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ABSTRACT

A common thread in contemporary research in student learning refers to the ways in which students go about learning. A theory of learning is presented that accentuates the interaction between the person and the situation. Research evidence implies a form of meta-cognition called meta-learning, the awareness of students of their own learning processes and their increasing control over them. The concept of meta-learning leads to a model of student learning in which relationships among personal factors, the situational context, approaches to learning, and quality of outcome are mediated by the students' meta-learning capability. Instruments have been designed to measure the extent to which students endorse common approaches to learning tasks. These instruments--the Learning Process Questionnaire for secondary grades, and the Study Process Questionnaire for tertiary (postsecondary) use--are published separately. The research that resulted in the formulation of the theory of student learning is described, as are the sampling, instruments, and methods of the basic studies that determined the reliability and validity of the two instruments. Important implications of the model for teachers, counselors, and researchers are discussed. Fifty-three tables and 17 figures supplement the text and present data and relationships. (SLD)

Student Approaches to LEARNING *and* STUDYING

John Biggs

Research Monograph

Student Approaches to Learning and Studying

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1 Introduction

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. The influence of the *Zeitgeist* is at work, however, and this area is now well established in Australia, Great Britain, Sweden and the USA (Wilson, 1981). 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 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.

That view has since been modified considerably, in particular by the recognition that the learning undertaken by students in high school, college, and university has its own context and parameters that may not be shared with other performances, and the flavour of which is not captured by a simple quantification such as grade-point average (GPA). The performance varies according to its content and nature, and more subtly, in the way students perceive their performance, its importance to them, and what constitutes an acceptable level of performance to them.

This new approach derives from the work of several writers, such as Entwistle, Marton, Schmeck, Pask, and many others, all of whom see student learning as a field in its own right, with its own problems, concepts, and methodologies. The general trend of this work can be followed in many useful summaries, including Entwistle and Hounsell (1975), Marton, Hounsell, and Entwistle (1984), Schmeck (1983; in press), Wilson (1981) and the fourth issue of the eighth volume of *Higher Education* (1979).

A common thread in contemporary research in student learning refers then to qualitatively distinct *ways* in which students go about learning. The major source of disagreement concerns the role of personality and situational factors in determining observed approaches to learning. One body of researchers sees most theoretical and applied fruit in emphasizing the situationally specific determinants of learning.

Students learn in the way they do because they construe their present situation in a way that determines their approach to the task: 'learning' in order to meet set requirements with minimal effort will be qualitatively different from the 'learning' done in order to compete for a special prize.

Other researchers tend to emphasize that learners react in a way typical for them across situations, as well as in a way dictated by a particular situation. This view accentuates the interaction between person and situation.

The writer has developed a theory of student learning that is more in the second tradition, and has designed instruments that measure the extent to which individuals typically endorse common approaches to learning tasks. The instruments—the *Learning Process Questionnaire* (LPQ, for use with secondary students) and the *Study Process Questionnaire* (SPQ for use with tertiary students)—and the *User's Manuals* are published separately by ACER. This volume is concerned with presenting the theory, and describing the research that led up to its formulation.

Chapter 2 describes the research, extending over nearly 20 years, that has led to the formulation of the theory of student learning which the instruments embody. An increasing shift may be noted: from the earlier nomothetic model of individual differences, to the present one that incorporates the view that stable individual differences interact with the perceptions an individual student has of the context in which he or she is presently placed. The final model emerges in terms of the *motives* a student has for engaging a learning task, and the *strategies* adopted so that the student's intention are realized. Motive-strategy combinations comprise the common *approaches* to learning.

Chapter 3 describes the sampling, instruments, and methods used in the basic empirical studies for determining the reliability, validity, and norms of the two instruments. Two secondary and two tertiary samples were drawn, providing norms at secondary level for both sexes at Age 14 and at Year 11, and at tertiary level for both sexes, for universities and Colleges of Advanced Education, and for the three faculties of Arts, Education and Science.

Chapters 4 and 5 summarize and review studies that provide information about the validity of the scale scores, the interpretation that may be put upon each scale for its appropriate context, and some research that demonstrates the utility of each instrument. These chapters concentrate on relationships between the LPQ and SPQ scales, and educational, demographic, vocational and personal characteristics of students, within the samples used to derive the norms. Chapter 4 concentrates on research carried out with the LPQ amongst secondary students, while Chapter 5 focuses on research with the SPQ at college and university.

Chapter 6 takes up more complex issues that relate to both secondary and tertiary areas. It is shown that the various scales relate differentially to important qualitative outcomes of learning: structural complexity, affective involvement, and factual reproduction. Further, the effects of the scales on examination performance are modified by personality characteristics, and by the congruence between motives and strategies. This evidence implicates a form of metacognition in student learning here called *metalearning*: the awareness of students of their own learning processes and their increasing control over them (Novak and Gowin, 1984). This concept of metalearning leads to a reformulated model of student learning, in which relationships between personality factors, the situational context, approaches to learning, and quality of outcome, are mediated by the students' metalearning capability.

This elaborated model has important implications for teachers, counsellors, and researchers, while the LPQ and SPQ scale scores are practically valuable in realizing them. These implications—which include teaching method, curriculum design, and intervention programs for improved study technique—are elaborated, along with supporting research findings where available, in the final chapter.

2 The Nature of Student Learning

LEARNING AS STUDY BEHAVIOUR

The writer began work on study processes in 1966, when he was involved in the problem of predicting student performance at university. It seemed that a potentially fruitful approach might be to adapt information processing models of educative learning (Biggs, 1968; 1969), in particular by accounting for *styles* of learning in terms of such models. Much work had been done showing that students with particular cognitive styles tended both to prefer different faculties, and to perform better within the preferred than in a non-preferred faculty (for example, Hudson, 1966, 1968: Cropley and Field, 1968; Field and Poole, 1970). The usual explanation for these relationships was that the learner's style fitted that required by the tasks predominating in a given faculty.

It seemed a reasonable hypothesis that a student's *study behaviour* mediated the connection between cognitive style and performance. In other words, the convergently-biased or dogmatic student would go about study in a different *way* from that of the divergently-biased or non-dogmatic student; and that that was the reason why the basic underlying personality or style variable affected performance.

The first instrument to assess student learning processes was designed to test this hypothesis. It was decided at the outset to use a pencil and paper self-report questionnaire in a Likert format as a means of operationalizing study behaviours; hence the title of the first instrument, 'Study Behaviour Questionnaire' (SBQ).

Ideas for the original SBQ items came from three major sources:

- Personality variables that had been related to approaches to academic study by previous writers. Particular attention was given here to Hudson (1966), Frenkel Brunswik (1949), Rokeach (1960) and Schroder, Driver, and Streufert (1967).
- Variables that appeared relevant *a priori* from the writer's information processing model of complex learning (Biggs, 1969); this model emphasized the use of coding or rehearsal strategies, and the relationship between coding quality and arousal levels (see Biggs and Telfer, 1987, Chapter 2, for a recent version of the model).

- Representative items from the well-established area of study skills, for example, Brown and Holzman (1966).

Intolerance of ambiguity was operationalized as 'I find it confusing when lecturers emphasize, for example, that a particular theory is only tentative and must be understood as such'; *cognitive complexity* as 'I try to relate what I have learned in one subject to that in another'; and *dogmatism* as 'I believe that it is useful to assume that nothing is ever certain or proved' (negative). Such items, together with general study skills items, (such as 'I work out in advance what my study schedule will be and then try and keep to it under all circumstances') were administered to more than 300 first year students entering Monash University in 1967. The data were factor analysed and six factors extracted, roughly approximating to those intended (Biggs, 1970*a*).

This sample also completed a battery of personality and reading performance tests, and their results in matriculation and final performance in first year were obtained. These data were then inter-correlated with factor scores on the six study behaviour dimensions (Biggs, 1970*b*). The results were consistent with the notions that the study behaviour items were academic manifestations of certain basic personality characteristics, and that these manifestations mediated relationships to performance. However, it was also clear that these relationships differed between the faculties of Arts and Science, and that some of the dimensions of the study process domain, particularly on the issue of the relevance of a value/attitude factor, needed to be relabelled. Subsequent studies (Biggs, 1972, 1973; and unpublished) suggested slightly different interpretations of one or another of the dimensions, and the addition of other dimensions.

The final version of the first order SBQ had 10 unidimensional scales. The details are set out in Table 2.1, giving the number of items per scale, and the internal consistency in the form of the alpha coefficient. The first set of alphas was computed on a 1975 Australian sample of 150 Diploma of Education students; the second set was obtained from a Canadian high school sample (Richmond, 1972).

The secondary school version of the SBQ was similar, consisting of nine scales, reworded to suit the school situation ('teacher' for 'lecturer', 'discussion' for 'seminar', etc.) and the deletion of the Openness scale.

Previous research with the SBQ

In this section, research with the SBQ is mentioned that was particularly important in the evolution of the current instrumentation of student learning processes.

The relationship beteween personological factors, study behaviour, and quality of performance is indicated in a study by Biggs and Das (1973). It had been established (Biggs, 1970*b*) that the study behaviour factors then extracted correlated in the expected way with underlying personality genotypes, but there were some discrepancies with previous research. In particular, it was found that 'extreme scorers' (those who tended to check the '1' and '5' positions on a Likert scale) were divergent, low on dogmatism itself, tolerant of ambiguity, intrinsically motivated, and more likely to be enrolled in Arts than Science. This finding was compatible with that of Katz et al. (1965) but is sharply inconsistent with the traditional interpretation of extreme scoring, which is that it indicates low intelligence, rigidity, and *in*tolerance of ambiguity (for example, Souief, 1958; Das and Dutta, 1969).

It was thought that the content of the scales might determine the nature of the extreme response set (ERS), and in the Biggs and Das study three measures of ERS

Table 2.1 First order SBQ scales

1	*Pragmatism* (10 items; alpha = .77; .70): Grade-oriented; student sees university qualifications as a means to some other end.
2	*Academic motivation* (10 items; alpha = .69; .69): Intrinsically motivated; sees university study as an end in itself.
3	*Academic neuroticism* (7 items; alpha = .58; .64): Overwhelmed and confused by demands of course work.
4	*Internality* (8 items; alpha = .54; .55): Uses internal, self-determined standards of truth not external authority.
5	*Study skills* (8 items; alpha = .70; .76): Works consistently, reviews regularly, schedules work.
6	*Rote learning* (8 items; alpha = .70; .61): Centres on facts and details and rote learns them.
7	*Meaningful learning* (8 items; alpha = .71; .67): Reads widely and relates material to what is already known; oriented to understand all input material.
8	*Test anxiety* (6 items; alpha = .82; .74): Worries about tests, exams, fear of failure.
9	*Openness* (8 items; alpha = .63; –): Student sees university as a place where values are questioned.
10	*Class dependence* (7 items; alpha = .50; .47): Needs class structure rarely questions lecturers or texts.

were taken: extremity of judgment concerning *one's own* values or behaviour (the Rokeach Dogmatism Scale and the SBQ) and that concerning *other people* (the Souief Personal Friends Questionnaire). These three scales were reduced to two dimensions: ERS-I (internal) and ERS-E (external).

A series of correlations and analyses of variance, involving the remaining tests in the battery with the two ERS measures as dependent variables, showed that high ERS-I scorers tended to be introverted, divergent, non-dogmatic (open), to use meaningful learning strategies, and to avoid rote learning. Highest ERS-I was found in those low-dogmatic subjects who had high response latencies, that is, they took a long time to respond, a time presumably spent in reflection. High ERS-E subjects tended to be extroverted, dogmatic, to favour rote learning strategies, to obtain good essay ratings but to obtain low scores on an objective test requiring a high degree of inference. Highest ERS-E was found in extroverts who avoided a meaningful learning strategy. Interestingly, there were no differences between ERS-I and ERS-E in final grade for the course; no sex differences were found at any stage.

In short, high ERS-I (internal) scorers are positive, and highly articulate, about organizing and integrating their ideas; the cognitive behaviour of high ERS-E (external) scorers are characterized by reproducing material in response to the perceived demands of others. The authors concluded that ERS 'may be an index of the manner in which a person orients himself in relation to the external world', and that 'this orientation may be predictive of his approach to academic learning tasks' (Biggs and Das, 197 ; p. 208). This foreshadows the distinction made much later between *deep* and *surface* approaches to learning, which is of much current research interest (see, for example, Marton, Hounsell, and Entwistle, 1984), including the theory underpinning the present instrument.

At this period of development of the SBQ, other work related socioeconomic background to SBQ scales (Biggs, 1972) and explored the relationship between certain situational factors and study behaviour. faculty membership and performance (Biggs, 1970*a*; 1976); essay and objective testing format (Biggs, 1973); and systems of combining marks for final grade (Biggs and Braun, 1972). While these studies are of some intrinsic interest in themselves, and provide validatory evidence for the initial version of the SBQ, they were not crucial in the development of the present instrument.

THE LEARNING PROCESS COMPLEX: APPROACHES TO LEARNING

The 10 scales that emerged from the first series of studies with the SBQ each has its own justification, both theoretically and empirically. As an instrument intended for practical use, however, the scales were too diverse, and the administration time too long. A shorter version, with fewer scales and a more coherent theory, was needed. As the 10 scales did intercorrelate to some extent, second-order factor analysis was indicated. Three separate analyses, with quite different samples, were undertaken. The method was principal components with varimax rotation. The samples were:

1 420 Canadian university freshmen enrolled in English and Chemistry classes, the questionnaires being administered by post and completed voluntarily;

2 150 Australian university students in their Diploma in Education year, the questionnaires being administered during regular class hours;

3 a different group of 148 Diploma in Education students, the questionnaires being picked up, completed, and returned on a voluntary basis.

The results of the analyses are reproduced in Table 2.2.

It can be seen that the three-factor solution is virtually identical across the three different samples. This is rather surprising, considering the different levels of student tested, subject areas, countries, and conditions of administration The first factor (from 25 per cent to 27 per cent of total variance in the three samples) is defined by the same scales with virtually the same loadings: Fact-Rote, Pragmatism, Test Anxiety, Neuroticism and Class Dependence. The second factor (from 18 per cent to 25 per cent of total variance in the three samples) is also defined by the same tests, although there is more difference here in the size of the loadings across samples: Academic Motivation, Internality, Meaningful Learning, and Openness. The third factor (from 14 per cent to 18 per cent of total variance in the three samples) show more variation, with Study Skills being the highest loading scale in all three cases and associated with low anxiety (negative loadings of either Neuroticism or Test Anxiety) in all three cases, and Academic Motivation in two cases and Meaning in one.

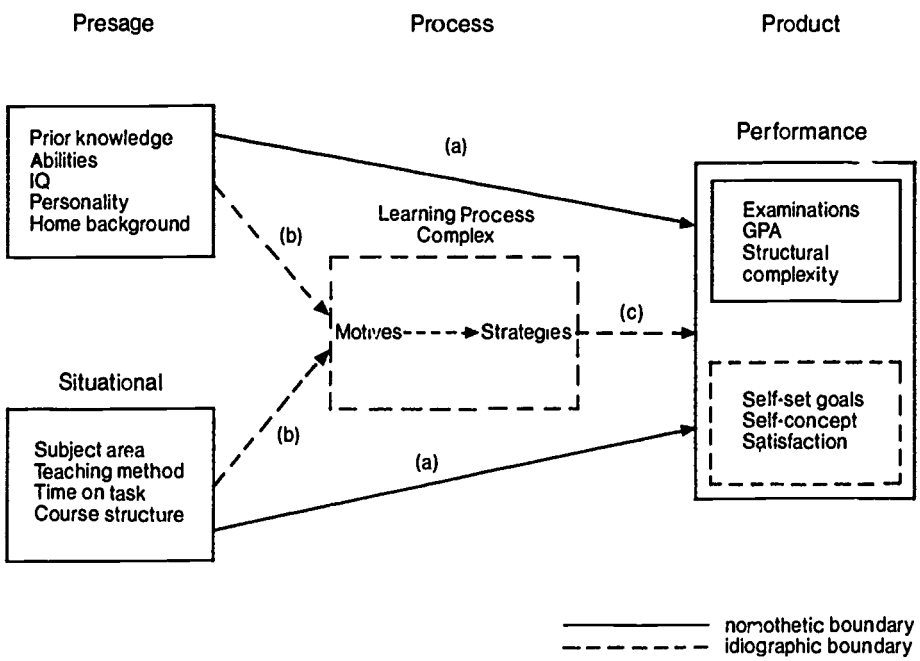
The interpretation of the factors was assisted by correlating the original 80 items with the three second-order factor scores. It became clear that items on each factor grouped themselves into an affective and a cognitive group; that is, a group of items in each factor addressed a *motive*, and another group a cognitive *strategy*. These analyses led to a fundamental rethinking of the theory of study behaviours.

A new model was proposed (Biggs, 1978) involving three stages of presage, process, and product, as outlined in Figure 2.1.

Table 2.2 **Second order factor analysis (varimax rotation) of 10 SBQ scales in three separate samples (rs < ± .40, and decimals, are omitted)**

Study behaviour scales	Sample 1			Sample 2			Sample 3		
	I	II	III	I	II	III	I	II	III
Pragmatism	75			73			77		
Ac. Motivation		44	70		80			53	69
Neuroticism	56		–60	64			59		–44
Internality		78			82			74	
Study Skills			82			94			76
Fact-Rote	78			85			74		
Meaning		61			77			40	65
Test Anxiety	68			65		–45	71		
Openness		72			67			84	
Class Dependence	70			76			70		
% Variance	25	18	18	27	25	14	27	19	18
Total			62			66			63

Sample 1: Canadian University Freshmen. N = 420. Voluntary administration.
Sample 2: Australian University Dip. Ed students. N = 150. Class administration.
Sample 3: Australian University Dip. Ed. students. N = 148. Voluntary administration.



(modified from Biggs, 1978.)

Fig. 2.1 **General model of student learning**

The presage factors exist before the student enters the learning situation. These are of two kinds: personal, and situational (usually institutional). Students have a certain amount of prior knowledge relating to the academic task, a particular IQ, and other abilities, values and attitudes deriving *inter alia* from their home backgrounds, certain personality characteristics that affect their approach to learning, and so on. Each of these factors has an immediate and direct effect on performance (a), but also each is likely to affect in various ways the student's motives for undertaking learning, and the strategies adopted in approaching learning (b).

The same points can be made about the situational factors. The amount of time spent on a task, the difficulty of the task, the structure of the course (for example, whether the unit in a particular course is compulsory or elective), and methods of learning and evaluating, all have direct effects on performance (a). They also affect the student's motives and perceptions of the task, and the effectiveness of the ways of going about the task (b).

A secondary sequence, then, is via the process variables, using paths (b) and (c) in Figure 2.1. These intervening variables are referred to as the *learning process complex*, which represents the way the student perceives the academic environment. According to that perception, it is decided to go about learning in this or that way, with consequent effects on the product, performance (c). These effects may be defined in two ways: objectively, for example, in terms of examination marks, or structural complexity of response as an index of the quality of the performance (Biggs and Collis, 1982); or *subjectively*, for example, the felt satisfaction with whatever level of performance is attained.

The learning process complex is presumed to refer, primarily, to students' *motives* and *strategies* for learning, and that domain is the focus of this book and of the LPQ and SPQ. The manner in which this complex was derived, and is currently defined and measured, is outlined in the remainder of this chapter.

Each motive–strategy combination defines a distinct *approach* to learning. Originally these approaches were called the Utilizing, Internalizing, and Achieving Dimensions, with each motive and strategy being differently named (Biggs, 1978, 1979), but this led to a potentially confusing plethora of terms. To avoid such confusion, and to bring the present instrument into line with other research (see below), the terms *Surface*, *Deep*, and *Achieving* are now proposed; with the term Approach, Motive, or Strategy denoting what is being referred to. Thus Surface Motive (SM) refers to the motive component of the Surface Approach (SA), and Surface Strategy (SS) to the strategy component (see Table 2.3).

This model is a particular instance of Mischel's (1973) description of how people behave in situations in terms of their encoding strategies and self-regulatory systems, to use his terminology. A student's encoding strategy of the learning context, or institution as a whole, is represented by his or her *motives* (to gain a qualification, to pursue academic interests, to gain highest grades, or any one or combination of these). Similarly, a student's self-regulatory systems are represented by the *strategies* adopted (reproducing limited content, etc.). The kind of reflective self-awareness that is implied here is called *metacognition*, or 'knowledge concerning one's own cognitive processes and products . . . (and) the active monitoring and consequential regulation of these processes in relation to the cognitive objects or data on which they bear' (Flavell, 1976, p.232) while the way in which the individual interprets his own motives is a *metamotivational state* (Apter, 1982, p.39).

There is, in other words, a 'psycho-logic' in how people construe their role in a

Table 2.2 **Motive and strategy in approaches to learning and studying**

Approach	Motive	Strategy
SA: *Surface*	Surface Motive (SM) is instrumental: main purpose is to meet requirements minimally: a balance between working too hard and failing.	Surface Strategy (SS) is reproductive: limit target to bare essentials and reproduce through rote learning.
DA: *Deep*	Deep Motive (SM) is intrinsic: study to actualize interest and competence in particular academic subjects.	Deep Strategy (DS) is meaningful: read widely, interrelate with previous relevant knowledge.
AA: *Achieving*	Achieving Motive (AM) is based on competition and ego-enhancement: obtain highest grades, whether or not material is interesting.	Achieving Strategy (AS) is based on organizing one's time and working space: behave as 'model student'.

situation, and in their deciding to do something about it. If, in a learning situation, one decides that a pass is sufficient, then it seems to make best sense to rote learn only those facts and details which are judged (or guessed) as most likely to be tested. If one is interested in a particular subject, then it makes best sense to find out as much as possible about it, and work out what it all means, regardless of any testing that may ensue. However, it must be emphasized that it is the *student's* psycho-logic that is at issue here, not the teacher's, or the researcher's.

