Thus, Sub-Rule (b) is that a reproducing orchestration is associated with academic underachievement (which assumes a qualitative measure of learning outcome). A meaning orchestration is, on its own, and at best, associated with academic success to a far lesser degree.

c) A characteristic feature of phenomenographically inspired research into student learning is the *qualitative* distinction that is made between differing approaches, motives and styles. The resultant conceptual framework of student approaches to studying, as mentioned previously, is also linked to learning outcome in a qualitative sense. It is also possible to distinguish, conceptually and empirically, between qualitatively different perceptions of certain elements of learning context. In two independent studies Meyer (1988a, 1988b) has investigated the association between qualitatively different perceptions of learning context and approaches to studying. The methodology employed has been fully described in Meyer (1988a). Using regression analysis as a modelling tool it has been possible to investigate the extent to which the variation in the conceptually defined 'orientations' of the ASI could be explained by mutually exclusive categories of contextual perceptions. The empirically derived categories of perceptions thus obtained were then subjected to conceptual analysis by a number of independent individuals in order to establish the basis of the differences between them. It was thus concluded that there were *qualitative* differences in the perceptions that constituted the contextual categories and, furthermore, that it was possible in a few cases to distinguish between qualitatively different perceptions of the *same* contextual variable in different categories. In other words, the mutually exclusive and qualitatively different categories of contextual perceptions referred, in part, to the same contextual variables. The most fundamental distinction posited was between 'deep' and 'surface' perceptions of certain elements of learning context notably books, handouts, methods of assessment, course content and human relationships. Based on subscales that reflect these qualitative distinctions it has been possible to establish in a series of independent studies that qualitatively different perceptions of learning context are associated with qualitatively different study 'orientations' (Meyer, 1988a, 1988b; Meyer & Muller, 1990a, 1990b). It has been concluded, furthermore, that students with a desirable orchestration and deep perceptions should theoretically be good students while students with an undesirable orchestration together with an *absence* of deep perceptions should theoretically be at risk.

Thus sub-rule (c) is that a rich, holistic perception of learning context in terms of 'deep' (as well as 'surface') perceptions is associated with a meaning orchestration, while a reproducing orchestration is weakly associated (if at all) with only 'surface' perceptions.

A synthesis of research into student learning illustrated in terms of sub-rules (a-c) thus leads to the formulation of a *general categorisation rule*: a well defined meaning orchestration coupled with a rich, holistic perception of learning context (in terms of 'deep' perceptions) is theoretically desirable and should lead to academic achievement. Students with this pattern of orchestration/perception are placed in Category 3. A reproducing orchestration (which empirically may be expected to be less robustly defined) coupled with an impoverished perception of learning context (in terms of, at best, 'surface' perceptions) is theoretically undesirable and should lead to academic underachievement or failure. Students with this pattern of orchestration/perception are placed in Category 1. The transition from Category 3 to Category 1 is characteristed by a *disintegration* of the meaning orchestration and the loss of 'deep' perceptions.

At this point it must be noted that the fundamental distinction between deep and surface approaches may be interpreted slightly differently in different academic disciplines. A deep approach in Science, for example, requires an emphasis on detail and procedure '...and may even require a preliminary stage of rote learning difficult to distinguish from a surface approach' (Entwistle & Ramsden, 1983, p. 194). Thomas & Bain (1984) have also pointed out that individual students have reported using combinations of deep and surface level activities. Empirical support for such a phenomenon (in the form of a factor structure) has been reported in Meyer & Parsons (1989a). It is therefore also possible to accommodate a *contamination* of an otherwise theoretically desirable meaning orchestration.

At some intermediate point between Categories 3 and 1 it may thus still be possible to recognise the remnants of a meaning orchestration that is defined in less theoretically desirable terms; for example, certain key constructs such as comprehension learning may be replaced by syllabus boundness. Other key constructs such as intrinsic motivation may be absent altogether, or may be replaced by those with qualitatively opposite meaning, such as extrinsic motivation. Such an orchestration, coupled with a fragmented perception of learning context, is theoretically problematic and could be expected to lead, at best, to 'average' or 'borderline' academic performance. Students with such a pattern of orchestration/perception are placed in Category 2.