Marton and Saljo (1976*a*; 1976*b*), working from phenomenological psychology, came to a very similar position. They distinguished 'surface level' and 'deep level' processing, which correspond quite closely in practice to the approaches so named here. (This point is discussed in more detail below.) Marton and Salsjo showed that students would adopt one or other means of processing academic tasks according to their intentions in approaching the task in the first place. If they wished merely to display the symptoms of having learned, they would adopt a surface level approach. If students intended to extract maximum meaning by understanding what is signified by the words, they would adopt a deep level strategy.

The factor analyses used here, and the idiographic models of Mischel and Marton, thus produce highly compatible results. The factor analyses provide the basis of the structure of the domain; the idiographic models suggest hypotheses as to how the component motives and strategies relate both to each other and to performance.

The emphasis in the present model, then, is firmly upon the way students exprience their environment and act upon it. The LPQ and SPQ summarize the more common goals, and ways of acting to reach those goals. Often students do not *consciously* think out their position in this way, so that their actions may not in fact be very appropriate, either to their own intentions, or to the intentions of their teachers.

To summarize, then, the LPQ and SPQ are based upon the following assumptions about students' learning.

1 A formal learning situation generates three common expectations: to obtain a qualification with minimal effort, to actualize one's interests, and to publicly

manifest one's excellence. These expectations correspond to the three motives in Table 2.3, and correspond well to those nominated in the psychological literature (for example, Biggs and Telfer, 1987) for motivating academic performance: extrinsic, including both positive reinforcement (task as a means to a desired end) and negative (fear of failure); intrinsic; and need-achievement. Taylor (1984) refers to four other motives, including social ones, but to include all of these would complicate matters severely. The three listed above refer to the more important ones, and to those that relate most clearly to particular strategies. They comprise therefore the focus of the present research.

2 Students may endorse *any* or *all* of these motives to any extent. For example, a student may be both intrinsically and achievement motivated. (In fact students whose performance is high tend to be so motivated.) It is even possible to be motivated simultaneously *both* to reproduce detail accurately, *and* to seek maximal meaning (as noted in (6) below), however, this is not true of deep and surface strategies. This is a point of difference between this model and Marton's; according to the latter, students have either deep or surface intentions towards a particular task, arising from their immediate perception of the present task.

3 It would seem good 'psycho-logic' for students to adopt the strategy most appropriate to their own complex of motives. In general, most students see a surface or reproducing strategy as congruent with being instrumentally motivated; a deep strategy as congruent with intrinsic interest (if one is interested in something, one wants to understand its meaning); and an organizing strategy as congruent with the drive to obtain highest marks.

4 The motivational mix—and consequent strategy adoption—may vary from subject area to subject area, and from time to time. Although there is an element of a characteristic style in the general approach used, there are, commonly, variations in an individual's approach as well. For instance, a student who is intrinsically interested in one particular subject, and is continuing at school or university in order to pursue it, may nevertheless have pass-only aspirations (that is, he or she may be surface motivated) towards another subject that is needed only to meet the particular course requirements.

5 The three strategies are likely to lead to different levels of quality of learning. The surface strategy is likely to lead to accurate but unintegrated recall of detail; the deep strategy to greatest structural complexity; and the achieving strategy is likely to lead to whatever goals the student sees as most pertinent to high grades. Evidence bearing on this will be presented in later chapters.

6 Deep and surface approaches differ from the achieving approach in an important way. The strategies involved in the first two describe ways in which students engage the context of the task itself, while the achieving strategy describes the ways in which students organize the temporal and spatial contexts surrounding the task. There is, then, no inconsistency in rote learning in a highly organized way ('surface-achieving') or reading for meaning in an organized way ('deep-achieving'). It is, however, difficult to see how one could simultaneously rote learn and seek meaning, which is not to say that these strategies may not be deployed successively (as they are for instance by actors when learning, then interpreting, their lines).

7 It might be expected that the effectiveness of strategy deployment would depend

upon the degree of *congruence* between a student's motives and the adopted strategy. As it turns out, matters are not so simple: this *congruence hypothesis* is discussed in more detail in Chapter 6.

There is a theoretical coherence and practical simplicity about the approaches-to-learning model, and it is this model that underlies the present *Study Process Questionnaire* (SPQ), and its high school version, the *Learning Process Questionnaire* (LPQ). It is important to note that a fundamental shift has taken place: from a nomothetic approach to student learning in the SBQ to one that embodies both nomothetic and idiographic aspects in the LPQ and SPQ, and as outlined in Figure 2.1. That is, the aim is not so much to see how students may be mapped along common dimensions, although that is possible, as to describe the common ways in which *students* see their task, and organize their individual resources to meet what they themselves perceive to be their personal learning 'space'.

Other research on approaches to learning

The present model obtains independent support from several sources. For example, Hackman and Taber (1979) found their clusters of students to comprise three major groups: pragmatic careerists, self-directed scholars, and competitive leaders, which are not bad descriptors for those scoring high on the surface, deep, and achieving approaches respectively.

However, the work that has most in common with the present model is that of Entwistle, who used similar multivariate techniques to those reported here (Entwistle and Brennan, 1971; Entwistle, Hanley, and Hounsell, 1979; Entwistle and Kozeki, in press; Entwistle and Ramsden, 1982; Entwistle and Wilson, 1977). In one study (Entwistle, Hanley, and Hounsell, 1979), questionnaire responses of nearly 800 students in two English universities were factor analysed and three second-order factors were obtained, which they called understanding, reproducing, and achieving. Understanding involves the search for meaning, and is related to intrinsic motivation; reproducing involves memorizing information verbatim and is related to extrinsic motivation and the fear of failure; and achieving involves a high degree of self-confident and ruthless organization. The parallel with the three approaches postulated by the present writer is striking.

In a later and more comprehensive study, Ramsden and Entwistle (1981) surveyed 2208 students from 66 academic departments in six disciplines in British tertiary institutions. They used Entwistle's Approaches to Studying Inventory (ASI) and this time four factors were obtained: the same three as listed previously, and an additional 'disorganized and dilatory' factor. Even more recently, Entwistle and Kozeki (in press) administered a 120-item questionnaire, appropriately translated, to 614 British and 579 Hungarian students aged 13–17. Three study-related factors emerged independently in each sample: meaning, reproducing, and achieving again.

Watkins (1982*a*) administered Entwistle's ASI to 540 Australian university students and found three factors: one deep, and two surface (disorganized and organized). The components of the achieving factor were spread over the other three. In another study with 300 Australian students, Watkins (1983*a*) obtained a similar result, but regarded his results as generally supporting 'the meaning/reproducing/achieving model of the study process complex' (p.29). Willis and Clift (1983), also

using the ASI with a large sample of New Zealand school leavers, found very similar dimensions to those nominated here as deep, surface, and achieving, together with a disorganized factor.

There is, then, some support from large-scale empirical studies for the three factor approaches-to-learning model, but the precise nature of the factors will vary according to the instruments (some ASI items were very similar to those used in the SPQ, but others were quite different), the samples, and the method of factor analysis used. It would therefore be surprising if both instruments yielded identical factor structures every time. It was noted above that Taylor (1984) identified four other motivational orientations; clearly the contention is not that the surface, deep, and achieving are the *only* ones. They are, however, important ones that are commonly replicated.

Another line of research relevant to the present model is that on deep and surface approaches to learning. The history of these terms starts with Craik and Lockhart (1972), who proposed that the depth of active processing, or thinking, that goes into the original learning would determine the nature and extent of subsequent memory of the episode. They proposed a continuum ranging from processing the physical attributes only, at the shallow end, to semantic encoding at the deep end. Marton and his co-workers (Marton and Saljo, 1976*a*, 1976*b*) have taken this notion and used it to help construe the relationship between the process used by students in reading text, and the ensuing level of complexity of the students' comprehension of that text. Marton also emphasizes that the student's intention is crucial: what the student intends to get out of his learning largely determines the approach used (deep or surface); the approach in turn determines the level of outcome. This distinction between intention and approach corresponds to that between 'motive' and 'strategy' in the present context.

Schmeck (1983) has also pursued the depth of processing analogy and proposes four factors in complex learning: Deep Processing, Elaborative Processing, Fact Retention and Methodical Study. These factors are measured in his Inventory of Learning Processes. Deep processing is represented by both 'vertical' and 'horizontal' aspects. Horizontal or elaborative processing is a 'personalization' of knowledge, reflecting the extent to which the individuals relate material to their own knowledge and interests; and vertical or deep processing is said to refer to depth of conceptual understanding. Shallow processing appears to be either a low score on one or other, or both, of the Depth and Elaborative Processing scales; or a high score on Fact Retention; or some combination of these.

The work of Biggs and Das (1973) in relation to the extreme response set has been referred to above. The internal ERS scorer has a predilection for meaningful strategies, divergent thinking, open (non-dogmatic) values, good performance and ability in discriminating complex shades of meaning, which clearly define a deep approach to learning. The external ERS scorer has a concern for reproducing in essays what is perceived as valued by the marker, a tendency to avoid meaning and use rote learning, and closed values, which in turn define a surface approach. Entwistle, Hanley, and Hounsell (1979) refer to 'orientations' towards learning which include understanding and reproducing. In a later version of their questionnaire they specifically include items referring to deep and surface level processing (Ramsden and Entwistle, 1981).

Ramsden (1981) took Marton's original concepts, and extended them to include many different tasks and academic subject areas (Marton was concerned originally

only with reading from text). In commenting on Ramsden's work, Marton (1983) draws attention to three sub-categories of deep and surface approaches:

1 *Focus* on content and author's intentions versus focus on correct reproduction of terms and (in the case of science) procedures;

2 *Relating* the parts of the task to each other (in science) or to the whole (in arts) versus keeping parts in isolation and dealing with details;

3 *Active* researching, drawing conclusions, and checking the author's logic versus passive and uncritical reception.

These refinements are important in that they draw attention to the fact that while the concepts apply overall to a wide range of academic learning, the application to a particular task will call out different aspects of the deep and surface approaches. This new formulation still retains, however, the 'either-or' or bipolar distinction between deep on the one hand, and surface as a polar opposite.

While there are clear differences in conception between all the above accounts, there is, as Schmeck (1983) makes abundantly clear, a great deal of overlap. It would be generally agreed that a student who adopts a deep approach:

- is interested in the academic task and derives enjoyment from carrying it out;
- searches for the meaning inherent in the task (if a prose passage, the intention of the author);
- personalizes the task, making it meaningful to own experience and to the real world;
- integrates aspects or parts of task into a whole (for instance, relates evidence to a conclusion), sees relationships between this whole and previous knowledge; and
- tries to theorize about the task, forms hypothesis.

And, a student who adopts a surface approach:

- sees the task as a demand to be met, a necessary imposition if some other goal is to be reached (a qualification for instance);
- sees the aspects or parts of the task as discrete and unrelated either to each other or to other tasks;
- is worried about the time the task is taking;
- avoids personal or other meanings the task may have; and
- relies on memorization, attempting to reproduce the surface aspects of the task (the words used, for example, or a diagram or mnemonic).

A search through the LPQ and SPQ items will show that all of the above characteristics are variously addressed in the items comprising the deep and surface approaches respectively. There is, then, considerable theoretical and empirical support for summarizing the affective and cognitive components present in the study process complex in terms of at least two independent approaches to learning: deep and surface. However, contrary to Marton's original distinction, these are not seen by the present writer as either end of a single continuum. They refer, rather, to quite *independent* ways in which students may become involved in learning, which raises the question of composite approaches. This is taken up below.

Composite approaches

It was noted that surface or deep approaches theoretically may combine with achieving. Another way to explain this is that there is some intercorrelation between the six motive and strategy subscales which comprise the three approaches so the possibility exists that there might be an even simpler third-order structure in the learning process complex. To test this possibility, another set of factor analyses was carried out, which, in terms of the original study process complex, would give third-order factors. These analyses were principal components, with varimax rotation, and were conducted separately within each of the four samples described. They are shown in Table 2.4 below.

Two factor solutions emerge for each of the four samples, with a consistent difference between tertiary and secondary samples. In the Age 14 and Year 11 samples, Surface Motive and Strategy form one factor, and the Deep and Achieving Motives and Strategies the other. In the tertiary sample, however, the Achieving Motive divides evenly between the two factors. This difference between the two educational sectors indicates that the dynamics are different between these levels. At university, students, probably because they are more highly selected, see the surface approach as related to achieving, just as much as they see a relationship between deep and achieving. As will become evident, however, this does not mean these two approaches are equally *effective*; it means only that students differentiate them from the learning process complex as possible approaches to tertiary level learning.

Table 2.4 Principal components analyses, with varimax rotation, of study process complex in four samples

		Age 14		Year 11		CAE		Uni	
		1	2	1	2	1	2	1	2
Surface	M		73		82		80		80
	S		86		76		82		80
Deep	M	78		72		79		78	
	S	82		78		86		86	
Achieving	M	72		67		53	51	52	55
	S	79		80		73		71	
% Variance		43	22	39	23	37	27	37	28
Total			65		62		64		65

Decimals and $rs < \pm.40$ are omitted.

In school, students tend to see only the deep approach as related to achieving. The third-order factor structure is thus mutually exclusive at school; what is being said in effect is 'If you want to achieve academically, use a deep-achieving approach (DAA); if not, just get by with the surface approach'. Since the two third-order LPQ factors comprise 65 per cent and 62 per cent respectively of the total learning complex variance, a convenient way of characterizing the LPQ data is to use two scores: surface approach (SM + SS scores) and deep-achieving approach (DM + DS + AM + AS scores). The simplest way of operationalizing deep-achieving on the LPQ is to count each component equally and add them up (the correlation between the deep-achieving approach score calculated from factor loadings and the simpler unit-weighted score is +.94, which is very close indeed.

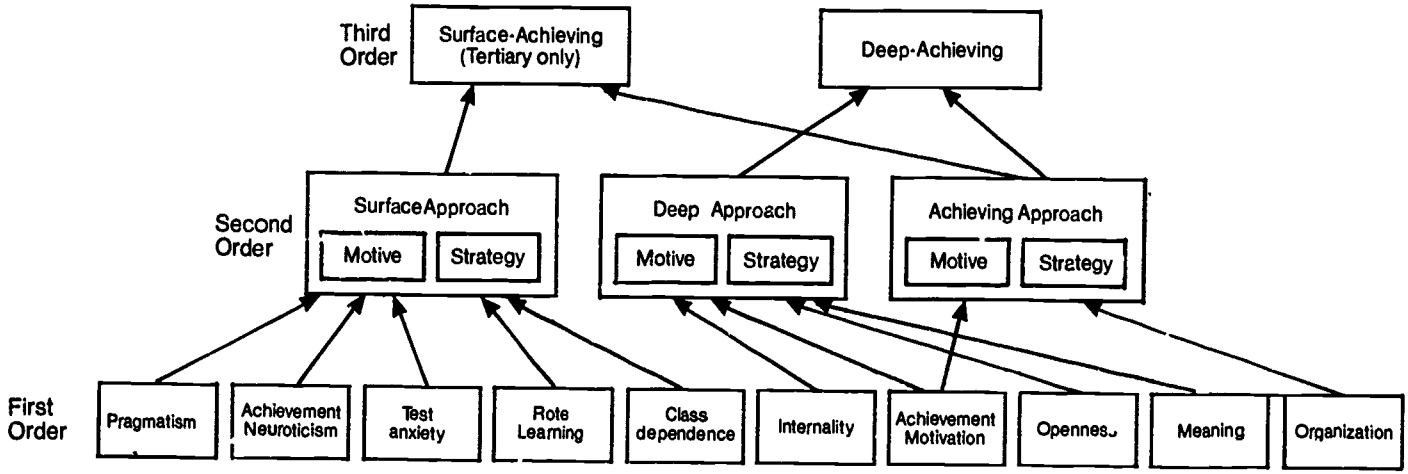


Fig. 2.2 **Hierarchical orders in the evolving factor structure of the LPQ/SPQ**

There is a logic and economy about this solution that recommends its application to the SPQ as well. After several exploratory studies, it was concluded that a Deep-Achieving score, that gave equal weighting to the Achieving Motive subscale, produced a distribution that correlated extremely highly (+.96) with one based on a weighting proportional to that indicated in Table 2.4. In both secondary and tertiary populations it is possible then to characterize students in terms of two dimensions only, if desired: a Surface Approach, and a Deep-Achieving Approach. These two scores (unit-weighted) were used then to derive norms, as described in the following chapter and in the LPQ and SPQ *Users' Manuals*.

SUMMARY AND CONCLUSIONS

In this chapter, the evolution of the theory of student learning, and the measurement of salient parameters in terms of LPQ and SPQ scale scores, have been described. This evolution may be summarized diagrammatically (Figure 2.2).

In this volume, we are concerned only with the second, and occasionally with the third, orders. The second-order level, from which the three motives and three strategy scale scores are obtained, gives most information about a student. Nevertheless, there are occasions when a broader characterization of learning will be more appropriate, and in that case the approach scores can be used. These second- and third-order factor analyses refer to ways of conveniently summarizing the learning process complex, which mediates between personal and situational aspects of the learning context, and the quality of performance. It has been pointed out that students' perceptions of their abilities, and relating them to task demands and to their own intentions with respect to learning, involve *metacognitive* processes.

These processes are the starting point for the present research, the aims of which are twofold:

1 *Empirical*: to determine correlates of the motive, strategy, and approach scores in secondary and tertiary contexts, and to derive norms for important subsamples of secondary and tertiary students, with a view to the practical implementation of the LPQ and SPQ;

2 *Theoretical*: to explore the nature of the learning process complex, particularly in its metacognitive aspects, in order to derive a more articulated theory than is represented in Figure 2.1.

The next chapter describes the method, sampling, and other instruments used.

3 Method: Sampling and Instrumentation

The main constraints on the design of the research were due to the major aim, which was to obtain norms on all motive, strategy, and approach scores of both LPQ and SPQ for subsamples of secondary and tertiary students. These constraints were quite different in the two main populations, as described below, but the general aims were similar in both cases:

1 To administer the LPQ and SPQ to representative groups of secondary and tertiary students;

2 To relate LPQ and SPQ scores to such other personal, demographic, educational, and performance data as may conveniently be obtained.

This chapter describes the sampling and instrumentation for the two student populations.

THE QUESTIONNAIRES

The 36-item LPQ and the 42-item SPQ (reproduced in the Appendix) are basically very similar, except for a number of items and minor changes in wording. Both are scored by summing responses to the 5-point Likert items comprising each subscale. There are six subscale scores, derived from three *motive* and three *strategy* subscales. The sum of the cognate motive and strategy subscales yields the *approach* scale scores, while a composite Deep-Achieving scale score can be obtained by summing Deep and Achieving scales (on the basis of the third-order factor analyses reported in Table 2.4, theoretical integrity, and uniformity across samples, the Deep-Achieving structure obtained in the secondary samples was taken as the standard).

Figure 3.1 clarifies the relationship between subscale and scale scores.

As the conditions of administration differed for the LPQ and the SPQ, the method is described separately for each.

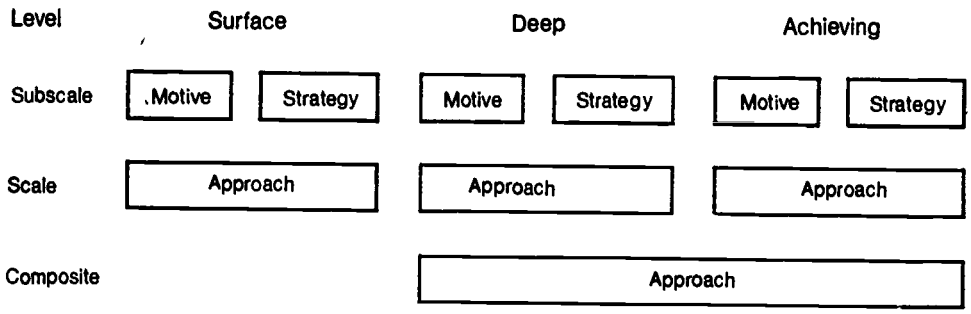


Fig. 3.1 **Composition of the LPQ and SPQ scale and subscale scores**

LPQ SAMPLING AND INSTRUMENTATION

Sampling

The sampling for the LPQ was arranged through the Australian Council for Educational Research, who were conducting several other studies of their own which required national random sampling. The then Director of the ACER agreed that the LPQ could 'piggy-back' the nationwide test battery, in exchange for which the present writer would look after the NSW testing for the whole battery. This arrangement made it possible to combine both sets of data, thus greatly extending the research potential of the data. Much of this work is reported in Chapters 5, 6, and 7.

The following account of the sampling was supplied by Dr Jan Lokan of the ACER. Fuller details are provided in a technical paper available from the ACER (Lokan and Ross, 1982).

Norms for two populations of students were desired. The target populations were defined as:

(i) 'Age 14' level: all students included in the 1975 population of 10-year-old students for the Australian Studies in School Performance (ASSP) (Bourke and Keeves, 1976)—hence aged 14 in 1979; and

(ii) 'Year 11' level: all students designated as in Year 11 in Australian secondary schools as at 1 August, 1979.

'Year 11' was selected for the older population rather than Year 12 because the data were being collected towards the end of second term and it was felt that some schools might not wish to release Year 12 students for a research study at that stage. The Year 10 population was not considered because of the overlap between it and the Age 14 population in some States. In terms of age, 17 per cent of the Year 11 students for Australia as a whole in 1979 were aged 15 years, 65 per cent were aged 16 years, 16 per cent were aged 17 years, and most of the remaining two per cent were 18 years old or over (from Australian Bureau of Statistics, 1979).

The definition for the 'Age 14' population in the study was:

all students aged 14.00 to 14.11 on 1 October 1979 attending normal schools in Australia in August 1979 in the following year levels:

New South Wales	Years 8 and 9
Victoria	Years 8 and 9; Year 10 in non-government schools only
Queensland	Years 8, 9 and 10
South Australia	Years 8, 9 and 10
Western Australia	Years 8, 9 and 10
Tasmania	Years 8 and 9; Year 10 in non-government schools only
Australian Capital Territory	Years 8 and 9; Year 10 in government schools only
Northern Territory	Years 8 and 9; Year 10 in government schools only

The distribution of 14-year-old students by year level during 1979, derived from ABS figures, is shown by State or Territory and school type in Table 3.1. This table reveals that the only area in which the exclusion of primary-level students from the target population causes a problem is the Northern Territory. Given the small overall 'state weight' to be applied to data from that area (see later), it was felt that the degree of bias arising from omitting primary students from the study could be tolerated.

Sample Size and Level of Accuracy. When the study was being planned the desired magnitude of error for estimates of percentages responding correctly to individual items was specified as about six per cent—that is, the standard error of the percentages should not exceed about 0.06 of a student standard deviation. Resources available to the study allowed for about 2,500 students across Australia to be tested, hence a sampling design involving 1,250 students from each target population (sampled in clusters of 25 from each of 50 schools) was selected. Such a sampling design could be expected to result in conservative error bounds (at the 95 per cent confidence level) of ± about five per cent for LPQ test item types.

Selecting the Samples. Two-stage cluster sampling procedures were used, with schools being selected first, followed by students within schools at each of the target population levels. In effect the schools were sampled with probability proportional to the size of their enrolment of 14-year-old students.

The number of schools selected in each State was determined from the exact proportional allocation of 1,250 students (the desired sample size) according to enrolment figures by State and Territory. State, Catholic and other independent schools were represented in the sample. In each of the schools selected, a random sample of 27 students from each target population was chosen, using class lists and date of birth information provided by the schools. Only two additional schools were needed to replace schools which were unable to participate, and some allowance for attrition of students was made by selecting 27 rather than the desired 25 from each school at each level. All selection of samples was done at ACER.

Achieved Samples and Weighting of Data. The attempt to achieve a relatively uniform cluster size approaching 25 (by nominating 27 students per school and requesting schools to conduct make-up testing sessions where necessary) was only partly successful. The cluster sizes achieved ranged from 19 to 27 at the Age 14 level and from 14 (in one school heavily affected by influenza) to 27 at the Year 11 level. To simplify the calculation of weights needed to compensate for departures from proportionality in the achieved samples, it was desirable to work from a uniform cluster size across schools. Given that a reduction in cluster size from 25 to 20 would increase the error

bounds on item percentages by only 0.2 per cent, it was decided to reduce the numbers of cases processed at each sample level to 20 per school. In schools where more than 20 students were tested, the 'extra' students were removed from the sample if their ID numbers matched a set of randomly generated numbers selected from a table.

Table 3.1 Percentage distributions of 14-year-old students by year level, school type and state or territory, Australia 1979[a]

State/ territory	School type	Secondary: Year						Total %	N
		Primary	7	8	9	10	Over Yr 10		
NSW	G	*	1.3	38.6	59.4	0.8	*	100.1	61 433
	NG	*	1.1	25.1	71.8	1.9	0.1	100.0	18 751
	All	*	1.2	35.4	62.3	1.0	*	99.9	80 184
Vic.	G	*	1.1	19.4	77.2	2.3	–	100.0	47 790
	NG	*	0.6	15.4	79.9	4.0	–	99.9	17 801
	All	*	0.9	18.4	77.9	2.7	–	99.9	65 591
Qld	G	0.6	–	9.0	56.5	33.9	*	100.0	27 945
	NG	0.3	–	7.0	55.9	36.7	*	99.9	9 398
	All	0.5	–	8.5	56.3	34.6	*	99.9	37 343
SA	G	0.2	–	5.0	52.5	42.2	0.1	100.0	18 702
	NG	0.2	–	3.5	46.4	49.3	0.6	100.0	3 586
	All	0.2	–	4.8	51.5	43.3	0.2	100.0	22 288
WA	G	0.2	–	4.8	62.3	32.6	0.1	100.0	16 709
	NG	0.4	–	4.7	61.8	33.0	0.1	100.0	4 504
	All	0.2	–	4.8	62.2	32.7	0.1	100.0	21 213
Tas.	G	*	1.2	24.6	71.2	2.9	–	99.9	6 274
	NG	–	0.8	27.7	65.1	6.4	–	100.0	1 236
	All	*	1.2	25.1	70.2	3.5	–	100.0	7 510
ACT	G	*	0.9	35.4	59.7	4.0	–	100.0	2 605
	NG	–	0.9	25.0	72.0	2.2	–	100.0	1 206
	All	*	0.9	32.1	63.6	3.4	–	100.0	3 811
NT	G	12.3	–	24.9	42.1	20.2	0.5	100.0	1 404
	NG	15.1	–	30.9	53.9	–	*	99.9	165
	All	12.5	–	25.6	43.3	18.1	0.4	99.9	1 569
Aust.	G	0.2	0.8	21.9	63.4	13.6	*	99.9	182 862
	NG	0.2	0.6	16.1	69.1	13.9	0.1	100.0	56 647
	All	0.2	0.7	20.5	64.8	13.7	*	99.9	239 509

[a] Source: Schools Australia 1979 (ABS Cat. No. 4202.0).
* Less than 0.1 per cent.

Weighting of the data in the Age 14 sample then became simply a matter of adjusting for the differences between the actual numbers of students tested in each State or Territory and the exact proportional allocation based on a cluster size of 20 (see Lokan and Ross, 1981, for a detailed discussion of the weighting procedures used).

Characteristics of the Final Samples. The norms presented in the User's Manual are based on the results of the 997 14-year-old and the 989 Year 11 students retained in the samples after the cluster size was reduced from 25 to 20. The obtained and expected distributions by sex and State are shown by Year level for the Age 14 sample in Table 3.2(a), and by age for the Year 11 sample in Table 3.2(b).

Table 3.2 **Obtained and expected distributions by sex, state and age: (a) Age 14 Sample, (b) Year 11 Sample**

(a) Age 14

	Year level					Obtained		Expected
	7	8	9	10	Total	N	%	%
Exp %	1	21	65	13	100			
Obt %	1	26	64	9	100			
N	7	362	880	117	1366			
Male %	71	48	49	41		653	48	51
Female %	29	52	51	59		713	52	49
NSW %	43	62	28	2		481	35	33
VIC %	29	22	26	3		320	23	27
QLD %	0	4	18	33		208	15	16
SA %	0	2	12	37		155	11	9
WA %	0	1	12	23		137	10	9
TAS %	14	2	2	0		21	2	3
NT %	14	1	1	2		19	1	1
ACT %	0	6	1	0		25	2	2
Total %	100	100	100	100				

(b) Year 11

	Age group					Obtained		Expected
	15 or under	16	17	18 or over	Total	N	%	%
Exp %	17	65	16	2	100			
Obt %	13	65	21	1	100			
N	128	639	205	9	981	989		
Male %	45	47	49	33		465	47	49
Female %	55	53	51	67		524	53	51
NSW %	1	36	51	33		338	34	25
VIC %	6	28	32	56		260	26	34
QLD %	44	14	6	0		160	16	14
SA %	33	8	3	0		99	10	13
WA %	13	8	1	0		73	7	9
TAS %	0	2	2	0		20	2	2
NT %	3	2	2	11		19	2	1
ACT %	0	2	3	0		20	2	2
Total %	100	100	100	100				

In both samples the obtained percentages by sex approximated the expected (population) percentages for the samples overall, and for the age and Year level categories containing the larger numbers of students. Disparities by State and Territory for the various age and Year level groups were expected because of the differing enrolment policies employed. In the Age 14 sample the obtained distribution by State and Territory over all Year levels was very close to the expected distribution. In the Year 11 sample, disparities were expected to occur because the sample schools were selected with probability proportional to the size of their enrolment of 14-year-old students. These disparities, most noticeable in the NSW and Victorian percentages, were adjusted for in the weighting procedures used. All other discrepancies between observed and expected frequencies were small enough to have occurred by chance.

The remaining characteristic on which the samples were compared with their respective populations was the type of school attended. The representation of State, Catholic and other Independent school students was accurate at the Age 14 level, as shown in Table 3.3. State school students were over-represented in the Year 11 sample, but this over-representation was largely counteracted by the weighting procedures which adjusted for differences among schools in retention of students to Year 11.

Table 3.3 **Obtained and expected distributions by type of school**

	Obtained N		Expected %		
School type	No. of schools	%[a]	Age 14[b]	Year 11[c]	Total secondary[d]
State	39	78	76	71	74
Catholic	8	16	17	18	18
Independent	3	6	7	11	8
Total	50	100	100	100	100

[a] A uniform number of students per school was selected, hence it suffices to base these percentages on the number of schools rather than the number of students.
[b] ABS Cat. No. 4202.0, pp 32–35.
[c] ABS Cat. No. 4202.0, pp 19–26.
[d] ABS Cat. No. 4202.0, pp. 28.

Other instruments

As data for more than one project were collected simultaneously, the LPQ was administered with five other instruments. In most schools the six instruments involved were administered in a single session of about two hours, while in the remaining schools the testing was split into two sessions. Relevant instruments are included in the Appendix.

The tests and parameters that were relevant to the present study included:

(a) *General Information Questionnaire*, containing items referring to such student characteristics as sex, date of birth, educational and occupational aspirations, parents' occupations, favourite subject in school, country of birth of self and of each parent, extent of usage of a non-English language in the home. Socioeconomic status (SES) was coded from parental occupation (the breadwinner, whether mother or father)

according to the 16-point scale developed by Broom, Duncan-Jones, Lancaster-Jones, and McDonell (1977).

(b) *Word Knowledge* (WK) (Thorndike, 1973). This is a 40-item test of verbal ability and has been extensively tested in Australia (Bourke and Lewis, 1976).

(c) *Locus of Control* (LC) (Lokan, Boss, and Patsula, 1982). This is a 7-item test, which assesses the extent to which students believe themselves to have some control over their own lives, in contrast to those who believe that what happens to them is governed by external forces such as chance, luck, or powerful others (Rotter, Chance, and Phares, 1972). This shortened version has an alpha coefficient of .75.

(d) *Career Development Inventory* (CDI), which was concurrently being normed for Australian conditions. This instrument is discussed further in Chapter 7.

(e) *Performance data.* Two self-ratings were completed by all students, each on a 5-point scale: own estimate of performance relative to peers (SRP), and satisfaction with that performance level (SAT). In the case of the NSW Year 11 sample, it was possible to obtain subsequent HSC results. This examination was taken 15 months after the testing session reported here.

SPQ SAMPLING AND INSTRUMENTATION

Sampling

Whereas the sampling for the LPQ was carefully designed and may be assumed without any misgivings to be representative of the national population, that for the SPQ was necessarily less controlled. Evidence as to its representativeness is given on pp. 27-28.

The major aims in designing the tertiary sampling were to obtain approximately 1,000 students from both the advanced education and the university sectors, with a spread of several 'typical' institutions involved in each case, and with classes selected that would encompass students from Arts, Education, and Science. It was decided that, given the resources available, it was better to obtain larger samples over fewer faculties than to spread the sar pling too thinly over more faculties. It was thought desirable to select faculties or schools that would have both university and advanced education representation so that comparisons between the two sectors might later be made. It was decided that other faculties could be represented later, as resources and opportunities became available.[1]

In early 1979 the tertiary sampling was co-ordinated and arranged. The only practicable method of obtaining completed questionnaires in the circumstances was to approach lecturers and to ask them if they would distribute the questionnaires at the beginning of a class, encourage the students to return them completed at the next class, and then package and return the questionnaires to the writer as they were completed. It was felt that to have asked for class time for completing the SPQ would have encroached too far on the excellent goodwill and co-operation already displayed. It was also felt that the participation of tertiary students would need to be seen to be quite voluntary, unfortunate though this procedure may be for the purity of the sampling.

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[1] The present norms are based only on the original 1979 sampling. It is hoped to publish later supplementary norms for other faculties and schools, and also for the TAFE sector.

The strategy of approaching students directly had been used with success previously (Biggs, 1976), but in the case of the SPQ a major difficulty emerged in that some administrations were reluctant to divulge addresses of students to an outsider. The possibility of a direct approach to students was therefore rejected.

The chosen procedure has its own limitations; in particular, it is impossible to estimate wastage rates accurately. After lecturers had agreed in principle to participate, they were asked how many questionnaires they would need. The reply was usually the enrolment figure for the class, rounded up 'just to make sure'. When these were distributed, some lecturers sent back the surplus to the writer, whereas others did not. In one case the returns from a university group were lost in the post. It was therefore impossible to obtain an accurate estimate of the number of questionnaires received by students, and hence of the real wastage rate. Overall, the maximum figure was 60 per cent; that is 40 completed SPQs were received for every 100 that were sent out. This figure did not differ significantly between the advanced education and university sectors. Because of uneven distributions of faculties in CAEs, it was necessary to send out more questionnaires to CAEs to build up arts and science numbers. This resulted in a disproportionate faculty spread, and in larger CAE numbers overall than university. The final figures were 1512 (CAE) and 853 (University). Table 3.4 gives a breakdown of these numbers by institution, sex, full or part-time, year of course, and faculty.

Table 3.4 Obtained Ns and percentages by sex, status, year and faculty in university and CAE populations

		Sex		Status		Year				Faculty		
		Male	Female	Full	Part time	1	2	3	4	Arts	Education	Science
UNI	N	331	546	785	89	343	163	166	210	407	208	251
	%	38	62	89	11	39	19	19	23	47	24	29
CAE	N	685	1051	1540	198	710	385	403	246	97	975	478
	%	40	60	88	12	41	22	23	14	6	63	31
UNI/CAE Difference		ns		ns		$p<.001$				$p<.001$		

The sampling by sex and status involved the same proportions of university and CAE students, but the proportions differed for year and faculty. The year differences are mainly located in the fourth year. The university fourth year consists mainly of Diploma in Education students, and the CAE fourth year is composed of degree students in their final year. The faculty differences are due to the CAEs being dominated by Education students, mostly in concurrent Diploma of Teaching or Bachelor of Education courses. These figures, then, make it clear that the CAE and university populations probably need to be separated by institution and faculty for the provision of norms. Later testing of the SPQ score distributions confirmed this (see Chapter 5).

Table 3.5 gives the distribution of the institutions sampled by State.

The CAEs were drawn from six States, including the ACT, but universities only from three States (it would have been four but for the postal accident). The CAEs

included two institutes of technology. These were tested separately against the remaining CAEs and the universities, and were found not to differ significantly from the CAE scale distributions whereas they did differ from the university distributions. For norming purposes, then, they were included with the CAEs.

Table 3.5 Distribution of institutions by state

State	No. of CAEs	No. of universities
New South Wales	3	1
Victoria	2	3
Tasmania	2	1
Australian Capital Territory	1	–
Western Australia	1	–
Queensland	1	–
	10	5

The university sample may appear to be less representative of Australian universities than the CAE sample is of CAEs. It is of course impossible to test this directly, but Table 3.6 helps to give some evidence as far as the universities are concerned. (The same data were unavailable for the CAEs.)

Table 3.6 Observed and expected percentages (in parentheses) of sexes in university sample

Obtained	%	Arts	Education	Science
Male	N	111	72	139
	%	27 (39)	35 (40)	56 (64)
Female	N	294	135	109
	%	73 (61)	65 (60)	44 (36)
Total		405	207	248

(Expected frequencies based on total Australian enrolments at 30 April, 1979.)

It can be seen that as far as the faculties of Arts are concerned, the present sample has fewer males but more females than the national distribution; Education is about right; and Science has proportionately more males than national proportions would lead one to expect. Thus, if sex balance can be taken as an index of the representativeness of the present samples, the present sample is little different from a truly representative sample. The important consideration, of course, is whether sex imbalance is symptomatic of other imbalances that might relate to the distributions of SPQ scale scores.

More direct evidence of the representativeness of the students sampled comes from a study by Williams (1982), who compared the reported experiences of students sampled from the first year 1980 intake of 15 Australian universities. One of his scales, *Academic Involvement*, assessed 'intrinsic interest and involvement in academic pursuits' (p.74). Inspection of the items suggests close affinity with Deep-Achieving. The five universities in the present sample are spread the full length of the scale used by

Williams, occupying positions 1, 2, 8, 9, and 15 (males) and 1, 7, 10, 12, and 15 (females). There is thus excellent evidence that the present norms are likely to be entirely representative of Australian universities. The same comparison could not be made for CAEs, as his sampling of colleges (Williams and Pepe, 1983) was more restricted and there happened to be little overlap of particular institutions.

Further evidence on this point is internal to the samples. We know that the LPQ norming samples are accurate and truly representative. If patterns and inter-relationships that occurred within the LPQ subscales are substantially the same for the SPQ, then the SPQ sample characteristics on appropriate dimensions may be considered to be as good as those for the LPQ. One might expect some differences, for the following reasons: the wording differs slightly between the two versions; the SPQ has one item per scale more; the scales were administered under different conditions; and the inter-relationships between study process dimensions may in fact differ between high school and higher education. Nevertheless, the test is a reasonable one, given that one may rely on the LPQ sampling. Two such examples include the third-order factor analyses of the six motive and strategy subscales for the two secondary and two tertiary groups (Table 2.4); and the Cronbach alphas for the subscale and scale scores for the two secondary and tertiary groups (Table 3.7). In the latter case, it can be seen that in every case, the alphas become higher (the scales more internally consistent) from Age 14, to Year 11, to CAE, to University.

While the evidence just presented does not prove that the tertiary samples are as representative of their parent populations as the secondary samples are of theirs, the stability of the internal properties across samples indicates that, in many essential respects, the tertiary samples are as good as the secondary samples.

Table 3.7 **Reliability data for LPQ and SPQ scale scores**

		Test-retest		Internal consistency (alpha coefficients)					
		LPQ Year 11		LPQ		SPQ			
				Age 14	Year 11	CAE		Uni	
		(a)	(b)	(c)	(c)	(c)	(d)	(c)	(e)
Surface	M	.60	.70	.46	.45	.51	.55	.61	.60
	S	.49	.60	.51	.55	.62	.56	.66	.69
	A	NA	NA	.60	.60	.68	.64	.73	.75
Deep	M	.63	.60	.56	.54	.63	.64	.65	.67
	S	.52	.63	.67	.65	.73	.65	.75	.72
	A	NA	NA	.76	.73	.79	.76	.81	.79
Achieving	M	.70	.67	.68	.67	.71	.72	.72	.70
	S	.72	.68	.67	.73	.75	.73	.77	.74
	A	NA	NA	.77	.78	.77	.78	.78	.77
Surface-Ach		NA	NA	NA	NA	.74		.77	
Deep-Ach		NA	NA	NA	NA	.85		.85	

(a) From Cornell (1986) (N = 60; four months between testing).
(b) From Edwards (1986) (N = 69; four months between testing).
(c) The present norming samples.
(d) From O'Neil and Child (1984) (N = 245).
(e) From Hattie and Watkins (1981) (N = 225).

Finally, given that the scales have been reduced to deciles, practically speaking, the final decile (or grouped) scale score is quite robust. If an observed raw scale score differs from its true population mean by one or two points, one can see from the norms in the *Users' Manual* that the difference may amount to one decile scaled score in the Average range, and probably no difference at all to the scaled extreme scores.

Other instruments

In view of the fact that the SPQ had to be administered anonymously, and that the conditions of testing precluded relating SPQ data to other tests, ancillary data had to be included on the SPQ form itself. This data included:

Faculty or School at which enrolled;
Year of study;
Full or part-time;
Sex;
Date of birth;
Country of birth;
Father's SES;
Educational plans; and
Performance self-ratings SRP and SAT (see above).

RELIABILITY OF LPQ AND SPQ

The first question that arises in discussing instruments of this kind is the *reliability* of the scales. Reliability may be conceived as the stability of the scores so derived, either in the sense of stability over time (test–retest reliability) or of stability over equivalent measurings.

Test-retest reliability is arguably not an appropriate index where the characteristic being measured may reasonably be thought to have changed between testings, either because of the testing itself (an effect of practice, for instance) or because the student's approach to learning has actually changed. For example, Biggs and Rihn (1984) attributed the latter kind of change to the effects of a study skill program, so that in this case observed changes in the scores on retest would be attributed to the intervention, rather than to unreliability of the scales. Similarly, while in an earlier version of the SPQ (the SBQ) all scales in Arts and most in Science faculties showed a significant test–retest correlation (ranging from 0.31 to 0.48) over a full academic year, these correlations are not large. In fact, the retest was close to the exams and it seemed, on other evidence, that students were reporting on 'swot vac' study processes rather than on the ones they used typically throughout the year (Biggs, 1970*a*). Test–retest correlations in the Year 12 classes in two large schools, tested in May and October, ranged from 0.30 to 0.65 (all significant) (Biggs, 1972), but again the retest was close to the public matriculation examinations.

Rather better results were obtained in two recent studies, using the current version of the LPQ with five Year 11 classes (Cornell, 1986; Edwards, 1986). In both cases, the interval between testing and retesting was four months, from mid-year to October. These figures are given in Table 3.7, and indicate a good degree of stability over a significant part of the school year.

A common measure of reliability in this context is *internal consistency*, measured by the alpha coefficient. This is a measure of the extent to which the items in the scale 'agree' with each other that they are measuring the same thing. Split-half reliability, where half the items in the scale are correlated with the other half, is conceptually the same thing, but more cumbersome to use.

Table 3.7 summarizes the reliability data that are currently available for the LPQ and SPQ scales and subscales. The test–retest reliability correlations are available for Year 11 only, in two independent studies, and the correlations range from 0.49 to 0.72 in one study and from 0.60 to 0.70 in the other. These figures are highly satisfactory, indicating that indeed students do display a degree of stability in their motives and strategies.