The method and form of classification deserves further comment. It is not a rigid classification based on absolute rules but is to a degree subjective, based on the classifier's understanding of the ASI and QCI constructs and their interpretation. The categorisation rule is a synthesis of overlapping areas of agreement between theoretical and empirical perspectives on student learning. To the extent that its derivation appeals to the *generalisability* of empirical studies, the scope of its application is similarly constrained as, indeed, are the numerous other process 'models' of student learning that have been proposed from time to time. There is, however, widespread agreement in the published literature about the empirical behaviour and theoretical interpretation of the ASI constructs (Meyer & Parsons, 1989b). The method of classification does not impose artificially simplistic divisions which fail to retain the flexibility that the uniqueness of the individual learning orchestration requires. It is also clear that the general rule employed combines, in effect, the outcome of two classifications; the individual orchestration of the ASI constructs and the qualitatively perceived context with which it is associated. This two-fold classification is supported by the view expressed by Ramsden (1985) that personal and environmental factors need to be regarded as complementary rather than trying to 'force a dichotomy between student characteristics and context'.

However, it must also be emphasised that the association between perceptions of learning context and outcome is also of considerable theoretical interest given the hypothesized effect that alterations to the context of learning could have on learning outcome. Any association between context and outcome must represent the basis of a potentially powerful paradigm for improving the quality of student learning by altering student perceptions of the context in which it occurs. This is a tantalising prospect for practitioners in higher education. In order to explore the association between context and outcome a second classification was performed in the present study based *only* on the dominance of 'deep' perceptions since it has been empirically established that these perceptions discriminate best between qualitatively different perceptions of the learning context (Meyer, 1988a; Meyer & Muller, 1990a, 1990b). In this manner students were again placed into three categories according to their 'deep' perception awareness, namely, Category A ('unaware'), Category B ('aware') and Category C ('very aware'). It must be emphasised that, in the present study, all the classifications that have been described were performed in the absence of *any* information about students' prior performance and *before* the test results were made available to the authors by the lecturer concerned.

The association between orchestration, 'deep' perceptions and learning outcome

Two sequential sets of intermediate test results and one final examination mark were available for use as the dependent (achievement) variable, while the two forms of orchestration/perception variables were available as the predictor variables. Test and examination results were classified on the basis of the marks and judgements and mark categories of the lecturer concerned. The assessment methods employed concentrated on the application of theoretical concepts in order to solve practical problems. Questions were all of an analytic problem-solving nature in which students had to determine numerical solutions or predict the behaviour of specific electronic circuits under specified conditions. The three-hour end-of-semester examinations as well as the two one-hour progress tests, which contributed 40% of the final mark, were all of this nature. No multiple-choice or recall questions were set. The analysis of the relationship between the dependent and the predictor variables is presented in terms of the two-way contingency tables contained in Tables 1-4. The first observed association presented in each Table is that between the orchestration/perception categorisation and learning outcome. The second association presented is that between the categorisation of 'deep' perceptions only and learning outcome.

Each predictor variable was allocated three categories as discussed earlier. The orchestration/perception classification is indicated as theoretically desirable (Category 3), average (Category 2), and theoretically undesirable (Category 1) to reflect the distinguishable groups perceived in the orchestration measure. The 'deep' perception categories are intended to reflect distinguishable levels of awareness.

The import of any findings on the relationships between orchestrations/perceptions and academic achievement (in this particular analytical context) will involve the *predictive* use of categories in the orchestration/perception polytomy to suggest likely categories in an achievement polytomy. In any such two-way categorization, both polytomies are understood to be inherently ordinal, so that the chosen descriptive measure for an association between them should be appropriate to ordinal polytomies.

Thus beyond using appropriate Chi-square statistics to establish the *existence* of an association, two additional statistics were employed to measure the *strength* of any such association in the present study: Somer's D:C/R statistic may be interpreted as the increased probability of an equivalent direction in academic achievement ratings for two randomly chosen members of the sample group who are known to differ in orchestration/perception rating. The notation 'C/R' merely reflects the choice of columns in the two-way table to correspond to dependent variable (achievement) categories, and rows for the appropriate predictor. The Goodman-Kruskal Gamma statistic is also suitable for ordinal categories, and is interpretable as the increased probability of an equivalent direction in academic achievement ratings for two randomly chosen members of the sample group who are known to differ in both orchestration/perception and achievement ratings. Both the latter measures are zero when the two-way table is derived under independence of the polytomies, and the maximal value of each is 1 under complete direct ordinal association (or – 1 for an inverse association) (Goodman & Kruskal, 1979; Dixon, 1983). They are reported in the Tables along with their asymptotic standard errors in 95% confidence interval form (estimate +/– 2 std. error), and with the corresponding t-statistic for null hypotheses that D:C/R and Gamma are zero (that is, that there is no ordinal association)[1].