With regard to internal consistency, it is evident that first, the coefficients are generally higher in the tertiary samples, and second, the coefficients are higher in the university than in the CAE sample. That the coefficients are higher in general in the tertiary samples is due partly to the fact that each LPQ scale is comprised of six items, whereas each SPQ scale is comprised of seven items. However, the data suggest that the scales tend to be slightly more internally consistent in universities than in CAEs, indicating that university students see the items within each scale as more related to each other. By extension, then, it is reasonable to suggest that tertiary students in general have clearer perceptions of the inter-relatedness of their motives and strategies than have high school students.

It must be emphasized, however, that these differences are slight. The *general* picture is one of reasonable consistency, both within scales and across populations. Such consistency is to be expected, given the firm factor analytic base upon which the scales were formed, and the similarity between secondary and tertiary factor analyses (see Chapter 2). The figures in parentheses under 'CAE' in Table 3.7 were obtained by O'Neil and Child (1984) from the responses of 245 polytechnic students in the UK (equivalent to Australian CAE students); those under 'Uni' were obtained by Hattie and Watkins (1981) in four faculties of one Australian university (N = 225). Both sets of figures are remarkably close to those obtained in the present research.

The least satisfactory scale is the surface motive (SM), particularly in the high school samples. Two major subgroups of items comprise this scale: the pass-only or 'meal-ticket' aspiration, and fear of failure. These subgroups are conceptually distinct and Watkins (1982*a*), for example, suggests that they should be assessed on separate scales. On the other hand, the background research to the present study indicated a three-factor solution that grouped both types of surface motivation (pragmatism and anxiety) together, and both kinds of motive with a reproducing strategy. Collectively, this syndrome describes a surface approach (Fransson, 1976). However, it does need to be borne in mind that this is not as unidimensional as the other approaches, particularly in secondary school.

Still other studies on reliability, obtained quite independently of the present writer, are by Watkins and Hattie (1980; 1981) in two investigations. In the first (1980) study, the original 10 SBQ scales were administered to 562 university students from five faculties, and subjected to a maximum likelihood method of analysis rather than the principal components analysis used in Biggs (1978; summarized in Chapter 2). They found five factors, rather than the three found in the present research, but their Factors 1, 2, and 4 were very similar to the present Surface, Deep, and Achieving

Approaches. Given that they included students from two extra faculties (Rural Science and Economics) their conclusion is encouraging:

> In general, however, our analysis does support the structure of the SPQ scales reported by Biggs (1978), which he uses to justify his value-motive and strategy model of the study process domain. (p.1127)

In the later (1981) study, Hattie and Watkins carried out similar analyses with a different group of 255 first year Australian students, and compared the results with those obtained from 175 Filipino freshmen. The alpha coefficients they found for the Australian students are reported in Table 3.7 for university students. They then applied confirmatory maximum likelihood factor analyses to test the 'goodness of fit' of the data and found strong confirmation of the present SPQ model for the Australian data, but not for the Filipino data. Their conclusion regarding the former is most pertinent here:

> This investigation of the internal structure of the SPQ provided very satisfactory results from the Australian sample—adequate to good internal consistency coefficients; item factor analysis which supported the existence of Biggs' subscales of the SPQ; and a subscale factor analysis which supported the validity of Biggs' model of the study process domain. The SPQ can then be recommended for further use with Australian students. (p.243)

O'Neil and Child (1984) administered the SPQ to 245 polytechnic (equivalent to CAE/Institute of Technology) students in the UK, and factor analysed their responses, comparing the principal components/varimax procedure (also used in the present research) and an oblique (oblimin) procedure. Their data again confirmed the structure of the present scales. However, like Hattie and Watkins, O'Neil and Child conclude that the Surface Motive subscale is the weakest, the other five subscales comparing 'most favourably' (p.232).

It is most encouraging that these independent investigations are supportive of the psychometric properties of the SPQ, and by implication, of the LPQ.

The validation of the scales and subscales, their suggested use, and further elaboration of the theory underpinning them, are matters taken up in the following chapters.

SUMMARY AND CONCLUSIONS

In this chapter the details of the sampling, administration, and instrumentation of the SPQ and LPQ were outlined. The LPQ was administered to two randomly-chosen secondary samples of all Australian students aged 14, and in Year 11, in 1979. The LPQ was 'piggy-backed' with other tests which were being normed on the same samples by the Australian Council for Educational Research. It was therefore possible to obtain a rich and unbiased data source for subsequent analyses.

The SPQ was administered to two tertiary samples of CAE and university students in the faculties of Arts, Education, and Science. It was not possible to sample on a random basis here, nor to obtain a range of other data. Nevertheless, comparisons both

with the secondary sample, and with other tertiary samples, indicated that the present data were satisfactory.

Evidence on the test–retest reliability, and on the internal consistency, of the scales and subscales of both the LPQ and the SPQ was provided. Reliability estimates were obtained both from the present sample and from independent investigations, and both were judged to be very satisfactory.

4 Descriptive Research on the LPQ

The LPQ is designed for use in the secondary school and the SPQ for use in college and university. Frequently findings obtained from secondary samples are generalizable to tertiary samples, and *vice versa*, but for convenience, and in order to cater for the specialized interests of the reader, research relating specifically to secondary populations will be dealt with in this chapter, and that relating to tertiary populations in the next. The research reported in both Chapters 4 and 5 is essentially descriptive in nature. Chapter 6 will deal with research that applies generally to all students, and that is more theoretical in its thrust.

As far as possible the analyses reported in this and the next chapter are kept parallel. However, due to the circumstances of testing, a wider range of performance and individual difference data is available for the LPQ samples.

This chapter is thus concerned with relationships between the LPQ scales and a range of other variables. These were mostly observed in the norming samples. All scales were investigated initially, but since the approach scores in effect summarize the motive and strategy scores, and the data are already complex, the motive and strategy subscale scores will not be mentioned unless they are particularly interesting, or add significantly to the picture presented by the approach scale scores.

In the following section, the LPQ scale scores are related to these other variables, mainly by analysis of variance (ANOVA) and correlation coefficients. The data are complex, and will be presented in subsections dealing with educational, demographic, and individual difference factors.

1 EDUCATIONAL

(a) Sex and year

Sex and Year were used as independent variables in a Sex × Year ANOVA with the LPQ scale raw scores[1] as dependent variables. Results are presented in full in Table 4.1.

1 It is important to note that in all the results reported in this and the following chapters, LPQ and SPQ results are given as *raw scores*, not scaled scores (deciles). The scaled decile scores would of course not show any sex or age differences.

Table 4.1 Year and Sex effects on all LPQ scores

			Surface		Deep		Achieving	
		N	M	S	M	S	M	S
Age 14	M	653	21.5	18.3	19.7	17.2	20.8	17.3
	F	714	21.4	17.1	19.4	16.7	19.7	18.0
Year 11	M	464	21.1	17.2	18.7	16.9	19.8	16.2
	F	520	21.1	16.4	19.5	17.5	19.0	18.0
ANOVA ($p<$)								
	Sex (S)		–	000	–	–	000	000
	Year (Y)		05	000	01	–	000	005
	S × Y		–	–	001	005	–	05

			Approaches			
		N	SA	DA	AA	DAA
Age 14	M	653	39.8	36.9	38.1	75.1
	F	714	38.5	36.1	37.7	73.8
Age 11	M	464	38.2	35.6	36.0	71.6
	F	520	37.6	37.0	37.0	74.0
ANOVA ($p<$)						
	S		000	–	–	–
	Y		000	–	–	–
	S × Y		–	005	05	001

The results shown in Table 4.1 indicate the major reason for presenting separate norms for the two age groups and for the two sexes: as can be seen, there are significant effects of S Year or both, on every scale.

Boys are highe than girls on Surface Strategy, Surface Approach in general, and on Achieving Motive. Girls are higher than boys on Achieving Strategy at both ages but particularly at Year 11. All deep-related scales show an interaction between Sex and Year: boys are higher than girls at Age 14, but girls are higher than boys by Year 11.

Year effects on all surface-related scales show a decline from Age 14 to Year 11, as do achieving-related scales. As noted, deep-related scales show a strong Sex × Year interaction: boys decrease from Age 14 to Year 11, but girls increase.

These results, particularly the Year × Sex interactions on deep-related scales, and the decline in Achievement motivation from middle to senior high school, are disturbing, and warrant closer scrutiny. The data may be examined from the points of view of *age* independently of year, and of *year* independently of age. Such analyses were carried out for all scale scores, and it was found that the analysis by Year gave the clearest results. The general picture can be seen from taking only Surface and Deep-Achieving Approach scale scores (Table 4.2).

The fact that analysis by Year gave the clearest result suggests that the changes in the LPQ scales are more *school*-related than *age*-related; that what happens to the scale scores over time is more related to what happens in school than merely to the fact that the students are getting older.

When we look at what happens on a Year by Year basis, then, Surface Approach declines from Year 8 to Year 11 in both sexes. There is the interaction between year

Table 4.2 Year and Sex effects on Surface and Deep-Achieving Approaches

	Year		N	SA	DAA
Year 11 sample:	11	M	464	38.2	71.6
		F	520	37.6	74.0
Age 14 sample:	10	M	48	39.9	72.5
		F	69	38.2	73.8
	9	M	427	39.4	74.1
		F	454	38.1	72.6
	8	M	173	39.6	77.8
		F	189	39.4	76.8
ANOVA ($p<$)					
		Sex (S)		01	–
		Year (Y)		000	000
		S × Y		–	01

and sex noted in Table 4.1 on Deep-Achieving: boys decline, while girls increase. Year 8, however, shows very high Deep-Achieving Approach scores in both sexes. In other words, students generally are better motivated, more organized, and boys at least, more meaning-oriented in their studies, in Year 8 than in Year 11. This is unlikely to be due to differences in scholastic aptitude—Year 9 and 10 14-year-olds would tend to be brighter than other 14-year-olds in Year 8—but to factors in the classroom. Possibly this finding reflects the decreasing morale that has been noted in international surveys as being particularly marked in Australian high schools compared to other countries (Comber and Keeves, 1973).

The sex interaction, however, cannot be explained in this way. While all students decrease in Achieving Motive, boys drop relatively more than girls in the related strategy of organizing their approach to work (AS), and in the strategy of reading widely and seeking meaning (DS), while girls actually increase on the latter. Table 4.2 shows that most of the drop for boys is from Years 8 and 9; the cross-over occurs between Years 9 and 10. Why this should be so is not at all evident, but it is a phenomenon that should give rise to some concern. The decrease for girls is rather earlier: they drop dramatically in Deep-Achieving Approach from Year 8 to Year 9, but unlike boys rise steadily thereafter.

The analyses in this section, then, show strong differences in the LPQ scale and subscale scores that are associated with Year level and sex, thus justifying the presentation of norms separately for each sex and age group.[2]

(b) Favourite subject

The subject nominated by the student as his or her favourite was then used in an ANOVA with Sex and Year. The aim of these analyses was to see if there were significant differences between students who nominated particular subjects as their

2 Despite the Year differences shown in Table 4.2, the norms are best used as suggested in the *User's Manual*: middle school students should be referred to the Age 14 norms, and post-Year 10 to the Year 11 norms, because that is the way the norms were derived and standardized from carefully selected national samples. The fact that, for example, 14-year-olds in Year 8 tend to be particularly high on deep-related scales is something that simply needs to be borne in mind when interpreting the data.

Table 4.3 **Year and Favourite Subject effects on Deep-Achieving and Surface Approaches**

	Level			
	Age 14		Year 11	
Favourite subject group	SA	DAA	SA	DAA
Art-Music (A)	38.3	72.3	37.1	72.1
Humanities (H)	38.7	75.9	37.5	73.3
Maths-Science (M)	37.9	78.4	36.3	73.7
Technical (T)	40.3	72.8	40.8	70.9
No Preference (N)	38.4	66.3	38.3	69.1
ANOVA ($p<$)				
Subject group	000	000		
Year × Subject	–	05		

favourites. To simplify matters, subjects were grouped in the following five categories Art–Music, Humanities, Maths–Science, Technical, and No Preference.

There are strong subject preference effects on approach to learning, with some interaction with Year in the case of Deep-Achieving, as outlined in Table 4.3. (Sex and Year effects are not reproduced here as they duplicate those mentioned in section (a) above.)

While all subject areas decrease in both Deep-Achieving and Surface Approaches from Age 14 to Year 11, as would be expected from section (a) above, the interactions with Year show some encouraging differences between subject areas. At both Age 14 and Year 11, the academic subjects (Maths–Science and Humanities) are preferred by students highest on Deep Achieving Approach, with Technical and No Preference the lowest on DAA. Technical subjects are preferred by students highest on Surface Approach, and Art–Music by the lowest on SA.

These patterns make considerable sense in terms of the construct validity of the scales, and might be compared with similar data at the tertiary level, where it will be seen that at that level a clear distinction in Surface and Deep Approach develops between Arts and Science faculty students (see pp. 49-52).

(c) Plans for further education

The students were asked about their own educational plans, ranging from terminating at Year 10 (Age 14 only), at Year 11, at Year 12, completing a post-secondary diploma or certificate, or a degree course. The results were examined separately for boys and girls within each year group.

First, a series of ANOVAs was run on each age group, and in both ages highly significant main effects due to Educational Plans were found for all subscales. The main effects were close to linear in all cases so that the correlation coefficients convey the picture (see Table 4.4).

The further students say they intend to climb the educational ladder, the more strongly they endorse deep-related motives and strategies, especially Achieving Motive, and avoid surface-related ones. The most consistent predictor of plans to continue education as far as possible is the Deep-Achieving Approach scale score. It is interesting but disturbing that, in boys, it was precisely this score that deteriorated

Table 4.4 **Correlations between future Educational Plans and LPQ scores for Age 14, Year 11**

		Age 14		Year 11	
		M	F	M	F
		N = 642	N = 710	N = 463	N = 515
Surface	M	–04	–08*	–07	–18**
	S	–19**	–19**	–24**	–18**
	A	–15**	–17**	–20**	–22**
Deep	M	18**	16**	24**	10*
	S	16**	20**	22**	18**
	A	19**	20**	26**	16**
Achieving	M	24**	25**	23**	17**
	S	19**	16**	17**	04
	A	26**	24**	24**	12**
Deep-Achieving	A	25**	24**	29**	16**

Decimals omitted. * $p<.05$, ** $p<.01$

with increasing exposure to the school system. As will be seen in the tertiary data, a somewhat similar phenomenon occurs in colleges and universities (see pp. 52-54).

These data, too, confirm the nature of the LPQ scales: deep-related are associated with plans for further education; surface-related with terminating education early.

(d) Performance

Major performance measures were the two self-ratings: self-rated performance (on a 5-point scale compared to peers) (SRP); and satisfaction with that performance rating (SAT). Actual performance scores were available for some of the present Year 11 sample, who completed their HSC fifteen months afterwards. For one subgroup of students, then, it was possible to relate LPQ to objective performance as well.

In interpreting the relationship between the LPQ scales and performance, it must be remembered that students were asked to respond with their *immediate* reaction to each item. This is standard procedure, and it is judged to elicit how students *typically* study with respect to their favourite subject. The LPQ responses might then be expected to be most closely related to performance in their chosen subjects than in performance in general. Nevertheless, it is unlikely that that 'typical' stance towards learning would always be maintained in all tasks related to the subject. Every student would occasionally feel instrumentally motivated towards a particular task, no matter how the subject may be liked in general; for instance, liking English in general but hating Wordsworth in particular, or simply feeling 'I can't be bothered today'. This is an important matter, and is discussed more fully in Chapter 6.

Measuring performance under examination conditions raises other problems, particularly in the present context. It is unlikely that students tackle public examinations with the same affective and cognitive deployment that characterized their approach to their schoolwork fifteen months earlier. Nevertheless, it is still useful to ask if the LPQ scales relate to HSC performance even under those conditions. If they do, then it would lend weight both to the validity of the scales, and to the stability of the approaches the scales are supposed to measure.

The present examination data were restricted to New South Wales because each State used its own marking scale and these scales were difficult to equate. There is, even within the one state, also the problem of levels of entry within a subject. In the present case, all exam distributions were pro-rated to a mean of 50. Three HSC performances were selected: two contrasting subjects, English and Mathematics, representing the humanities and maths–science areas; and the Aggregate, which is a composite score, comprising the sum of the student's best four subjects, and is used for tertiary selection.

The first analyses determined the extent of correlation between the LPQ scales and subjectively rated performance (SRP) and satisfaction with performance (SAT) (Table 4.5).

Table 4.5 Correlations between LPQ scores and Self-Rated Performance variables

		Age 14				Year 11			
		Male (644)		Female (709)		Male (462)		Female (517)	
		SRP	SAT	SRP	SAT	SRP	SAT	SRP	SAT
Surface	M	–07	–02	–09*	–05	–13**	–05	–13**	–11*
	S	–15**	–09*	–23*	–16**	–21**	–08	–25**	–19**
	A	–14**	–07	–20**	–13**	–21**	–08	–24**	–19**
Deep	M	14**	08*	20**	19**	17**	11*	13**	07
	S	17**	14**	18**	16**	13**	04	16**	12**
	A	18**	13**	21**	20**	17**	09*	17**	11*
Achieving	M	31**	25**	33**	24**	34**	24**	29**	26**
	S	19**	23**	22**	27**	21**	25**	11*	20**
	A	30**	28**	32**	29**	32**	28**	23**	27**
Deep-Achieving	A	27**	23**	29**	27**	29**	22**	23**	22**

Decimals omitted. * $p<.05$, ** $p<.01$

The correlations are presented separately for boys and girls, although there is little difference between those for the two sexes, or between those for the two age levels. Surface-related scores are consistently related negatively with the subjective measures of performance, and rather more strongly with SRP than with SAT. There is some evidence that the Surface Approach is unrelated to dissatisfaction in boys, but is so related in girls. Deep-related scores are correlated consistently and positively with performance ratings, and again rather more strongly with SRP than with SAT.

Strongest relationships of all come from the achieving-related scores: AM correlations are also higher with SRP than with SAT. AS differs from all other subscales in that relationships with SRP are weaker than with SAT. These patterns seem reasonable. Students motivated to achieve would be likely to achieve (SRP), but being ambitious, would be less easily satisfied with their performance (SAT). The Deep-Achieving Approach is related relatively strongly and consistently to all measures of performance.

These findings are in keeping with expectations, but the performance measures are subjective. The next question, then, relates to examination performance. The 1980 HSC results in NSW were made available for the students who were in the 1979

Year 11 sample in NSW. As noted, these data are far from ideal, but they will give some indication of the relationship between the LPQ and 'hard' performance data: for purposes of comparison, the 'soft' SRP and SAT self ratings are included. The performance scores are: HSC Aggregate, English and Mathematics, and a 'level' score for English and Mathematics. The latter reflects the level of examination entered by the student, Unit 2A being rated 1, Unit 2 as 2, and Unit 3 as 3. The latter are not strictly performance scores, but the three levels may be assumed to reflect aptitude shown over the year: students with the greatest aptitude would in general be expected to enter the most difficult (highest) level for that subject, and vice versa. This score was included because it does not require pro-rating of scores. All these correlations are given in Table 4.6.

Table 4.6 **Correlations between LPQ scores and performance variables (N = 323; NSW HSC 1980 candidates) by exam**

		Performance						
		Subjective		Exam			Level of entry	
		SRP	SAT	Agg	English	Math	English	Math
Surface	M	−16**	−21**	−15**	−12*	−16**	−14**	−04
	S	−29**	−22**	−25**	−25**	−17**	−15**	−15**
	A	−28**	−27**	−25**	−23**	−20**	−18**	−12*
Deep	M	23**	18**	15**	13**	05	19**	07
	S	18**	17**	09	05	07	01	07
	A	13**	21**	14**	10	07	11*	08
Achieving	M	27**	24**	23**	09	22**	03	22**
	S	20**	29**	12*	11*	09	06	05
	A	28**	32**	20**	12*	18**	05	16**
Deep-Achieving	DAA	30**	30**	20**	13**	15**	09	14**

Decimals omitted. * $p<.05$, ** $p<.01$

Generally speaking, level of examination entered correlates least with the LPQ scales, actual performance next, and the subjective rating most. This last is unexpected, if only because of the greater reliability of objectively measured performance. On the other hand, the lapse of fifteen months itself introduces an unknown amount of variation in the student's study processes between the LPQ measurement and sitting for the examination. The patterns are nonetheless clear. Surface-related scores correlate consistently with poor performance, however measured. A Deep Approach correlates positively with HSC Aggregate, but barely with English and Mathematics. Correlations with Achieving Approach are more positive, especially in Mathematics. The combined Deep-Achieving Approach score also correlates significantly with performance.

It is possible that part of the problem is that deep-related scores are not expected to relate to performance unless the student is intrinsically interested in the task. Deep Approach, and Deep-Achieving, in this case should relate most strongly to performance in the favourite subject of the student, and marginally, if at all, in other subjects. To simplify matters, we shall look only at Surface and Deep-Achieving

Approaches. The HSC candidates were divided into three subgroups: those preferring Humanities (H, comprising English, History, Geography); Maths–Science (M); and No Preference at all (N). It will be recalled from Table 4.3 that the H and M groups were virtually the same on DAA and SA, with N higher on SA and rather lower on DAA. The resulting correlations are presented in Table 4.7.

Table 4.7 strongly supports the notion of selective relevance. There is interaction at several levels. Both approaches relate significantly to indices of general performance in the groups expressing a preference, whether to Humanities or to Maths–Science, but students expressing No Preference show no significant correlations between approach and performance. If the particular preferred subject area is now taken into account, DAA relates positively only when the subject is in the preferred area: in the H group, DAA relates to English but not to Maths, while in the M group, DAA relates to Maths but not to English. SA relates negatively throughout. With respect to performance, then, three conclusions may be drawn:

(a) Students appear to be responding to the deep related scales of the LPQ with their favourite subject in mind.

(b) Students who have a preferred subject, whatever it is, should avoid a surface approach.

(c) The Deep-Achieving Approach works only in the preferred subject, which confirms the theory of the Deep Approach in that it operates through intrinsic interest in the academic task (see p.00), and thus provides good validating evidence for the present scale.

Table 4.7 **Correlations between Surface and Deep-Achieving scores and subjective and examination performance, and level of entry**

		Performance						
Preferred		Subjective		Exam			Level of entry	
area	Approach	SRP	SAT	Agg	English	Math	English	Math
Human (H)	SA	−36*	−32*	−34**	−41**	−29**	−25*	−07
(N = 92)	DAA	−23*	14	23*	20*	15	29**	41**
Math/Sci (M)	SA	−40**	−25**	−27**	−27**	−19*	−25**	−19*
(N = 170)	DAA	21**	25**	21**	11	17*	01	14
No Pref (N)	SA	02	27	19	05	10	10	43*
(N = 25)	DAA	18	−15	−06	−18	30	−39*	39*

Decimals omitted. * $p<.05$, ** $p<.01$

Other interactions refer to level of entry in the examination. This index correlates around 0.4 with performance in the examination entered, so that it is reasonable to conclude that level of entry is related to some extent to the competence of the student. At all events, the pattern of correlations between level and DAA and SA are different from those between performance and those scales. In H and M groups, the direction of the relationships are not drastically different from those with performance itself.

With students having No Preference, on the other hand, the pattern is quite different.

Students high on Deep-Achieving Approach actually *avoid* high levels of entry in English; whereas students high on both DAA and SA aim high when entering Mathematics. This unusual result reflects the perceptions unmotivated or uncommitted students have of English and Mathematics as subjects.

These data, linking approach to learning with preferred content of learning, prompt questions about possible performance differences between these preference groups. A one-way ANOVA was run for the Aggregate, English, and Mathematics performance, and the results were clear: there was no difference on the Aggregate, but the H group outperformed the M group on English, and the M group outperformed the H group on Maths, while the N group did not differ from H or M groups on any subjects.

In summary, then, the LPQ scales and subscales correlated with performance in the expected ways. Surface-related scores correlated negatively with self-rated performance, and also with expressed dissatisfaction at both year levels and with both sexes. Deep-related scores correlated significantly and positively with both these subjectively rated measures; as did achieving-related scores. Correlations in general were higher for SRP than for SAT, except for the Achieving Strategy, which was more closely related to satisfaction.

Correlations with 'hard' data (examination performance) were in the same direction—SA negative, DA and AA positive—but rather lower. Part of the reason for this is that 15 months separated the LPQ administration and the exams. When the correlations between SA and DAA and favourite subject were considered, SA correlated negatively irrespective of subject, but DAA correlated positively only with the favourite subject, as would be expected of a deep-related score. There were no correlations between either SA or DAA and performance when students had no preference, although DAA was associated with a *low* level of entry in English.

These data affirm the validity of the scales, but are far from exhaustive in relation to the complexity and detail of relationships between the LPQ and performance. Further relationships are examined in Chapter 6.

2 DEMOGRAPHIC AND INDIVIDUAL DIFFERENCE VARIABLES

(a) Demographic

Several questions were asked about country of origin of self and of each parent, length of time spent in Australia, language used in the home, and so on. Several ANOVAs were carried out using these variables, with Sex and Year as independent variables: the Sex and Year main effects replicated those already found, and interactions were few and weak. Relationships with individual motive and strategy scores closely followed overall deep-achieving and surface approaches, so that the general picture can be presented quite simply in terms of demographic main effects on SA and DAA scores.

Apart from Australian and British born, there were relatively few students who came from single countries. Students were sorted into five groups according to country of birth: Australian, British, European, Asian, and Other (mainly African and Middle Eastern). Table 4.8 provides full information.

The two Anglo-Saxon groups scored lowest on Deep-Achieving, with European and Asian the highest. There were no differences on Surface Approach.

Table 4.8 **Country of birth of student and Surface and Deep-Achieving Approaches (age 14 and year 11 combined)**

		Australia	Great Britain	Europe	Asia	Other	
Approach	N	2060	112	76	20	70	*p*<
Surface		38.6	38.7	38.7	36.8	39.3	n.s.
Deep-Achieving		73.4	73.4	80.8	78.6	76.1	000

Degree of ethnicity was investigated by comparing three groups: English-speaking parents having English-speaking children; Father born overseas, but child born in Australia; and father and child born outside Australia, each with a first language other than English (Table 4.9).

Again, the Anglo-Saxon group scored lowest on Deep-Achieving, the mixed group next, and the Foreign/Foreign group highest, with each group significantly different from the other two. Surface effects were weaker, with the mixed group falling lower than the other two.

A paradox is evident. On the one hand, ethnicity is associated with superior approaches to learning; on the other hand, the evidence is that immigrant populations actually *achieve* below indigenous Australian populations in verbal subjects, although not necessarily in arithmetic (see, for example, Bourke and Keeves, 1977). The reasons for the under-achievement of migrants are complex and in many cases are only transitory: once the second language has been mastered, achievement may be greater than would be otherwise expected (Cummins, 1979). Clearly, then, it is necessary to distinguish between the *approaches* to learning, and the *outcomes of* learning. Although there is evidence, once the approach has become established, for a strong link between approach and outcome (Biggs, 1979; Marton and Saljo, 1976*a*, 1976*b*; Van Rossum and Schenk, 1984; Watkins, 1983*b*), immature learners may need first to develop suitable approaches for coping with their learning environment before they can produce adequate outcomes.

In sum, then, differences on deep-related motives and strategies were found according to country of birth. Further analysis suggested that these differences were most marked in students with a non-English linguistic background, and that bilinguality is associated with the adoption of a deep approach to learning. The pattern in tertiary populations is similar (pp. 63-64). The theoretical and practical implications of that association are considered in Chapters 6 and 7 respectively.

Socioeconomic status (measured by the status of the breadwinner's, usually the father's, occupation) has long been associated with academic success. It is relevant then to ask to what extent different social groups may be distinguished in terms of

Table 4.9 **Degree of ethnicity and Surface and Deep-Achieving Approaches (age 14 and year 11 combined)**

		Language of country of birth (father/child)			
		English/English	Foreign/English	Foreign/Foreign	
Approach	N	1769	277	76	*p*<
Surface		38.7	37.7	38.6	.05
Deep-Achieving		73.1	75.2	80.5	.000

motives and strategies for learning, or general approach to learning. SES was measured here on the scale of Broom et al. (1977). (See Table 4.10.) Categories are meant to lie along an ordinal scale, with 1 highest and 16 least: categories 17–20 are not ordinal, and were not treated as continuous with the rest of the scale.

There are obvious anomalies in this, or any such scales (for example, very successful models or photographers would be very much higher than category 13), but it is a standard instrument of its kind, and one of the most recently developed for the Australian workforce. It is intended to reflect the general attitudes of the Australian public to these roles, placing them in rank order of esteem.

Table 4.10 Broom-Jones scale for assessing socioeconomic status

Scale	Position	Typical examples
	1	Architects, engineers, academics, medical practitioners, clergymen, legal practitioners, accountants, officers in armed force, general managers of large firms.
	2	Graziers, wheat or sheep farmers.
	3	Public service administrators, managers (e.g. banks, small industries).
	4	School teachers, nurses, entertainers, draftsmen.
	5	Other farmers and primary producers.
	6	Public servants, clerical workers, cashiers, insurance and real estate salesmen, commercial travellers.
	7	Shop proprietors (self-employed).
	8	Armed forces (not officers), police.
	9	Skilled craftsmen (tailors, watchmakers and jewellers, fitters and turners, plumbers, carpenters etc.), foremen.
	10	Farm workers (shearers, station hands), fishermen, forestry.
	11	Drivers and transport workers.
	12	Shop assistants.
	13	Service industries (gardeners, bartenders, hairdressers, firebrigade), sportsmen, photographers, models, medical attendants.
	14	Miners.
	15	Factory workers, construction equipment operatives.
	16	Labourers.
	17	Home duties.
Non-scaled	18	Retired.
	19	Deceased
	20	Cannot decide (briefly describe job).

Based on Broom, Duncan-Jones, Lancaster-Jones and McDonell, 1977.

Preliminary analysis showed main effects but no interactions involving SES, Sex and/or Year, with respect to the Deep-Achieving and Surface Approach scales. Accordingly, a one-way ANOVA was run on the combined Age 14 and Year 11 samples, on SA and DAA. Few comparisons were significant (Table 4.11).

Level 6 (public servants, clerical workers, cashiers, salesmen) were found to have children highest on Surface Approach. The top SES group, comprising professionals, were found to have the lowest. Differences on Deep-Achieving were few, with miners' children scoring highest and graziers' lowest.

Table 4.11 **Socioeconomic status of father and Surface and Deep-Achieving Approaches (age 14 and year 11 combined)**

Approach	High	Low
Surface	Public servants, clerical, cashiers (6)	Professional (1)
Deep-Achieving	Miners (14)	Graziers (2)

Some intuitive sense may be read into these findings, but they do not show a strong link between parental SES and approach to learning. The next parental variable to look at is education, which, while related to SES in a broad sense, might reasonably be expected to provide evidence for stronger links with approach to learning than SES alone.

Both father's and mother's education were investigated. Effects were found to be similar in both cases, but stronger in the case of the former, so only father's education is reported here. Father's education was classified into five groups:

1 Completed primary school only.
2 Incomplete secondary school (left before Year 12).
3 Finished Year 12 but no tertiary.
4 Further education/trade qualifications.
5 College/University degree.

There were several motive-strategy differences, which are summarized here by the overall Surface and Deep-Achieving Approach scores (see Table 4.12).

Table 4.12 **Father's education and Surface and Deep-Achieving Approaches (age 14 and year 11 combined)**

Approach	Primary	Inc. Sec.	Comp. Sec.	Further	Tertiary	$p<$
Surface	39.1	39.2	38.5	37.4	37.0	.000
Deep-Achieving	73.5	72.8	74.6	75.5	75.1	.05

The effects can best be seen graphically (Figure 4.1).

Children of fathers who have completed secondary school show an increase in Deep-Achieving, and a decrease in Surface, Approach to learning. This is a general trend that maintains itself up to tertiary level qualifications. In other words, the more education the father has, the more likely the child to have a 'scholastic' approach to learning: to avoid reproductive learning, to be motivated by curiosity and achievement, and to read widely for meaning in an organized fashion.

These results are stronger than those found with SES *per se*, and suggest that both affective and cognitive aspects of learning are picked up at home to some extent. Thus, parents of low education, and in low status jobs, are likely to see education instrumentally, and approach academic tasks reproductively, while parents with post-secondary education are more likely to value education for its own sake, and try to understand what they learn. It seems likely that their children pick up these orientations from home.

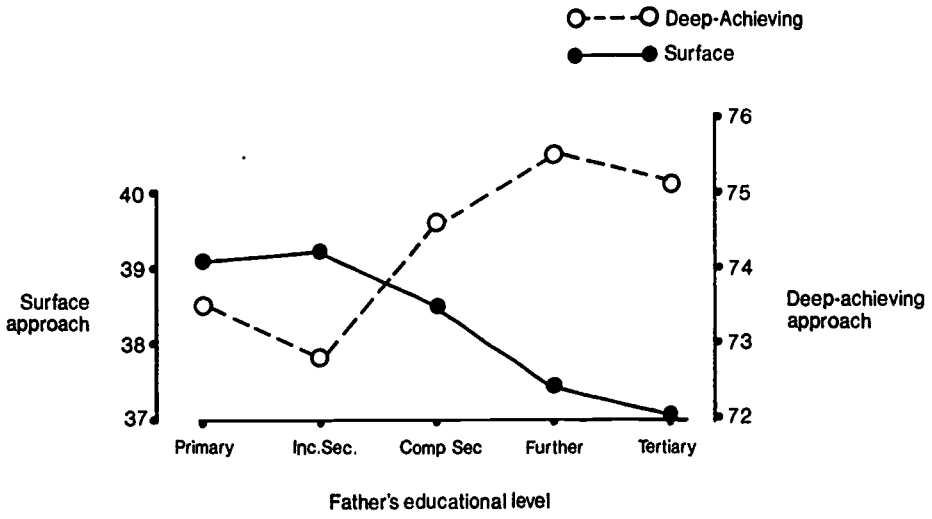


Fig. 4.1 **Father's education and Surface and Deep-Achieving Approaches (Age 14 and Year 11 combined)**

(b) Individual differences

Two individual difference variables were included in the initial testing, word knowledge (WK) and internal locus of control (LC) (see p. 25) for brief descriptions of these tests). In order to give some idea of the correlates of these variables, Table 4.13 presents these with each other, with self-rated performance, and with satisfaction with performance, for the two age samples. There were no significant sex differences, so males and females are combined.

Table 4.13 **Correlations between Word Knowledge, Locus of Control, Self-Rated Performance, and Satisfaction with Performance**

		N	LC	SRP	SAT
Word Knowledge	Age 14	1367	.37**	.30**	.07*
	Year 11	984	.24**	.28**	.02
Locus of Control	Age 14	1367	–	.26**	.16**
	Year 11	984	–	.20**	.09**

Decimals omitted. *p<.05; **p<.01

Students with an internal locus of control tend to be brighter, to rate their achievement more highly, and, to a lesser extent, to express satisfaction with performance; all correlations are slightly but consistently lower in the Year 11 sample. Brighter students naturally enough rate their performance more highly, but by Year 11 do not feel more satisfied with their performance, possibly because by then bright students have set themselves correspondingly higher goals.

The correlations between these two variables and the LPQ scales are given in Table 4.14

Table 4.14 Correlations between LPQ scores and Word Knowledge and Locus of Control

		Age 14				Year 11			
		Male	(644)	Female	(709)	Male	(462)	Female	(517)
		WK	LC	WK	LC	WK	LC	WK	LC
Surface	M	−16**	−08*	−16**	−06	−26**	−03	−28**	−15**
	S	−13**	−16**	−15**	−26**	−18**	−29**	−17**	−21**
	A	−17**	−15**	−19**	−20**	−27**	−20**	−27**	−22**
Deep	M	03	12**	00	13**	05	11*	−03	08
	S	02	08*	−02	08*	06	15**	01	07
	A	03	11**	−00	12**	06	15**	−01	09*
Achieving	M	09*	19**	04	17**	[illegible]	24**	04	20**
	S	−07	06	−03	12**	−12*	17**	−14**	11*
	A	01	15**	00	17**	−06	24**	−06	18**
[illegible]									
Achieving	A	02	15**	−00	16**	−00	23**	−04	15**

Decimals omitted. *$p<.05$; **$p<.01$

The correlations are fairly stable across sex and age; if anything, they change more with age than with sex. With surface-related scores, there is little difference between motives and strategies. The overall SA scale gives the picture, which shows that students adopting Surface Approach tend to be of low verbal ability, and of external locus of control. The relationships are stronger at Year 11 than at Age 14. It is likely in fact that as low ability and high external students progress, they are more likely to pick up a surface approach, which requires less ability (rote learning) and an externalized criterion for learning (Biggs and Das, 1973).

Deep-related scores are unrelated to ability at either age level or with either sex. This is particularly interesting given that DA is related to performance, either subjectively or objectively measured to high quality performance. This is rather important, as it suggests that performance may be improved by students *throughout* the ability range by encouraging them to adopt a deep approach if they do not do so already. Deep-related scores are, however, consistently related to an internal locus of control. This is also to be expected (Biggs and Das, 1973) and indeed the original approach was called 'internalizing' (Biggs, 1978), as it emphasized a personal involvement in learning with an internal criterion for learning adequacy.

Achieving-related scores are less simply correlated with ability and locus of control. AM is only marginally correlated with ability at Age 14, and not at all by Year 11. In other words, bright and dull alike may be ambitious. At Age 14, AS is unrelated to ability, but correlates negatively by Year 11 for both boys and girls. In interpreting this, it must be remembered that this strategy relates positively with performance (see Table 4.6) and with satisfaction (see Table 4.7), and characterized the approach of CAE students who rated themselves as 'Excellent' in performance (see p. 62). It seems reasonable to conclude, then, that the Achieving Strategy is an adaptive one, and more likely to be used by low ability, internally controlled students. Apparently

externally controlled low ability boys have yet to realize even by Year 11 that it might be a good idea to start organizing their work.

The question of interaction between WK, LC, and the LPQ scores with respect to their joint effects on performance is an interesting and important one. It raises other complex questions, however, and is considered in more detail in Chapter 6.

SUMMARY AND CONCLUSIONS

In this chapter a great deal of empirical data has been reviewed. The material provides much information about what the LPQ scales and subscales measure, and was obtained from the two norming samples, which were carefully selected to represent with considerable accuracy the populations of all 14-year-olds attending Australian schools, and all Year 11 students.

Year and Sex were considered together, and it was found that many scales and subscales did change over the period from middle to senior high school, and differently for boys and girls. The Surface Approach (SA) was the least complicated, showing a decline from Age 14 to Year 11 in both sexes. Boys were higher than girls at both levels. The Deep Approach (DA) showed opposite movements: boys declined from Age 14 to Year 11 whereas girls increased. The Achieving Approach (AA) stayed fairly constant for girls, but declined again for boys. The composite Deep-Achieving Approach (DAA) repeated the last pattern: a slight gain for girls but a substantial drop for boys. These changes over time appeared to be more closely associated with exposure to number of Year levels in school than with age alone. DAA represents an intrinsically motivated, organized search for meaning in school learning—a 'scholarly' approach—and it is disquieting to find that increasing exposure to high school diminishes this approach in boys. Why it does so for boys and not for girls is not clear: the answer may reside in school, or in a broader societal context.

Favourite Subject groups showed consistent differences in SA and DAA, the Maths–Science and Humanities groups (that is, the 'academic' subjects) having highest DAA and lower SA than remaining subject groups or No Preference group.

Future Education Plans correlated significantly with the LPQ scales in the manner expected. The longer a student intended to continue in formal education, the higher the deep- and achievement-related scores, and the lower the surface-related ones.

Performance relationships were complex. The only concurrent estimates of performance in the major samples were subjective self-estimates of performance (SRP) and levels of satisfaction with performance (SAT). SA related to low SRP and in girls was related with low SAT; while both DA and AA, and of course their composite, DAA, consistently related to high self-estimates both of performance and of satisfaction.

These relationships were not as strong when the scales were correlated with subsequent HSC performance. When they were broken down into performance in favoured, or non-favoured, subjects, however, the correlations became stronger. In particular, DAA correlated significantly only with the preferred subject; SA correlated negatively when a subject preference was registered, but SA and DAA correlated zero when no preference was expressed. The approaches in other words tend to relate more strongly to performance when some degree of commitment or interest in the academic task is displayed by the student.

Ethnicity was related to approach to learning, in that those with English as a first language were lower on DAA than ESL students, with Australian-born students of foreign-speaking parents in between. There was no evidence, in comparing European or Asian first languages, to suggest that particular languages or language families related more strongly to DAA than any other. Further, these relationships were not stronger for motives as opposed to strategies: the superiority of ESL students on DAA was not simply a motivational question. It is certainly possible, and consistent with other evidence, that coping with a second language actually deepens one's approach to learning, although it may take some considerable time for that approach to manifest its effects on the outcomes of learning.

Socioeconomic Status of parents was measured on the 16-level Broom-Jones Scale, but differences were not very pronounced. Children of clerical workers were found to be highest on SA, and children of the highest SES group the lowest. Miners' children were highest on DAA and graziers the lowest. These data however were not as meaningful as *parental education*, which emerged as more strongly related to children's approach to learning. Thus, children whose parents had primary or incomplete secondary schooling were high on SA and low on DAA; then as parental education increased so SA decreased and DAA increased. In other words, it is not so much SES as such, but parental (and especially father's) education that helps to influence the child's approach to learning.

Individual Differences were investigated by reference to two major variables: verbal ability (Word Knowledge) and Locus of Control. Ability had a negative correlation with Surface, but zero with Deep and Achieving Approaches; while internal LC correlated negatively with Surface, and positively with Deep and Achieving Approaches. Low ability children appear to pick up the Achieving Approach if their locus of control is internal. This interaction is investigated in more detail in Chapter 6.

In short, the findings reviewed here strongly reinforced the meaning of the various scale and subscale scores. Perhaps two findings were not in accord with expectations. The first is the Sex × Year interaction on the Deep-Achieving Approach, which showed that boys decreased in DAA in proportion to length of schooling. In fact, a similar finding emerges at tertiary level (see pp. 63-64), which suggests that this apparently discordant trend is nevertheless a valid one. The second, also out of keeping with conventional wisdom, is the relationship between ethnicity and approaches to learning. FSL students were higher on DAA than English speakers. There is, however, a body of literature that could accommodate that finding (Cummins, 1979).

Otherwise, relations with performance, favourite subject, future educational plans, parental education, and individual differences all confirmed the construct validity of the scales. The next chapter considers the SPQ in corresponding tertiary contexts.

5 Descriptive Research on the SPQ

This chapter reports research with the SPQ on tertiary populations, paralleling that reported in the last chapter with the LPQ on high school populations. As noted earlier, the constructs underlying the SPQ are very similar to those underlying the LPQ, and the results obtained by the one instrument with its population are frequently generalizable to the other instrument with respect to its population.

On the other hand, there were differences in sampling and method of administration that may limit such generalization:

1 The sampling for the LPQ was strictly random while that for the SPQ was not. In the last case, students groups were tested as they became available.

2 The administration of the SPQ was done anonymously (except in a few studies, referred to below), and so relationships with academic performance cannot be reported as frequently.

Within these limits, equivalent analyses were carried out on the SPQ and these are reported in this chapter.