The data presented in Tables 1-3 provide evidence for both the *existence of association* (in the form of significant Chi-square statistics) and of the *strength of the association* (in terms of the Somer's D-statistic and Gamma-statistic). The Somer's D-statistic indicates the difference between the two proportions of pairs of students in the sample within which the student with the preferable predictor category obtains a higher achievement category. Thus, in Table 3, in terms of the orchestration/perception category,

$$D{:}C/R = 0.632$$

implies that the probabilities of consonant and dissonant pairs differ by 0.632. Since

Table 1. Analysis based on first test results

Orchestration/ perception Category	Academic achievement category				
	<40	41-50	51-60	>60	Totals
(1) Undesirable	10	2	1	1	14
(2) Average	3	3	1	5	12
(3) Desirable	0	4	0	10	14
Totals	13	9	2	16	40

Chi-square = 20.308; df = 6; p = 0.0024
LR Chi-square = 25.195; df = 6; p = 0.0003
Somer's D:C/R = 0.579 +/- 2(0.093); t = 6.349
Gamma = 0.751 +/- 2(0.101); t = 6.349

'Deep' perception Category	Academic achievement category				
	<40	41-50	51-60	>60	Totals
(A) Unaware	6	3	0	1	10
(B) Aware	5	2	2	5	14
(C) Very aware	2	4	0	10	16
Totals	13	9	2	16	40

Chi-square = 13.109; df = 6; p = 0.041
LR Chi-square = 14.449; df = 6; p = 0.025
Somer's D:C/R = 0.414 +/- 2(0.115); t = 3.532
Gamma = 0.570 +/- 2(0.145); t = 3.532

they also sum to one, they must therefore be 0.816 and 0.184 respectively. Thus 81.6% of students with better orchestration/perception than a counterpart, achieved a ***higher*** mark category (as opposed to 18.4% with equivalent or lower mark category) than the counterpart.

If we consider only the subset of all pairs of students defined by those pairs who differ on both predictor ***and*** response category, then the Gamma-statistic is the proportion of pairs in that subset which exhibit the desired direct relationship between categories. Thus, in Table 3, in terms of the orchestration/perception category,

$$\text{Gamma} = 0.789$$

Table 2. Analysis based on second test results

Orchestration/ perception Category	Academic achievement category				
	<40	41-50	51-60	>60	Totals
(1) Undesirable	6	7	1	0	14
(2) Average	4	3	2	3	12
(3) Desirable	0	1	5	8	14
Totals	10	11	8	11	40

Chi-square = 21.636; df = 6; p = 0.0014
LR Chi-square = 28.011; df = 6; p = 0.0001
Somer's D:C/R = 0.609 +/- 2(0.078); t = 8.130
Gamma = 0.743 +/- 2(0.083); t = 8.130

'Deep' perception Category	Academic achievement category				
	<40	41-50	51-60	>60	Totals
(A) Unaware	2	6	1	1	10
(B) Aware	6	4	1	3	14
(C) Very aware	2	1	6	7	16
Totals	10	11	8	11	40

Chi-square = 16.305; df = 6; p = 0.0122
LR Chi-square = 16.585; df = 6; p = 0.0109
Somer's D:C/R = 0.343 +/- 2(0.122); t = 2.869
Gamma = 0.431 +/- 2(0.146); t = 2.869

implies that the probabilities of consonant and dissonant pairs differ by 0.789. Since they also sum to one, the probabilities must be 0.895 and 0.105 respectively. Thus 89.5% of those student pairs will show the desired parallel improvements (for example A=(1,2):B=(2,4) and 10.5% will show contradictory relationships (e.g., A=(1,2); B=(2,1)). In all of the Tables, there is a stronger association between the orchestration/perception polytomy and the response variable than that between the 'deep' perception polytomy and the response variable. The authors conclude that this is evidence of the pertinence of the rule-based classification, and of the complexity of its structure. It also implies that the orchestration/perception polytomy is a superior predictor of the achievement response than the 'deep' count polytomy in the present study.