1 INSTITUTION, FACULTY, AND SEX

Institution, Faculty, and Sex were used as independent variables in a three-way ANOVA, with the raw scores of the SPQ subscales and scales as dependent (Table 5.1).

All scales, with the marginal exception of Surface Motive, show either significant main effects or interactions; this finding establishes clearly the need for presenting separate norms for institution, faculty and sex. The main effects that hold up regardless of the other independent variables are summarized below.

(a) *Institution.* CAE students are higher than university students on all surface scores: motives, strategies and total approach ($p<.0001$); and university students are higher than CAE students on deep-related ones ($p<.001$). Achieving Approach scores are complicated by interactions, except for AS (organizing) which is higher in university students. Interactions are explained below. University students are higher than CAE students on the Deep-Achieving Approach ($p<.01$).

Table 5.1 Institution, Faculty and Sex effects on SPQ scale and subscale scores

	Motives and strategies					
$p<$	Surface		Deep		Achieving	
	M	S	M	S	M	S
Inst. (I)	10	01	001	10	–	005
Fac. (F)	–	000	000	10	–	000
Sex (S)	–	–	–	–	–	000
I × F	–	05	005	–	000	–
I × S	–	–	–	–	–	–
F × S	–	–	–	–	–	–
I × F × S	–	–	–	–	–	–

	Approaches			
$p<$	Surface	Deep	Achieving	Deep-Achieving
I	000	001	–	01
F	000	000	000	–
S	05	–	01	005
I × F	–	01	05	–
I × S	–	05	–	–
F × S	–	–	–	–
I × F × S	–	–	–	–

(b) *Faculty.* Faculty differences are strongest on the strategies rather than on the motives, although the general direction is the same in each case, so that the approach scores sho the strongest effects (all $p<.0001$):

Surface: Science students are much higher than Arts and Education in both sectors.

Deep: Arts students are generally highest and Science students lowest, but some differences exist with respect to Education students according to Institution (see below)

Achieving: Science students are generally highest; others according to Institution (see below).

Deep-Achieving: No difference, as the DA and AA scores cancel each other.

(c) *Sex.* With respect to motives and strategies, the strongest effect is on Achieving Strategy ($p<.0001$) with females significantly more organized than male students. This finding replicates that with the LPQ, but, unlike the secondary school samples, males were not found to be higher on Achieving Motive or Surface Strategy.

With respect to approaches, males are higher than females on Surface, with females higher than males on Achieving, Approach. The DAA scores favour females.

These effects are modified by the interactions referred to above. Those involving the DA and AA scales are graphed in Figure 5.1.

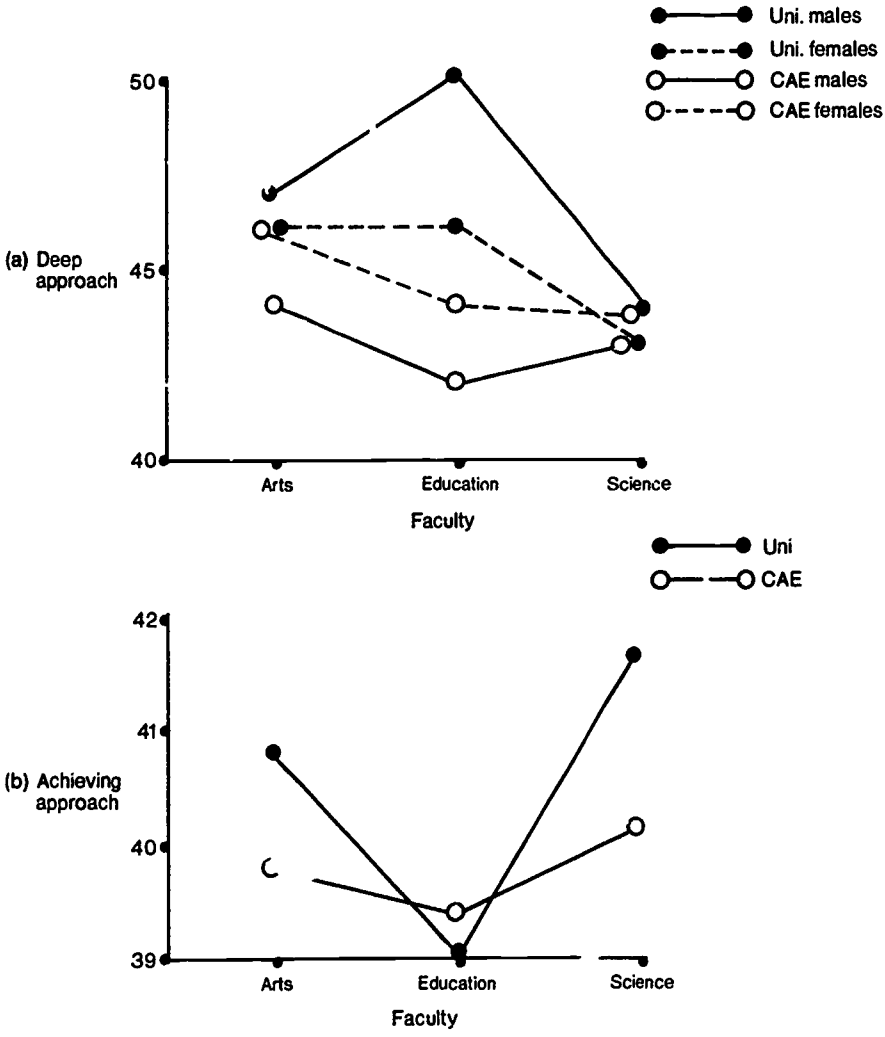


Fig. 5.1 **Institution, Faculty, and Sex effects on Deep (a), and Achieving (b) Approaches**

The main effect in which universities exceed CAEs on Deep Approach is now seen (Figure 5.1(a)) to be strongest in Education ($p<.01$), for both male and female students. This difference is worth a comment. Most (but not all) university Education students were enrolled in the postgraduate Diploma in Education, while most (but not all) CAE education students were enrolled in concurrent programs (Dip.Teach. and B.Ed.). The arguments for the concurrent program predict higher intrinsic motivation, and a deeper-related approach to teaching, than end-on (Correy, 1980), which is contrary to the pattern observed here. Likewise, year of study does not account for the difference (see next section). One is therefore left with the possibility that these data reflect genuine differences in the approach to teaching, and to teacher education in particular, between the two sectors (Biggs, 1982; Biggs and Kirby, 1983; Collis and Biggs, 1983).

The Institution × Sex interaction is seen to be due to the fact that males are slightly higher than females on Deep Approach in universities, but CAE females are higher on DA than CAE males in all three faculties. Both differences are probably due to differential selection. Students intrinsically interested in their subject matter are more likely to go to the university sector for teacher education, while those more pragmatically motivated are more likely to opt for advanced education (see also the Institution main effect on Surface Approach). In addition, however, the sex interaction with institution indicates that proportionately more DA males opt for the university, and more DA females for advanced education. These data do not, however, suggest why students should choose in this way.

The Institution × Faculty interaction on Achieving Approach is graphed in Figure 5.1(b), where it can be seen that, whereas university students are higher than CAE students in Arts and Science, CAE students are higher than university students in Education: to simplify, universities may produce the more 'academic' teachers (Figure 5.1(a)), while CAEs may produce more 'organized' ones.

2 INSTITUTION AND YEAR OF STUDY

It is important to see if there are motive, strategy and approach differences related to year of study, and if such differences vary between institutions. An initial look at the data compared the first three undergraduate years across institutions in a two-way ANOVA (Table 5.2). Motive and strategy differences were very similar to overall approach differences, so only the latter are reported.

Table 5.2 **Institution and Year effects on SPQ scale scores**

	Approaches		
$p<$	Surface	Deep	Achieving
Institution (I)	000	000	001
Year (Y)	–	01	000
I × Y	–	–	05

Table 5.3 **Faculty, Year and Sex effects on Approach scores for (a) university and (b) CAE students**

	(a) University			(b) CAE		
	Surface	Deep	Achieving	Surface	Deep	Achieving
Faculty (F)	05	000	–	000	01	001
Year (Y)	–	–	05	01	10	001
Sex (S)	–	–	–	–	10	05
F × Y	–	01	–	10	–	–
F × S	–	–	–	10	–	–
Y × S	–	–	–	–	–	–
F × Y × S	–	–	–	10	–	–

Institution effects replicate those noted in (1) above. Main effects and interactions involving Year show a decline, particularly marked in third year, in Deep Approach in both sectors; and a decline also in Achieving Approach in both sectors, but especially amongst the CAE students. The problem with interpreting t ese data, especially the institutional comparisons, is that there are important course differences between the two sectors, particularly in the meaning of 'third' and 'fourth' years. In university, fourth year means Honours in Arts and Science, or the one year Diploma in Education. In the CAE, some courses (UG2) terminate after three years, while bachelor's (UG1) terminate after four years. Proper comparisons therefore need to be made *within* each sector. Table 5.3 presents the results of a series of three-way ANOVAs with Faculty, Year and Sex as independent variables, and the three approach scores as dependent variables, for each sector.

(a) *University.* The faculties here are Arts and Science only, as Diploma of Education is only a one-year course. The only effect on SA is that Science students score higher than Arts ($p<.05$). The effects on DA are interactive and are best seen graphically (Figure 5.2).

Arts and Science students commence first year with the same level of DA, but diverge sharply thereafter; Arts increasing at first, reaching a maximum in the Honours year, and Science generally declining, reaching a minimum in third year. This might appear surprising but a similar finding is to be found in the Year effect on Achieving: in both Arts and Science, AA scores decline from first to third years, rising in Honours for Arts and remaining low in Science.

These findings for Deep and Achieving scores from first to third year parallel data reported by Watkins and Hattie (1983), who in a longitudinal study also showed that deep scores (on Entwistle's Approaches to Study Inventory) declined from first to

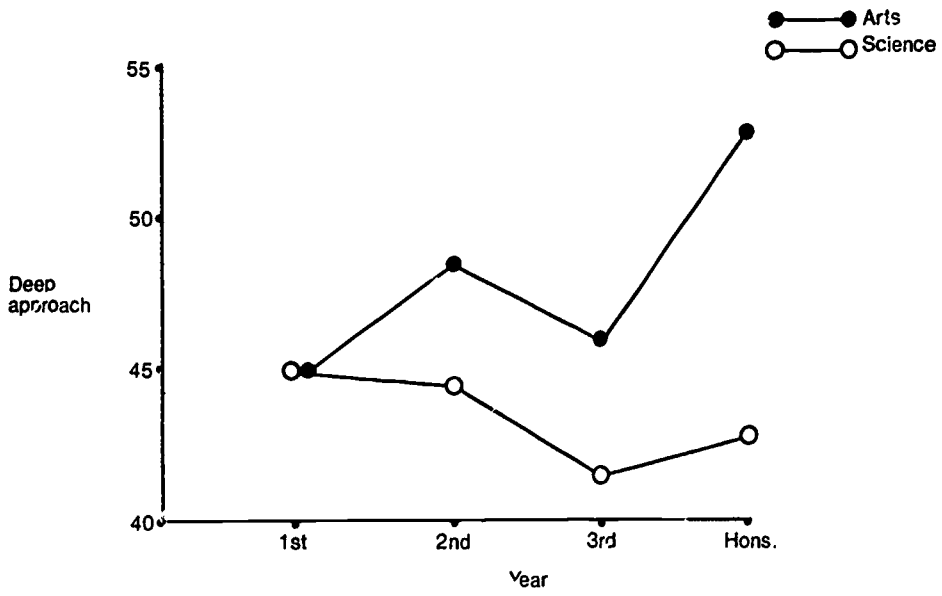


Fig. 5.2 **Deep Approach scores from first year to honours in university Arts and Science faculties**

third year. They then interviewed students about the reasons for this abrogation of the deep approach, and suggest that the fall-off is due to motivational factors brought about by low morale in the face of a perceived lack of employment opportunities, and by increased workloads and the demands made on them. They report one girl from Arts saying: 'Most of all I write what "they" like me to . . . when I get the piece of paper with BA (Hons) then I will write the way *I* want using *MY* ideas . . .' (p.22).

In the present sample, the situation in Arts appears to improve (the last comment notwithstanding) in that the Deep Approach increases strongly in Honours, but the general sentiment would explain what happens through the undergraduate years in Arts, and in Science through to Honours.

(b) *AE.* In the CAE data, four faculty groups are distinguished: Commerce and Business Studies, Arts, Education, and Science. The main effects on SA are clear-cut, the weak interactions indicating slight differences according to year and faculty. Th basic pattern is that the Commerce group are much higher on SA than the others in all years, followed by Science, then Education, with Arts the lowest. The faculties retain this order for the first three years, then all drop sharply at fourth year with the exception of Education.

Deep Approach is highest in Arts, then Commerce and Education, with Science the lowest. The fourth year is highest on DA; and females higher than males, as noted earlier. Commerce is the highest on Achieving Approach, then Science, then Arts, with Education lowest. The Year effects were simple and linear in all faculties: first years were highest on Achieving Approach, and fourth the lowest. This last finding seems to be the advanced education counterpart of the low morale problem referred to by Watkins and Hattie (1983) in universities: as the time for employment becomes closer, the students become less achievement-oriented. Whether this finding would be replicated in times of better employment prospects is unknown; these data were obtained in 1979, when the problems of teacher oversupply were already manifest.

To sum up, then, quite different results were obtained with Year of Study in each sector, and for each faculty. There were similarities and differences between the two tertiary sectors, and within faculties. Deep Approach gradually decreased in university Science, minimizing in third year; Arts scores were more varied, but maximized in fourth year. Achieving scores decreased throughout the undergraduate years in both faculties. In the CAE sector, the fourth year showed most change: decreasing in Surface and Achieving, but showing a slight increase in Deep.

3 PLANS FOR FURTHER EDUCATION

Another way of looking at the year dimension is prospectively: that is, at the motives and strategies of students when, as undergraduates, they state what they intend to do on completing the course. Students were asked to respond to the item:

I intend to finish my education

1 Before the end of this course, whether I pass or not.

2 At the successful completion of the present course.

3 After completing Honours or a coursework postgraduate qualification.

4 After completing a research higher degree.

5 Haven't decided yet.

There were only two university and five CAE students who endorsed the first alternative and so this category was dropped. An analysis of variance was carried out with Institution, Sex, and Plans as independent variables and approach scale scores as dependent variables. This is shown in Table 5.4.

Table 5.4 Institution and Plans: effects on Approach scores

	Approaches		
$p<$	Surface	Deep	Achieving
Institution (I)	000	000	–
Plans (P)	000	000	000
I × P	01	05	–

Institution effects replicate those already reported. Plans exert very strong and consistent effects on all scores, the interactions suggesting that these effects differ between institutions. These differences can mainly be attributed to differences in meaning to the term 'postgraduate' between the two sectors. The data are graphed in Figure 5.3.

CAE students are consistently higher on Surface, and the effects of Plans are less varied, but the pattern is the same in both sectors. Students planning to do research score lowest on SA, while students planning to leave after their present qualification score highest.

The shapes of the curves for Deep and Achieving are similar: students planning to leave after the present qualification score lowest, and those planning to do a research higher degree score highest on both approaches, with the 'undecided' falling between. Again, university students' DA scores vary more than CAE students' with their future plans.

These curves provide good validatory evidence for the scales. The pragmatically motivated (SA) would be expected to leave as soon as the meal-ticket has been obtained: those aspiring high in the academic world would be expected to be both achievement oriented (AA) and with a deep approach (DA) to their studies.

4 FULL/PART-TIME STATUS AND AGE

Not unrelated to the question of the year of study is that of the age of the student, and of status (full-time or part-time). It seems reasonable that the motivational patterns of full- and part-time students might differ; it is also important to disentangle any such relationships from straight age effects. Thus, Institution, Age and Status were used in a series of three-way ANOVAs with the SPQ scales as dependent variables. The motive and strategy subscale scores yielded similar patterns to the scales, so only the latter are reported here (see Table 5.5).

The institutional effects are as reported earlier. Status has no effect, except marginally on Achieving, while Age has very strong effects on all scales. In other words, differences that might be attributed to full or part-time status can best be attributed to age, and to age alone. Differences between FT and PT students, in other

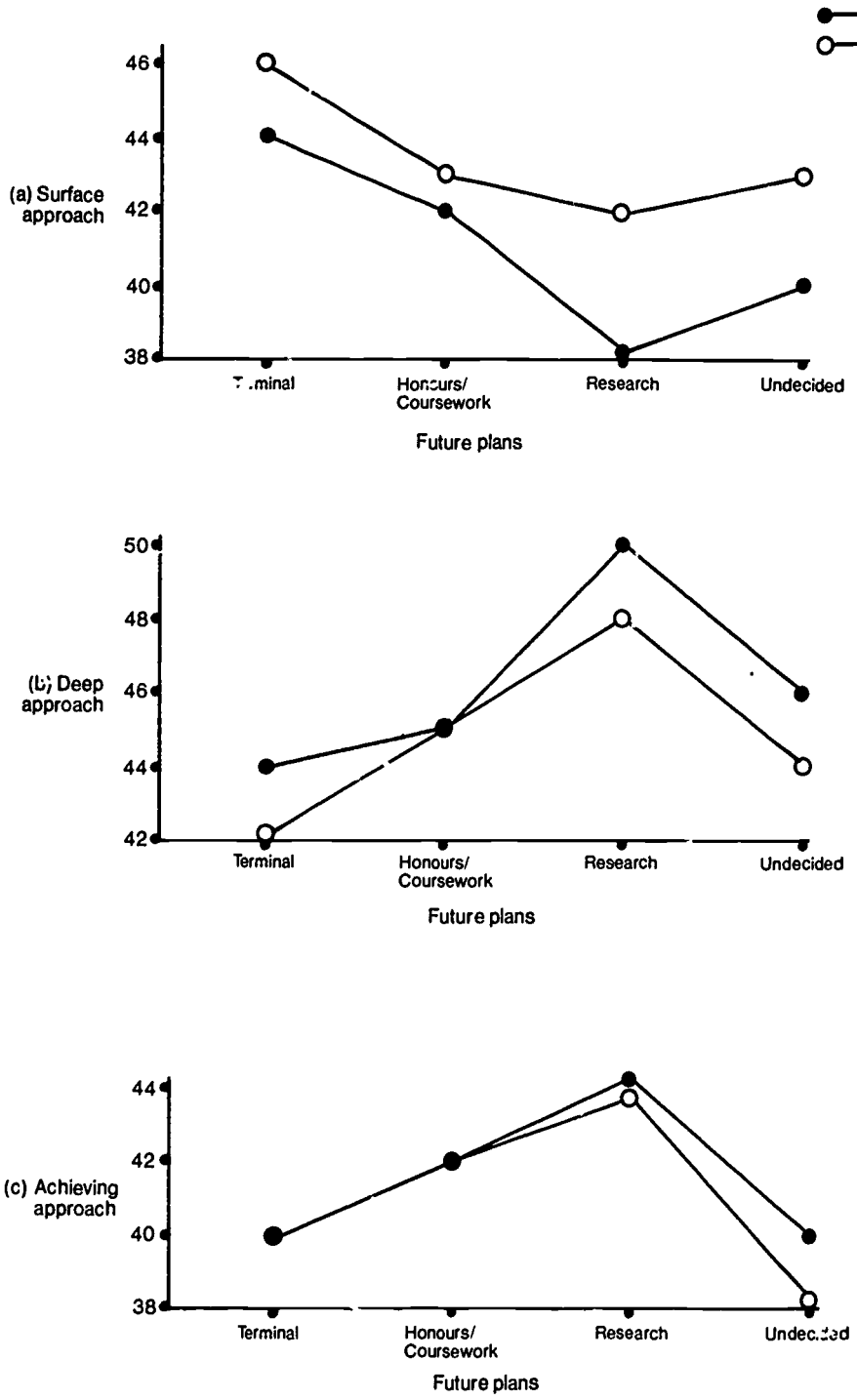


Fig. 5.3 **Effects of plans for further education on SPQ Approach scores on university and CAE students**

Table 5.5 **Effects of Age and Full/Part-time Status on SPQ Dimensions**

	Approaches		
$p<0.05$	Surface	Deep	Achieving
Institution (I)	01	05	–
Status (St)	–	–	10
Age (A)	001	0001	0001
I × St	–	–	–
I × A	–	–	–
St × A	–	–	–
I × St × A	–	–	05

words, occur simply because PT students tend to be older. The age effects are important and are graphed in Figure 5.4 (a), (b) and (c). The pattern is the same regardless of status and institution, except for a minor shift in the 40-and-over group in the achieving dimension (see below).

There is a steady drop in Surface Approach from 18 years of age to the mid-twenties, after which it stabilizes until age 39, after which there is a sharp drop. This applies to both full-time and part-time students, and to CAE and university, students.

The inverse happens to Deep and Achieving Approaches, both of which reach a minimum at age 22, but increase in a strong, linear fashion thereafter. The interaction (I × St × A on AA) is mostly concerned with the 40-and-over group: full-time university students scoring highest on Achieving, and part-time university the least, with part-time CAE students scoring nearly as high as full-time university students. At age 22, however, part-time university students were the highest, and part-time CAE students the lowest. The reasons for this are not immediately evident, and do not alter the main picture.

In terms of motivation, what seems to be happening is that the material and psychological costs of entering a tertiary institution tend to increase with age: older students thus have more to give up, and would need to be increasingly intrinsically or achievement motivated (or both) than younger students. Correspondingly, younger students are more pragmatically or instrumentally motivated: they are more likely to have the 'meal-ticket' mentality. On the strategic side, it seems that the strategies of wide reading, and relating to one's personal experience, and of organizing one's activities, are more readily acquired in real life than in the classroom; that the further one is away from the classroom in time, the more likely one is to use these deep approaches to study, and the less likely to see study as reproducing set material. This general pattern is well established and has been replicated several times (Entwistle and Ramsden, 1982; Moylan and Biggs, 1983; Watkins, 1982*a*; Watkins and Hattie, 1981). It is ironic that while mature-age students in fact have a more 'academic' approach to their studies than do younger students who proceed direct from secondary to tertiary study, the former tend to feel that they are out of touch with study technique, and seek assistance more readily.