In Table 1, in which academic achievement is represented by a polytomy of the

Table 3. Analysis based on final examination results

Orchestration/ perception Category	Academic achievement category				
	<40	41-50	51-60	>60	Totals
(1) Undesirable	8	3	2	1	14
(2) Average	4	2	3	3	12
(3) Desirable	0	0	3	11	14
Totals	12	5	8	15	40

Chi-square = 21.123; df = 6; p = 0.0017
LR Chi-square = 26.468; df = 6; p = 0.0002
Somer's D:C/R = 0.632 +/- 2(0.087); t = 7.413
Gamma = 0.789 +/- 2(0.086); t = 7.413

'Deep' perception Category	Academic achievement category				
	<40	41-50	51-60	>60	Totals
(A) Unaware	3	4	2	1	10
(B) Aware	7	0	2	5	14
(C) Very aware	2	1	4	9	16
Totals	12	5	8	15	40

Chi-square = 15.757; df = 6; p = 0.0151
LR Chi-square = 16.175; df = 6; p = 0.0128
Somer's D:C/R = 0.332 +/- 2(0.110); t = 3.037
Gamma = 0.435 +/- 2(0.138); t = 3.037

first test scores, obtained early in the course, we have evidence of real association of substantial strength. On the orchestration/perception polytomy the association is stable through the second test scores (Table 2), to the final course marks (Table 3). Although the final course marks include the previous test marks as component scores, it is apparent that the association and its measures are remarkably stable, and any detailed discussion on the particularities of each Table in turn does not add to the argument that has already been presented.

Even the cruder polytomy given by the 'deep' perception shows consistent (but lesser) association with academic achievement over the three time points represented by Tables 1 to 3. Thus *both* the orchestration/perception and 'deep' perception polytomies have predictive value.

However, due to the sample size, the number of expected observations per cell in the present study transpires to be quite small (under independence) and, in the final contingency analysis presented in Table 4, a more conservative and less discriminating approach was explored by reducing the number of categories in the column (achievement) polytomy from four to two. This change was effected by changing the category end-points from 40, 50, 60 to 50. The observed statistics change with each modification of the original sets of polytomies, precisely because they measure the association between the variables as reflected in the corresponding sets of categories. Thus we have in sacrificing discriminatory power (by reducing to two categories) nonetheless obtained further clear evidence of association.

The generally encouraging results of the categorical data analysis can be subjected to criticism. It could be argued, for example, that in the present study the lecturer concerned may have inadvertently allowed himself to adopt a fixed set of attitudes

Table 4. Reduced analysis based on final examination results

Orchestration/ perception Category	Academic achievement category		
	Fail	Pass	Totals
(1) Undesirable	11	3	14
(2) Average	6	6	12
(3) Desirable	0	14	14
Totals	17	23	40

Chi-square = 18.078; df = 2; p = 0.0001
LR Chi-square = 23.365; df = 2; p = 0.0000
Somer's D:C/R = 0.538 +/- 2(0.082); t = 6.692
Gamma = 0.888 +/- 2(0.076); t = 6.692

'Deep' perception Category	Academic achievement category		
	Fail	Pass	Totals
(A) Unaware	7	3	10
(B) Aware	7	7	14
(C) Very aware	3	13	16
Totals	17	23	40

Chi-square = 7.110; df = 2; p = 0.0286
LR Chi-square = 7.480; df = 2; p = 0.0237
Somer's D:C/R = 0.344 +/- 2(0.113); t = 3.034
Gamma = 0.638 +/- 2(0.172); t = 3.034

and rankings of the individual students, as reflected in the consistent pattern of test results and their consistent association with the predictor variables. Even if this were true, it would, however, not explain the strength of the association evidenced in the data. The authors concede that the strength of the association may well reflect the thorough and conscientious commitment of the lecturer to his teaching and the development of his assessment procedures. It must also be said though that, in many instances in higher education, the process of educational assessment is somewhat capricious. The assumption that quantitative measures reflect qualitative outcomes and that they are linearly associated with educational ability is more an act of faith than proven scientific fact. It is precisely the capricious nature of educational assessment, even the variability within individual examiners (Sparks, 1988) that should guide us in carefully selecting for research studies (such as this one) student groups whose lecturers have distinguished themselves as educational practitioners. It is axiomatic that the qualities of the lecturer who sets and marks a test, rather than those of the individual students who complete it, determine the extent to which any resultant quantitative measures reflect qualitative learning outcomes.

Part 2. An unfolding analysis of 'achievement' and 'failure' orchestration/perceptions

In the second part of the present study an unfolding analysis was performed on two sub-groups of students; those who failed outright (that is, achieved strictly less than 50%) and those achievers who obtained more than 60%. The intermediate category of 'borderline' failures (two students who obtained 50%) and the remaining eight under-achievers represented a sub-group too small to analyse.

The purpose of the unfolding analysis, after the methodology employed, and explained in detail, in Meyer & Muller (1990a, 1990b) was to establish, for each of the two sub-groups, the pattern of association between approaches to studying and perceptions of learning context. In an unfolding analysis this requires the interpretation of the common joint space within which the individuals, and their preferences for the various stimuli, are optimally represented. The unfolding analysis for the 'achievers' is represented in Figure 1 and that for the 'failures' in Figure 2. In each figure three students have been plotted to represent the variability of individual orchestration in each of the two sub-groups. These students are symbolically represented by the 'balls' and the 'crosses' in the two figures respectively.

It is clear from Figure 1 that there is a well defined meaning orchestration/perception cluster represented by the symbolic 'hearts'. The meaning 'orchestration' is essentially represented in terms of deep approach (DA), use of evidence (UE), relating ideas (RI) and strategic approach (St). Intrinsic motivation (IM), comprehension learning (CL), operation learning (Ol) and achievement motivation (Am) surround this central cluster as well as the four 'deep' perceptions of books (BD), relationships (RD), handouts (HD) and methods of assessment (AD). The three 'surface' perceptions of learning space (ls), content (cs) and relationships (rs) also surround the central cluster. One further feature of the central cluster is the