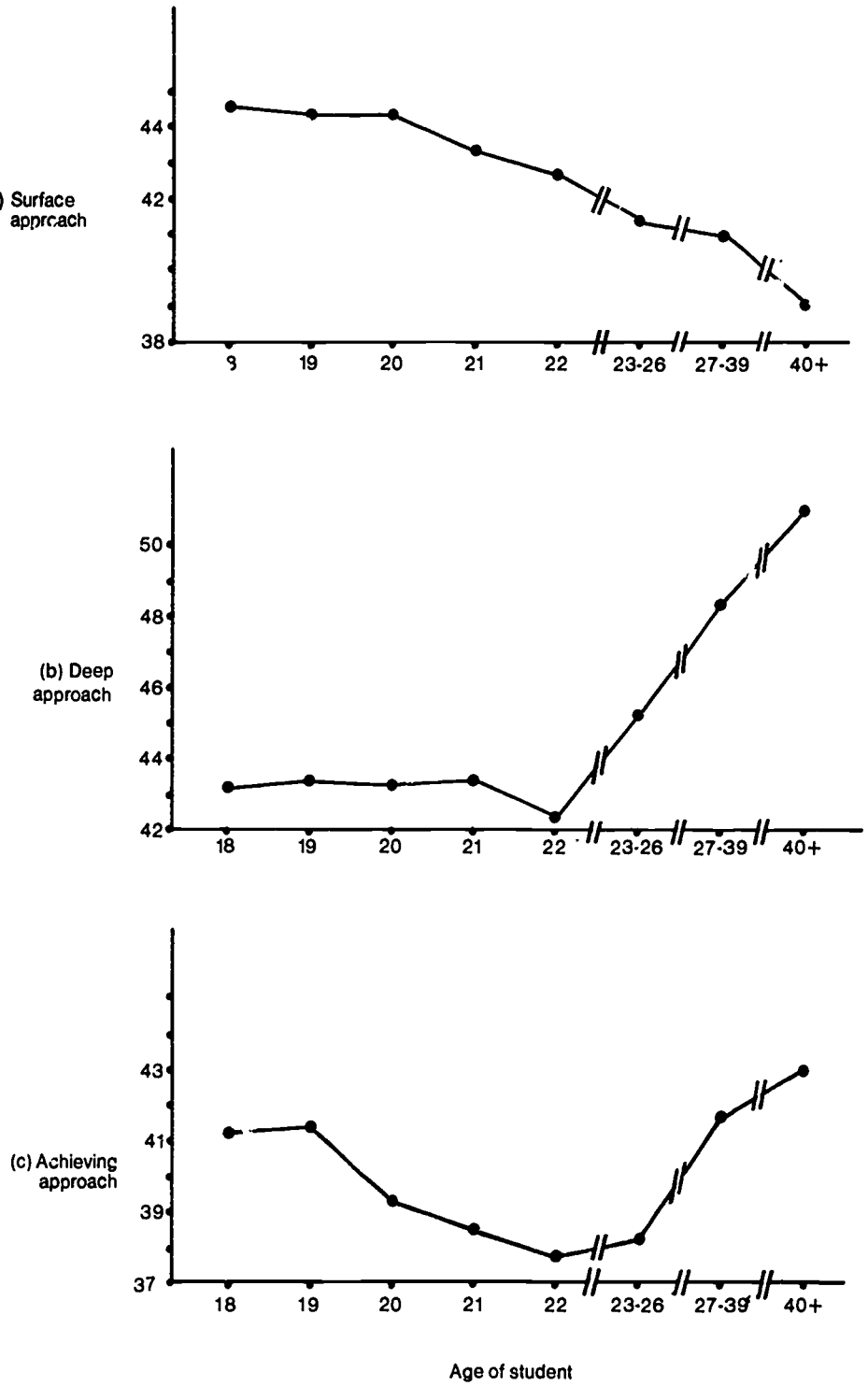


Fig. 5.4 **Age effects on SPQ approach scores**

5 PERFORMANCE

Major performance measures were the two self-ratings: self-rated performance (SRP), on which students were asked to rate their performance, relative to peers, on a five-point scale; and satisfaction with performance (SAT), which was a five-point rating scale asking students how satisfied they were with their performance. Unfortunately, the SPQ had to be administered anonymously in the norming samples, so that it was not possible, as it was with the Year 11 sample, to link SPQ score with examination or other objective measures of performance. Objective performance data were obtained in a couple of independent studies, as reported below.

The correlations between subjective measures of performance and the SPQ scales, including DAA, are given in Table 5.6, separately for each type of institution and faculty. Sex differences were minimal, and so to simplify presentation males and females are combined.

1 Approach (scale) scores usually, but not always, correlated with SRP as well as, and sometimes better than, either one of the component motive or strategy subscales. The motive and strategy work in generally the same direction, with the motive generally relating more strongly to SRP than the strategy. Given the higher reliability of the scales over the subscales, and the fact that it is easier to deal with three rather than six scores, it would generally be more convenient to use approach scores rather than individual motives and strategies.

2 Nevertheless it sometimes happens that a motive and its related strategy work in different directions, as is frequently the case for correlations with SAT. For example, the correlations involving the Achieving Motive subscale are usually negligible, whereas those involving Achieving Strategy are uniformly and relatively strong: students who organize consistently (high on AS) are more satisfied with their performance even though they do not see that their performance is relatively better as a result. It is possible that there is some dissonance reduction at work: students who go to the trouble of organizing their work (AS) feel satisfied that they are doing the right thing by their studies, even if it makes no difference to their self-perceived performance.

3 These motive and strategy correlations are of course directly comparable with those reported in Table 4.5 for the secondary school samples. It will be seen that for SRP they are quite comparable in size (the secondary school counterparts attain a higher level of significance only because of greater degrees of freedom), but those with SAT are consistently lower in the tertiary sample. A possible explanation for this is that the variance for SAT ratings is more restricted in the tertiary sector; in effect, the meaning of the rating changes. To be 'dissatisfied' as a low-achieving secondary school student who intends to leave school as soon as possible is clearly very different from being 'dissatisfied' as a high-achieving university student. In the former case one would expect a closer relationship between satisfaction and approach to learning, but in the latter, dissatisfaction could easily be linked with good performance and a positive approach.

4 The Deep-Achieving Approach (DAA) is included here, but it does not seem to be as useful as with the high school samples, and it should be remembered that the factor structure was not quite as clear in the tertiary samples (see Table 2.4). Nevertheless, as a consistently robust representation of a 'good' or 'scholarly' approach to tertiary learning, it is useful. More fine-grained analysis is obtained by looking at DA and AA separately.

Table 5.6 **Correlations between SPQ scales and subscales and (a) Self-Rated Performance (SRP), and (b) Satisfaction with Performance (SAT)**

		University			CAE		
		Arts	Education	Science	Arts	Education	Science
	N	407	208	208	97	975	478
(a) SRP							
Surface	M	−18**	−09	−24**	−04	−08*	−10*
	S	−12*	−14*	−13*	−10	−09**	−10*
	A	−18**	−14*	−22**	−08	−10**	−12*
Deep	M	22**	33**	13*	24*	15**	21**
	S	18*	22*	11	16	15**	25**
	A	22**	30**	14*	23*	17**	96**
Achieving	M	28**	19**	32**	17	25**	17**
	S	02	14*	13*	08	10**	19**
	A	19*	20**	27**	16	22**	21**
Deep-Achieving	A	24**	28**	24**	21*	22**	26**
(b) SAT							
Surface	M	−04	02	04	09	05	12*
	S	−04	02	04	17	01	06
	A	−05	00	00	15	03	11*
Deep	M	08	16**	11	02	05	13**
	S	13**	00	08	16	06	17**
	A	11*	09	11	10	06	17**
Achieving	M	01	12	10	16	08*	10*
	S	22**	21**	27**	36**	18**	25**
	A	15**	20**	23**	31**	17**	21**
Deep-Achieving	A	15**	21**	08	25*	12**	22**

Decimals omitted. * $p<.05$; ** $p<.01$

5 In looking at faculty differences, surface-related scores correlate most strongly with SRP (negatively) in Science, then with Education, and least with Arts, averaging across both institutions. Deep-related scores correlate most in Education in universities and at lower level in CAEs, and least with university Science. Achieving-related scores correlate fairly evenly across all faculties. These data indicate that each sector has its own pattern of correlations. University Arts and Education behave similarly while CAE faculties behave differently from each other. These institutional differences in correlations supplement the differences in approach score means reported in Section 1 above.

To sum up, then, the Deep and Surface Approaches relate differently to rated performance according to faculty, but except in CAE Science, do not relate to satisfaction

with performance. The Achieving Approach relates to self-rated performance, and the Achieving Strategy to satisfaction with performance, virtually irrespective of faculty in each case.

These data may be compared with correlations with actual performance obtained in an independent study in one university by Watkins and Hattie (1981). Corresponding motive–strategy (but not approach) correlations with grade-point average (GPA) obtained in four different faculties are reproduced in Table 5.7 below.

Here it is seen that there are two basic patterns: surface-related scores correlating most strongly (negatively) with performance in the science-related faculties, and deep-related with performance in Arts (together with Achieving Strategy). Deep Motive was the only significant correlation in Economics. It is encouraging that the size and patterning of the correlations with objective performance by faculty correspond well with the correlations obtained in the present study using self-rated performance.

On the question of faculty differences, it is worth recalling (from Table 5.1) that the Science students scored *highest* in Surface Approach yet it is that approach that relates most negatively to performance. In other words, it looks as though the students entering Science are those least likely to do well in that area! This is in contrast to the corresponding Arts data, which show that Arts students tend to be high on Deep Approach, but that is appropriate since that scale correlates positively with performance (whether subjectively or objectively measured). The difficulty can be resolved by reference to the nature of the science task. Specifically, sciences need *both* surface- and deep-related approaches; surface to focus on the fact and detail of formulae and procedures, and deep to understand them (Biggs and Kirby, 1983). Students who relied *only* on a Surface Approach would do poorly. In other words, students entering Science from school would tend to be high on surface-related scores, but would not go far if that is all they had: they need also to be able to handle a deep approach too.

There is another seeming inconsistency. At high school, students nominating Mathematics or Science as a 'favourite subject' tend to be low on surface and as high on deep-related scores as are humanities-oriented students (Table 4.3). Yet by first-year university, Science students are higher on surface, and equal on deep (Figure

Table 5.7 **Correlations between SPQ scales and GPA (from Watkins and Hattie, 1981)**

		Arts	Science	Rural science	Economics
N		113	53	22	61
Surface	M	−17	−39**	−46*	−01
	S	−08	−40**	−52**	−14
Deep	M	40**	26	38	30*
	S	24**	07	15	00
Achieving	M	15	−05	−13	−09
	S	31**	09	11	17

Decimals omitted. *p<.05; **p<.01

Table 5.8 **Effect of Institution, Sex, and Self-Rated Performance on SPQ subscale scores**

	Surface		Deep		Achieving	
	M	S	M	S	M	S
Institution (I)	01	05	01	-	–	–
Sex (S)	–	10	10	05	–	001
SRP (P)	000	000	000	000	000	01
I × S	–	–	10	–	–	–
I × P	–	-	–	–	–	01
S × P	–	05	05	–	–	05
I × S × P	-	–	05	–	–	–

5 2), and they diverge progressively from each other thereafter. These patterns probably reflect both self-selection *vis-á-vis* the two faculties, and moulding by the arts and science tasks (Biggs, 1970*a*).

An interesting difference between university and CAE students emerged when SRP is ta' en as an independent variable, along with institution and sex. The ANOVA is given in Table 5.8.

The main effects replicate those already noted. The interactions on DM are complicated, and are caused by the fac that females in CAEs in the 'Below Average' category happen to be very highly intrinsically motivated. Otherwise, DM increases monotonically with SRP. The interesting interaction is that on the Achieving Strategy subscale ($p<.01$), and is depicted in Figure 5.5.

While all below-average students are low on Achieving Strategy, students who rate themselves 'Excellent' are very high on AS in CAEs but only moderately so in universities. It turns out that these 'Excellent' university students are very high on Deep Approach, but CAE students only average. This appears to be a crucial difference

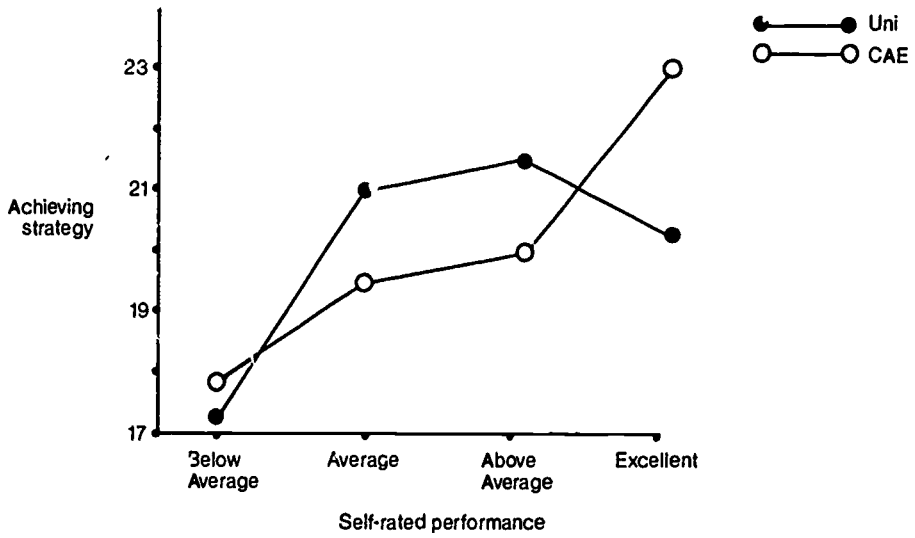


Fig. 5.5 **Effects of Institution and Self-Rated Performance on Achieving strategy**

between the sectors: 'excellence' in CAE students is associated with organization, and in university students with intrinsic motivation and a deep approach.

The performance studies reviewed here are much fewer than those available for the LPQ. Where the analyses are comparable (as in correlations with subjective assessments of performance), the findings are equivalent, despite the possible bias in the tertiary sampling. In both secondary and tertiary populations, Surface Approach relates negatively to self-rated performance, the other two approaches relate positively. The Achieving Strategy is unique in that it relates with satisfaction more strongly than with performance. Independent research (Watkins and Hattie, 1981) found rather higher correlations with objective performance (GPA) than those found here with SRP, but the faculty pattern was similar: surface-related correlating most in Science (negative), and deep-related in Arts (positive).

These findings, together with those already cited in Chapter 4, indicate that the approaches to learning, and their component subscales, have consistent relationships with performance in ways that confirm the construct validity of the scales.

6 DEMOGRAPHIC VARIABLES

The CAE and university samples were presented with questions about ethnicity, parental education, and socioeconomic status similar to those asked of the secondary samples (reported in Chapter 4, pp. 41-42).

The first factor examined was Country of Birth. There were relatively few born outside Australia, and so CAE and university samples were combined and then sorted into five groups according to country of birth: Australia, Great Britain, Europe, Asia and Other (mainly African and Middle Eastern). Table 5.9 shows this information.

The Australian sample is significantly higher on Surface Approach than Great Britain and Other, contrary to the secondary school sample which showed no difference between any groups. The Asian sample is also high on SA, but there were too few in this group to make comparisons reliable. As non-Australian-born students tend to be older than Australian-born ($p<.05$), a higher proportion of the latter would be under 22 years of age, having come straight from school to tertiary studies, and could be higher on Surface for that reason (see Figure 5.4).

Other was significantly higher on Deep Approach than Great Britain and Australia, which was also true of the secondary school Deep-Achieving score. There were no differences on Achieving.

In short, Australian-born were higher on Surface and lower on Deep Approach than non-Australian-born students. This could reflect the differential effects of

Table 5.9 **Country of birth of student and approach scores (university and CAE combined)**

Country of birth	Australia	Great Britain	Europe	Asia	Other	
N	2240	181	36	29	82	$p<$
Surface	43.4	42.2	42.1	44.7	41.6	.05
Deep	44.0	45.2	45.1	46.1	47.7	.001
Achieving	40.1	39.4	40.9	39.8	41.4	–

schooling, but it is more likely a matter of maturity; Australian-born students being on average slightly younger than non-Australian-born ones.

Degree of ethnicity was assessed by comparing English, mixed, or foreign, first language groups on the three approaches, but there were no significant differences between the groups on any dimension. This was in contrast to the high school situation (see p. 42) where students with English as a second language were found to be higher on the Deep-Achieving score. The groups were then compared on DAA and this time the foreign first language group was significantly higher than both the Mixed and English-as-first-language groups ($p<.01$). The sample was then divided on the basis of their answer to the question 'Is English the only language spoken in your home? Yes/No' and their SA and DAA scores computed for the Yes (N = 2264) and No (N = 326) groups so formed. There were no differences on SA, but the No group was over three points higher than the Yes group on the Deep-Achieving Scale ($p<.001$). The general picture with regard to ethnicity, then, is that deep-related scores are higher in ESL students. This applies at the tertiary and secondary levels, although it is perhaps less pronounced at the tertiary level due to the more highly selected nature of the tertiary samples and to the covariation of age with ethnicity.

The next demographic factor was socioeconomic status of the breadwinner's (usually the father's) occupation, as assessed by the scale devised by Broom et al. (1977). (The scale and how it is used have been described previously on p. 43; see also Table 4.10.) There was evidence of some slight interaction with institution and the data were analysed separately for each sample. Table 5.10 presents the occupations that were significantly high or low on the three dimensions.

It seems that children of particular occupational groups are differently oriented to tertiary study according to the particular kind of institution they enrol in. The number in parentheses after each occupation is the scale level of that occupation (1 is highest, and 16 lowest, in socioeconomic status). The entries in the 'high' and 'low' cells comprise occupations that are significantly different from each other on the scale in question, within each population. Generally speaking, there was agreement in the rank

Table 5.10 **Parental occupations scoring high or low on the scale scores for university and CAE students**

Approach		High	Low
Surface	CAE	Armed Services (8) Skilled craftsmen (9)	Professional (1) Graziers (2) Managers (3)
	Uni	Graziers (2) Miners (14) Factory workers (15)	Public servants (6) Transport (11)
Deep	CAE	Medium farmers (5) Labourers (16)	Armed services (8)
	Uni	Service (eg. waiters) (13) Labourers (16)	Miners (14)
Achieving	CAE	Armed services (8) Labourers (16)	Graziers (2) Shop assistants (14)
	Uni	Graziers (2) Factory workers (15)	Medium farmers (5) Labourers (16)

orders in the two samples but there were occasional reversals, with the highest for the CAE being lowest for the University sample and vice versa. Particularly dramatic is the case of children of graziers, who are particularly high on Surface at university but low at CAE, and high on Achieving at university but low at CAE. This twice-repeated interaction is almost certainly due to the different courses available; CAEs offer agriculturally-related courses of particular interest to these students, while at university they would be enrolled in Arts, Science or Education, where they are high on both Surface and Achieving Approaches. Labourer's children show another interaction, being high on Achieving Approach at CAE and low at University; while they are high on Deep Approach at both institutions. Children of armed service personnel provide a group of Surface-Achievers at CAE, being high on SA, low on DA, and high on AA.

There is however only minor agreement with similar data from the secondary samples (see Table 4.11). The actual levels of status from 1 to 16 were used as scores and correlated with Approach Scale Scores to see if any trends could be discovered but there was no evident relationship between approach to learning and status as such.

When parental education is taken as an independent variable, a clearer picture emerges with no interactions with institutional type. The following categories were provided in the question relating to highest level of education reached by each parent:

1 Primary school only
2 Some secondary school
3 Completed trade certificate
4 Finished secondary school (Year 12/HSC)
5 Further post-secondary training, but not graduating from college or university
6 Graduated from college
7 Graduated from university
8 Don't know

The combined data for father's education are presented in Table 5.11.

Children having parents without post-secondary education are higher on Surface Approach than those with post-secondary education. This is directly parallel with the findings on the Surface scale with the secondary samples (Table 4.12). Deep Approach scores a rough U-shape with increasing parental education: primary educated only are highest, then the post-secondary groups, with varying degrees of

Table 5.11 Father's education and SPQ approach scores (university and CAE samples combined)

Level fathers' education	Primary	Secondary	Trade	Year 12	Post secondary	College	University	$p<$
N	216	808	485	214	221	213	379	
Surface	43.5	43.5	43.7	43.9	42.5	43.0	42.2	.05
Deep	45.9	44.0	43.8	42.9	45.7	44.5	44.2	.001
Achieving	41.5	39.7	40.6	39.7	40.9	40.1	39.3	.05

secondary-education falling lowest, which is similar to the secondary group, except that there the tertiary educated were highest. The present superiority of the primary educated group is no doubt due to the selectivity of the tertiary sample: poorly-educated parents with bright children going on to university are rather a special group, and indeed are more achievement oriented than the other group.

To sum up this section, there are background demographic factors that affect the scale scores but the picture in general is not as clear as it was at secondary level, where there is much more variance in academically related characteristics. In general, however, the findings support the meaning of the scale scores.

SUMMARY AND CONCLUSIONS

In this chapter empirical studies have been reviewed that provide much information about what the scales and subscales measure, and some background for deciding how they may be used. Most of the research material was obtained from the university and CAE norming samples, but some reference was made to other studies in order to elaborate particular points.