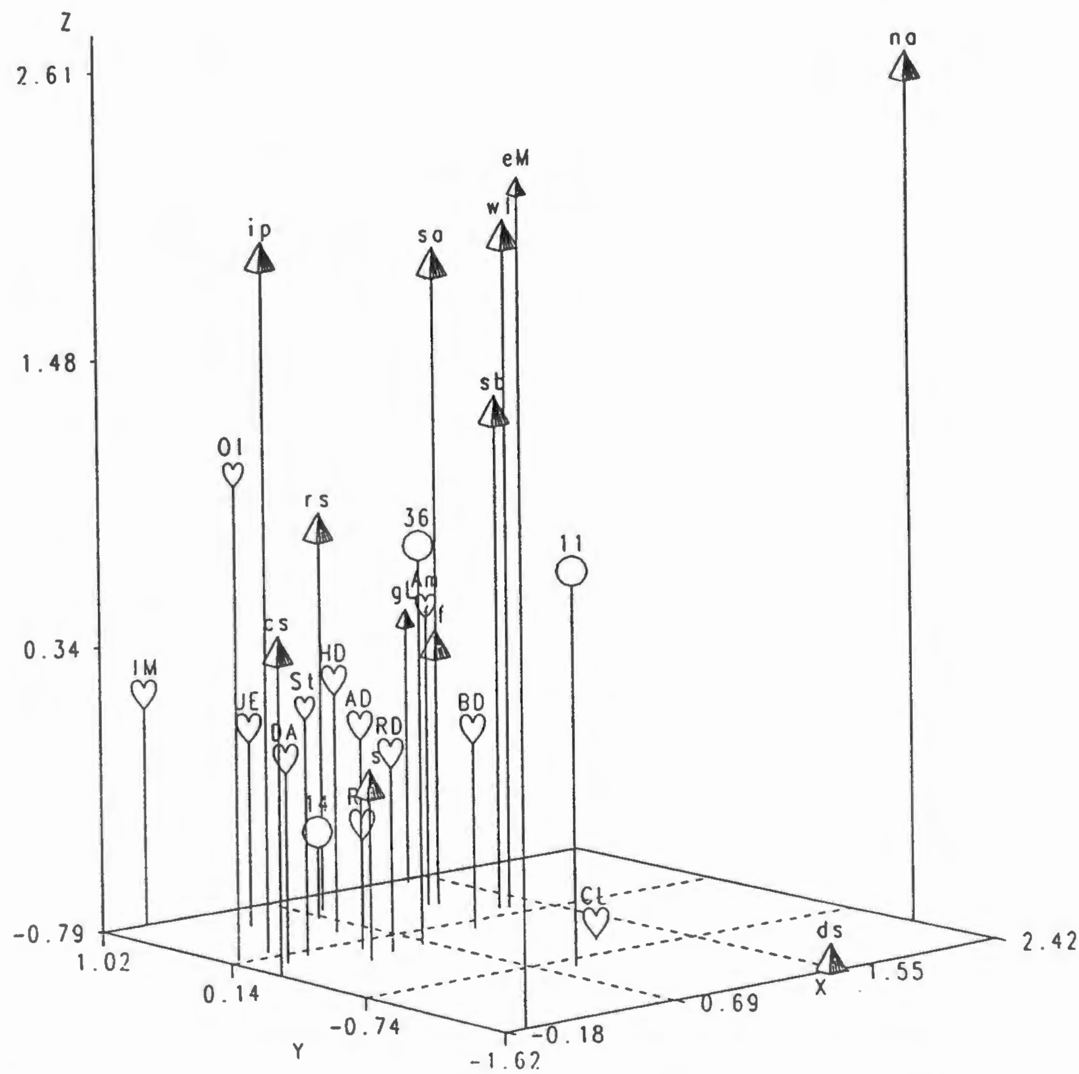

Fig. 1. 3-D joint space for achievers ($n = 15$). *Note:* 1. overall stress = 0.141; 2. obs 11, 14 and 36 plotted.

Legend: DA=Deep Aproach, RI=Relating Ideas, UE=Use of Evidence, IM=Intrinsic Motivation, CL=Comprehension Learning, St=Strategic Approach, Am=Achievement Motivation, Ol=Operation Learning, sa=Surface Approach, sb=Syllabus Boundness, ff=Fear of Failure, na=Negative Attitudes, ip=Improvidence, gL=Globetrotting, eM=Extrinsic Motivation.
In addition, BD=Books (Deep), AD=Methods of Assessment (Deep), HD=Handouts/Notes (Deep), RD=Relationships (Deep), cs=Content (Surface), ls=Learning Space (Surface), rs=Relationships (Surface), wl=Workload.

proximity, albeit on the boundary, of globetrotting (gL) (which is theoretically undesirable) and of fear of failure (ff) (which is theoretically admissible). The remaining reproducing orchestration stimuli are dispersed, at a distance, in the remainder of the joint space and there is no theoretically recognisable pattern of association between them – in other words, *there is no empirical manifestation of a reproducing orchestration.*

The pattern of meaning orchestration/perceptions manifested in Figure 1 may be regarded as an empirical validation of the general rule that was used to categorise students in Part 1 of the present study. It also supports the theoretical model proposed by Meyer & Muller (1990a, 1990b) that a rich, holistic perception of learning context is associated with a meaning orchestration and should lead to academic success.

The unfolding analysis for the 'failure' sub-group presented in Figure 2 is fundamentally different. *There is no pattern of meaning orchestration/perceptions.* The primary constructs of the meaning orchestration that are collectively essential for understanding (DA, UE, CL, RI and IM) are widely dispersed in the space and there is no association between them, not even between any pair of them. The reproducing orchestration (which is not associated with any perceptions) is represented by the surface approach (sa), syllabus boundness (sb) and improvidence (ip) cluster. Other associations of theoretical interest are those between fear of failure (ff) and workload (wl), achievement motivation (Am) and intrinsic motivation (IM), and finally between 'deep' perceptions of relationships (RD) and handouts (HD). The strong association between deep approach (DA) and extrinsic motivation (eM) is somewhat bizarre while the region of the space occupied by strategic approach (St), operation learning (Ol) and 'deep' perceptions of methods of assessment (AD) could be theoretically interpreted as a fragmented pattern of strategic orchestration/perception. Figure 2, then, reflects a malignant pathology for the 'failure' sub-group as a whole. *There is a total disintegration of the meaning orchestration/perceptions pattern* and, while there are certain weak redeeming features in terms of the fragmented strategic orchestration/perception pattern, the association between RD and HD, and the association between Am and IM, these associations are independent of one another. The analysis presented in terms of Figure 2 is, once again, in general agreement with the theoretical model proposed by Meyer & Muller (1990a, 1990b) that a reproducing orchestration is weakly associated, if at all, with 'surface' perceptions of learning context, and that academically it puts students 'at risk'. The general rule formulated in Part 1 is similarly empirically supported.

Discussion and conclusions

The results of the present study have illuminated a number of dimly lit areas of previous quantitative studies on student learning. The conclusions reached are entirely consistent with the theoretical relationships posited in the literature. They have been derived within an established research tradition, employing widely accepted and validated instrumentation. They confirm the importance of recognising the variability of individual responses to perceived situations and they demonstrate the empirical manifestation of the elusive association between meaning orchestrations and learning outcome as well as the often reported negative association between surface level approaches and outcome. They also confirm the existence of the important association between 'deep' contextual perceptions and learning outcome. However, the present study does more than simply establish the association between study orchestration, 'deep' contextual perceptions and learning outcome. It addresses the fundamental problem raised by Ramsden (1985): 'Prediction studies of student success or failure can more or less accurately describe the factors linked statistically to academic progress. They cannot explain why some students succeed while others fail.'

The framework employed in this study provides more than an understanding of what factors are involved in determining success or failure; it describes, in terms of

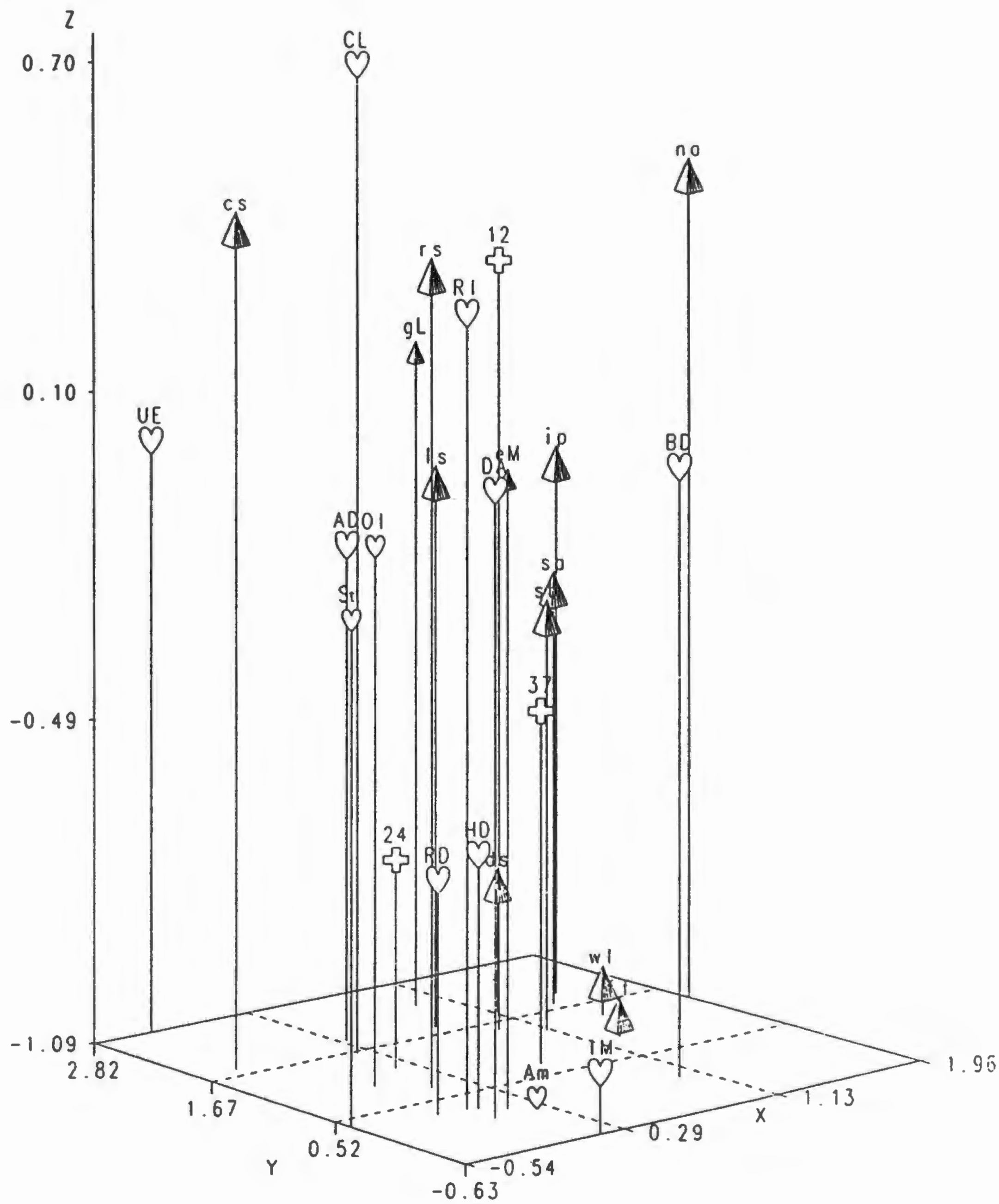

Fig. 2. 3-D joint space for failures ($n = 15$). 2. *Note:* 1. overall stress = 0.177; 2. obs 12, 24 and 37 plotted.

Legend: See Fig. 1.

the individual students concerned, those aspects to which success or failure can theoretically be attributed. Viewed from a different perspective, the self-reported individual perceptions that form the basis of the present study can also be interpreted in an attributional sense; the perceptions may be regarded as 'antecedent testimonies' of approaches to studying and perceptions of learning context to which success or failure can be theoretically and empirically ascribed rather than on the basis of the personal judgements of the groups of individuals concerned. In a recent study van Overwalle, *et al.* (1989) have demonstrated that changes in learning outcome can be effected by manipulating students' *perceived* attributional causes for failure. A general feature of attribution-based intervention programmes is the replacement of perceived 'enduring' and 'uncontrollable' attributional causes for failure (such as low intellectual ability) with 'temporary' and 'controllable' ones (such as disorganised study habits). The question needs to be asked whether the individual orchestrations used in the present study can serve as a basis for intervention through the substitution of attributional causes for failure that may already exist in the minds of the students by others that are theoretically more desirable and predictive of academic success.

It follows that there is an obvious need for future research to explore the possibility that qualitatively improved learning outcomes might be effected through intervention at the level of the orchestration of approaches to studying constructs, and at the level of perceptual awareness of learning context. This implies a *joint* intervention at two levels; the altering of perceptions of learning context and of approaches to studying. Perceptions of learning context can be altered in both a subjective and an objective sense. Subjectively, the perceptions that students may have formed about certain aspects of their learning context can be altered while objectively the learning context itself can be altered, but it does not necessarily follow that an altered context will lead to an altered perception of it. Stated differently, while it is possible to alter the *variable* attributes of discrete contextual elements (or substitute elements with differing *fixed* attributes), it should also be possible to alter the perhaps undesirable perceptions that people form about them (Meyer, 1988a). In the context of the present study 'undesirable' is interpreted in a qualitative sense as reflecting a 'surface' and impoverished perception of learning context rather than a 'deep' and holistic one. An intervention programme based on the above principles, and on the findings of the present study, has been implemented and its impact on study orchestration and learning outcome will be reported by the authors in a forthcoming publication.

It must finally be observed that determining the extent to which *general* learning behaviour patterns and relationships are reflected in the present study will require the distillation of results from many other similar studies. No single study in educational research can ever claim to be definitive no matter how large or how frequently cited. There is a clear indication that the unusually strong and predictable associations found in the present study between *individual*-context categorisations and learning outcome warrant further research. Given more data and increased sample sizes, it is possible that less conservative approaches will lead to further insights. Generalized Linear Models (GLIM's) constitute one such set of approaches and allow for a wide range of violations of the correlational assumptions mentioned earlier. In particular it may be useful to investigate using generalised linear models as predictors of performance. They open up the possibility of applying a wide range of interpretive and predictive models for the academic achievement response on continuous and categorical scales using the methodology of the present study and extensions thereof. The present research findings suggest that the orchestration and perception categories may serve as important initial predictive constructs in GLIM methodology. The authors are not yet in a position to specify a GLIM that can be expected to outperform the approach adopted in this study, but mention the possibility for the sake of completeness and for the benefit of other researchers engaged in predictive studies.

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Note

1. Alternative measures of association might have been used in these analyses. The Spearman rank-correlation coefficient was not employed because the predictor polytomies appeared to be too crude a ranking of the 40 subjects to warrant use of the statistic. A Kruskal-Wallis Chi-square statistic could have been used to provide evidence of differences in achievement for the groups in the orchestration and 'deep' perception polytomies, but would have had the disadvantage of not admitting a predictive interpretation.

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