Institution, Faculty and Sex either singly or in interaction showed significant effects on every scale and subscale, thus establishing the need for providing separate norms within the 12 groups so defined. On Surface Approach, CAE students scored higher than university students, Science higher than other faculties, and males higher than females. On Deep Approach, university students were generally higher than CAE students, but there was an interaction with Sex, showing that males were higher on DA in universities, but females were higher in CAEs. Arts students were highest on DA, and Science students low, with Education students high in universities but low in CAEs. On Achieving Approach, Science students were generally high, with Arts students high in universities, and Education students particularly low. Females scored higher on AA than males.

These results fit generally with expectations concerning the selectivity, philosophy and course structuring of the two sectors; and concerning the typical kind of task undertaken within each faculty. Arts attracts students with relatively high DA scores and low SA; Science ones high on both SA and DA. This creates some problem, however, because students with too high a Surface Approach in relation to Deep tend to do poorly in Science. Students scoring high on Deep Approach, however, appropriately do well in Arts, whether performance is measured by subjective self-estimate or by grade-point average.

Year of Study showed strong effects on Deep and Achieving Approaches, both tending to decline from first to third year, AA particularly in CAEs. Because of structural differences in university and advanced education courses, within-institution analyses were conducted to investigate this further. In the university sample, the decline was least in Arts, and in fact was dramatically reversed in Honours, Arts Honours students being very high on DA. Science students, however, start with the same level of DA as Arts, but then decline, levelling out at third year. Somewhat similar trends occur in CAE's, with third year being the lowest for DA, except in Education which declined steadily from the first year onwards. AA scores also declined steadily from first to fourth year in the CAE sample.

Such findings are only partly in accord with expectations, as one would expect DA to increase with further educational experience. On the other hand, other inves-

tigators have reported similar trends, and attribute the cause to concern over unemployment and increasing work demands over the years.

Plans for Further Education at the completion of the present course related strongly and predictably with each approach to learning, with interactions according to institution. As students planned more and more formal education, so did SA decrease and DA and AA increase, with such covariation being stronger amongst university than amongst CAE students.

Full-Time or Part-Time Status, and Age effects were compared and it was concluded that any effects of full-time or part-time status independently of age were minimal, while age effects were most pronounced. Surface Approach declined from age 20 onwards, being minimal at 40 and over, while Deep Approach increased strongly after age 22. Achieving Approach was U-shaped with age, being moderately high in the late teens, minimizing at age 22, then increasing thereafter, being highest at 40 and over. Ironically, it seems that students are more likely to pick up academically-oriented motivations and strategies the longer they are away from the classroom. How does one explain this? On the motivational side, older students would need to be highly motivated to come back as a full- or part-time student. This does not, however, explain the strategic side of the effect: it seems that the experience that comes with maturity tends to teach them to read widely, and to seek out the meaning of a topic in an organized kind of way. While these motivational effects could be explained by increasing selctivity of intake with age, it is less plausible to explain the strategy effects in this way, because mature age students, ironically, *feel* less organized in their approach to study. The implications of this are discussed further in Chapter 6.

Performance variables could not be as adequately researched here as they could with the secondary samples because the need to administer the SPQ anonymously precluded matching examination results with SPQ scores. However, relations between subscale scores and self-rated performance and satisfaction were similar in the secondary and tertiary samples. Achieving Motive was related to good self-rated performance, but the Achieving Strategy (organizing) had low correlations with performance, but consistently high correlations with satisfaction. Students who organized their approach to work, in other words, did not necessarily see themselves as performing better, but they *felt* better.

Faculty differences have been mentioned: surface-related scores are particularly associated with poor performance in Science, and deep-related scores with good performance in Arts.

An interesting interaction with institution showed that self-styled 'Excellent' students from the CAE sector saw themselves as particularly high on the Achieving Strategy, while their university counterparts scored particularly high on Deep Approach.

Other and more complex relationships to performance are considered in the next chapter.

Demographic factors had similar relationships to the scales as were found in the secondary school samples, although the effects were not as strong here, due possibly to restricted variance in the tertiary samples. Australian-born students, possibly because they were younger than other ethnic groups, scored high on Surface Approach, along with Asian students. Otherwise, ethnicity was associated with Deep Approach, possibly arising from the need to deal with bilinguality from an early age.

Scale differences on socioeconomic status of the main breadwinner were found, but the picture was confusing as CAEs and universities, due to their different faculty mix, appeared to be attracting differently-motivated students from the same parental occupations—children of graziers and of armed services personnel in particular appeared to be drawn to each sector for quite different reasons. Taking parental education *per se* as the point of departure, however, a much clearer picture emerged with no institutional interactions: students with parents having post-secondary education were low on Surface and high on Deep, but the highest of all on Deep and Achieving were tertiary students whose parents had had primary education only. These latter seemed an exceptional and highly-motivated group.

The data reviewed in this chapter provide evidence for the construct validity of the scales, and should alert users to groups of students that might be expected to have exceptionally high or low scores on particular scales. The next chapter looks at more experimental and detailed research that further adds to knowledge about the theoretical nature of both LPQ and SPQ scores. and an elaborated model of student learning, based on the wide range of research reviewed is outlined. The final chapter discusses in detail the uses and applications of the LPQ and SPQ.

6 Towards an Elaborated Model of Student Learning

INTRODUCTION

The previous two chapters have outlined essentially descriptive research that dealt with the reliability of the scales and subscales; sex, institutional, and age differences on scale scores; differences associated with subject specialization, educational plans, socioeconomic status, parental education and ethnicity; and general linear relationships with performance. Yet to be discussed is research addressing more generalized and theoretical issues that would help pin down aspects of the model outlined in Figure 2.1, and thus give adequate conceptual support to practical applications of the LPQ and SPQ. Some of this research has already been reported in the literature, and is summarized here, while other work is reported for the first time.

First, we look in more detail at the ways in which the approaches to learning involve qualitatively different *kinds* of performance outcome. Second we interpret those relationships, and others involving ability and locus of control in particular, to develop an elaborated model of learning based on the concept of *metalearning*.

Thus, for example, relationships with performance directly imply the so-called congruence hypothesis first alluded to in Chapter 2 (pp. 12-13, Nos 3 and 7). This hypothesis states, first, that students motivated in certain ways will tend to *select* learning strategies that are congruent with their motives; and second, that congruent motive–strategy combinations will be more *effective* than non-congruent ones. Congruent strategy selection makes certain assumptions about the metacognitive sophistication of students.

The metacognitive issue has two aspects: students' *awareness* of their motives, of their abilities, and of the task demands; and their ability to *control* those strategies deemed most appropriate to handling the task within those self-perceived constraints. Several analyses are presented that suggest the course of development of these aspects of awareness and control.

A long-standing debate in the student learning literature concerns the question of whether a student's approach to learning is situationally determined by the immediate learning context, or is a matter of an enduring learning style that is characteristic of the individual. The question is important for deciding how to interpret the

LPQ and SPQ scores themselves, and it is considered in the light of evidence reviewed here.

This chapter, then, raises several fundamental issues about the theory and use of the LPQ and SPQ that need to be cl.ared up before looking at practical matters of putting the scales to use in the classroom.

QUALITATIVE EFFECTS ON PERFORMANCE

We have seen in Chapters 4 and 5 that the LPQ and SPQ have direct effects on performance. Surface-related scores commonly correlated negatively with several subjective and objective performance measures, and deep- and achieving-related scores correlated positively. The Achieving Strategy, unlike other subscales, seemed to relate more to student satisfaction than to actual self-perceived performance.

In this section, we concentrate on this question of the *qualitative* effects of learning approach on performance. When Marton (1975) and Marton and Saljo (1976a; 1976b) reported relationships between deep surface approaches to learning and the kinds of learning outcomes achieved, the point was made very clearly that a surface approach leads to the outcomes that are qualitatively different from those resulting from a deep approach. This seems natural enough given that the intention in the former is to concentrate on what the author *said* and in the latter to comprehend what the author *meant*.

The Surface and Deep Approach Scales in the LPQ and SPQ are conceptually related to those described by Marton and his team, and so it would be an important confirmation of the validity of the present scales if similar qualitatively different relationships with performance could be found. So far, we have found that the Surface Approach is associated with poor academic performance in general, not that it may lead to improved performances of certain kinds. This question of approach and kind of outcome was investigated in a study (Biggs, 1979) using the SPQ with 60 undergraduate Education students who were required to read abstracts of two educational research studies (the learning task). Half the group was instructed to read the first abstract by concentrating 'on the *purpose* of the experiment, and the evidence used to draw the conclusion', and the second abstract by concentrating 'on the *facts and details* of the experiment'. The instructions were reversed for the second half of the group. Thus, each student was instructed to read one abstract meaningfully and the other for detail, while each abstract had been read both for meaning and for detail.

After the students had read each abstract, they were asked to show how well they had learned the material. This took two forms: (a) *quantitatively*, by answering a list of quite factual questions about experimental procedures and details; and (b) *qualitatively*, by writing an open-ended response to a question designed to elicit the depth of understanding the student had of the experiment. The quality of this response was indicated by its structural complexity and relevance, as assessed by the SOLO Taxonomy (Biggs and Collis, 1982). It was found that higher SOLO levels (structurally complex, 'good', responses) were associated with Deep Approach, and with students low on Surface Approach who were instructed to learn the facts. Poor quality responses were found in students high in Achieving Approach and especially in those high on Surface

Approach who were instructed to learn facts and details. However, when factual learning was scored, students high on Surface and Achieving Approaches (who had both scored low SOLO levels) did in fact report facts and details more accurately, but those using the Achieving Approach had forgotten the details within a week, whereas those using the Surface Approach had not. All students, then, had learned *something:* the question was what. Their typical approach to learning, *plus* the context (instructions, which suggested what they should concentrate on), determined what that was: the factual details or the underlying meaning.

Watkins (1983*b*) carried out a somewhat similar experiment, although he used extreme scorers on the Ramsden and Entwistle (1981) Reproducing and Meaning Approaches (which correspond to Surface and Deep, respectively). He found a very strong association between approach and quality of outcome (assessed in terms of SOLO level) in line with that found in the Biggs (1979) study.

These findings, then, strongly support the construct validity of the scales, except that in the Biggs (1979) experiment it was expected that high quality would also be associated with the Achieving Approach, as is usually the case (see Chapters 4 and 5). It seems likely that students high on Achieving Approach did not wish to waste their time on the experiment, yet felt the need to 'do well'. A reasonable compromise, then, is to do well on the easiest aspects of the task (noting details) for as long as they thought necessary (they were not informed of the retest after a week).

In another study investigating qualitative differences in performance and learning processes (Kirby and Biggs, 1981), the following tests were administered to 321 Year 9 students: the LPQ, an ACER Mathematics Operations Test, three tasks from which indices of SOLO level could be obtained (written appreciations of two poems and a creative writing essay), and tests designed to elicit measures of simultaneous and successive processing ability. Teachers' ratings of English and mathematics performance were also obtained. Simultaneous processing refers to the ability of students to hold two or more items in mind while attempting to find a relationship between them, as in reasoning tasks (it is measured by Raven's Progressive Matrices and Figure Copying); and successive processing refers to the ability to process data when there is no relationship between them other than their sequence in time, as in memory and rote learning tasks (it is measured by Serial Recall and Visual Short Term Memory). (For further details on simultaneous and successive processing, see Das, Kirby and Jarman, 1979.) These data enabled a number of different studies of learning processes to be carried out.

The technique of canonical correlation enables one to identify the minimum number of unrelated vectors that express the maximum degree of association between two sets of variables. Here, the problem is to 'predict' the performance set with the person-related set, (comprising the LPQ, and simultaneous and successive ability), and specifically to find out if the LPQ subscales predict particular qualities of performance. The result is given in Table 6.1.

It can be seen that two vectors are needed to link both sets of variables. The first is defined, on the performance side, by the achievement tests and ratings, and then by the SOLO tasks; and on the person-related side by simultaneous processing ability, some successive processing ability, and a little Achieving Motive. The second vector is defined by the SOLO tasks on the one hand, and by what is essentially a Deep Approach on the other. In other words, a Deep Approach (plus avoidance of SS, with

Table 6.1 **Canonical correlations for LPQ scales, class performance, and structural complexity (SOLO) of performance (Year 9, N = 321)**

Variable		I	II
Predictors			
	SM		
	SS		−35
	DM		80
	DS		51
	AM	34	
	AS		50
	Simultaneous	87	
	Successive	44	
Criteria			
	Maths Ach.	69	
	English Ach.	80	
	Maths (ACER)	95	
	SOLO—Poetry 1	38	71
	Poetry 2	54	64
	Writing	61	46
Canonical correlation		75	33

Decimal points, and all loadings <.30, are omitted.

a slight degree of AS) is related more to the *structural complexity* of performance than to high achievement in the conventional sense.

In the canonical analysis SOLO levels were treated as scores on an equal interval scale, which is possibly an oversimplificatio . In another analysis, the possibility that learning processes were involved in particular SOLO shifts was investigated. Students were grouped by SOLO level in two tasks, and learning process and processing ability differences were compared across level (Kirby and Biggs, 1981). The two tasks were a written appreciation of the content of a poem, and the other a creative writing task: a SOLO structure based on content was used in the former, and on component writing skills in the latter. There were very few extended abstract responses, so only three transitions were looked at:

1 *From prestructural to unistructural.* In the case of poetry, this involves a shift from a position of basic misunderstanding to a single unidimensional view of what the poem is about; and in the case of writing, from an incoherent to the simplest (linear) form of essay.

2 *From unistructural to multistructural.* A successful transition means that the student can now see several but essentially unrelated aspects of the poem; and that he or she can write 'correct' English but in a conventional or stereotyped way.

3 *From multistructural to relational.* This shift involves integrating the unrelated aspects to achieve a grasp of the poem in its immediate context; and in the case of writing to break sufficiently with conventional rules to write with an original style and an appreciation of audience.

A summary of the findings is given in Table 6.2.

Table 6.2 **Learning processes and abilities involved in upward SOLO shifts in two tasks**

Process	Pre to Uni	Uni to Multi	Multi to Relational
		(a) Poem appreciation	
SM			
SS			
DM	Yes		
DS			
AM		Yes	
AS		Yes	
Sim		Yes	Yes
Succ		Yes	
		(b) Creative writing	
SM			
SS			
DM			
DS		Yes	
AM			
AS		Yes	Yes (negative)
Sim		Yes	Yes
Succ			Yes

It can be seen that each task has its own associated processes with each transition (a 'yes' entry indicates a difference between levels where p is at least $<.05$). In the case of the poem, there were no cognitive process factors associated with the shift from pre- to unistructural, only intrinsic interest (DM): students giving prestructural responses were not doing so because they were necessarily cognitively inferior to those giving unistructural responses but rather because they were not interested in schoolwork. The shift from uni- to multistructural was, however, associated with the Achieving Approach; and with both simultaneous and successive ability. The shift from multi-structural to relational requires only a higher level of simultaneous ability, which fits the nature of relational thinking.

In creative writing, no process factors were involved at the first shift. Possibly the issues here are to do with instructional factors, such as adequate practice. At the next shift, from unistructural to multistructural or conventional writing, the Deep and Achieving strategies are involved, together with simultaneous synthesis: the student now needs to hold several things in mind, to interrelate them and comprehend their meaning, and to organize adequately. The next shift is interesting in that successive ability seems to replace the Achieving Strategy; in fact, the latter is now significantly *low*, as if continued organizing will stand in the way of producing authored text, and that the function previously fulfilled by organizing is now done by successive processing. Such an interpretation certainly fits the nature of the task at this transition.

These analyses give an idea of which factors are involved in responding with increasing complexity to a given task. As we can see, the factors differ at each transition in the two tasks studied here, and also differ between tasks. The particular learning processes involved at each shift indicate how the student is to go about the task if

the next level of complexity is to be reached. It thus becomes possible to suggest how students may be helped to make these transitions. It is necessary, first, to analyse the transitional processes for each task in question, and then, second, to train each student as befits that individual's current level of responding. Such a procedure is rather complex and time-consuming, and it would be beyond the present scope to pursue the matter further here. The present point is simply to note that the approaches to learning tapped in the LPQ and SPQ relate both to overall growth in learning quality, and more specifically, to particular facets of that growth.

Students' subjective evaluations of their performance are as much outcomes or products of their learning as are objective assessments, and it is important to find out how the various approaches to learning are related to these subjective and affective aspects. To determine this, another canonical correlation was calculated. In this case, the HSC data on the NSW part of the Year 11 sample and the self-ratings SRP and SAT comprised the 'criterion' set, while the 'predictors' were the six motive and strategy subscale scores, Word Knowledge and Locus of Control. These are shown in Table 6.3.

As in the previous case, two canonical vectors were obtained. The first comprised much variance from all performance measures (thus being equivalent to a measure of general achievement) and was closely associated with high WK, internal LC, some Achieving Motive, absence of Surface Approach and some intrinsic interest (DM). The second factor was defined on the performance side mainly by SAT, with some SRP, and amounts to a student's *academic self-concept*: how one sees oneself in relation to others and what one feels about that. This was related mostly to the Achieving Approach, some Deep Strategy, low Surface Approach, and low WK. In other words, even if they did not achieve very much, students who are not so bright but keen to

Table 6.3 **Canonical correlations for the LPQ scales, subjective ratings of performance and Year 12 examinations (Year 11, N = 320)**

Variable		I	II
Predictors			
	SM	−30	−32
	SS	−47	−33
	DM	34	
	DS		46
	AM	42	53
	AS		69
	WK	84	−48
	LC	41	
Criteria			
	SRP	76	35
	SAT	49	81
	Aggregate	94	
	English	58	
	Maths	48	
Canonical		62	35

Decimal points, and all loadings <.30, are omitted.

achieve derived some satisfaction from an organized approach to their work, with a meaningful orientation, and absence of rote learning.

In this section, we have seen that although the LPQ and SPQ scales do have significant if moderate relationships overall to performance, however measured, they show rather stronger relationships when particular qualitatively different aspects of performance are considered. Surface Approach leads to improved factual recall, at the expense of structural complexity. The Deep Approach is associated with high complexity. The Achieving Approach in general is associated with good performance of most kinds, with the Achieving Motive relating more to conventional academic performance and the Achieving Strategy to expressed student satisfaction.

THE NATURE OF METALEARNING

The above section gives evidence of a process–product match, implying that, within their range of cognitive options, students deliberately choose those approaches to learning that are most likely to bring about the sort of outcome that is desired. In other words, students are, to a greater or to a lesser extent, behaving metacognitively. In terms of the discussion in Chapter 2 (see especially items 3 and 7), the extent to which students do behave metacognitively is reflected in the *congruence* of the strategies they choose with their motivational state.

Taylor (1984) discusses a broader but generally similar notion to that of motive–strategy congruence when she refers to the *personal study contract* that a student makes with himself or herself. The contract recognizes the intentions and purposes held on arriving at university, and the actions one is thereby committed to if those intentions are to be realized (allowing for some revision as experience modifies both what is desirable and what is practicable). As Taylor says: 'To make a study contract that has a reasonable chance of succeeding... students need to be aware of their own abilities in relation to the situational context' (op. cit., p.254).

Whether one is talking about motive–strategy congruence, or a personal study contract, the above discussion fits squarely with Flavell's (1976) definition of *metacognitive* processes (see above, p. 10; see also Brown, 1984; Brown, Bransford, Ferrara, and Campione, 1983). Although there are several, and confusing, meanings attached to the prefix 'meta', essentially metacognition is a second-order construct: the object of metacognitive activity is the cognitive process itself, not the task that is the object of that cognitive process (Thomas 1984).

To be properly metacognitive, then, students have to be realistically aware of their own cognitive resources in relation to task demands, and then to plan, monitor, and *control* those resources. In view, however, of the wide range of mental events that is, or could be, covered by 'metacognition' (Brown et al., 1983), the term *metalearning* is proposed here for the rather specialized application of metacognition to the area of student learning (see also Novak and Gowin, 1985). Metalearning, then is, like metamemory or metamotivation, one of the subprocesses of metacognition; it refers to particular metacognitive processes involved in learning and studying in institutional settings, and more specifically those relating to students' awareness of their motives, and control over their strategy selection and deployment.

In this section, evidence bearing upon these two phases in metalearning, that is, of being aware of the available options, and of exerting control over those options, is

presented. Next, interactions with performance are described, with particular attention on the moderating function of individual differences and motivational state, which illustrate how the dynamic of metalearning operates.

On being aware of the options

In the present model, six components of the learning process complex are suggested, three motives and three strategies, which logically combine to form three approaches, with a motive and a related strategy comprising each approach. In other words, a factor analysis of the six subscale scores should reduce to three orthogonal dimensions if students were quite accurate in discriminating possible motives for learning and associating them with their appropriate strategies. It seems likely, however, that students of differing abilities would perceive different options in line with their ability pattern.

Biggs and Kirby (1984) were interested in the factor structures that might emerge from groups of students selected on the basis of the pattern of their information processing abilities. It had been established that simultaneous and successive processing (see p. 71) did not correlate with LPQ subscale scores, but the possibility nevertheless remains that students differing on these abilities might discern quite different approaches to learning in an academic context. For example, it was thought that students with a bias towards simultaneous processing might be more likely to select and use a deep approach, while those with a bias towards successive processing might select and use a surface approach.

Accordingly, the group of 321 Year 9 students was divided along the simultaneous and successive score distributions at the medians to form four subgroups: high on both simultaneous and successive, low on both, high on simultaneous and low on successive, and low on simultaneous and high on successive. Principal components analysis, with varimax rotation, was then carried out on the motive and strategy subscale scores within each of these four subgroups; and, using the eigen value > 1 criterion, rather different factor structures emerged within each group. This information is given in Table 6.4.

The first and most general point to be made is a simple quantitative one: as the groups become more able, the covariation between motives and strategies increases. In the weakest group only 48 per cent of the common LPQ variance can be accounted for, through 60 per cent in the middle (cognitively 'lop-sided') groups, to 71 per cent for the group high in both abilities. In itself, that supports an important aspect of the congruence hypothesis: motives and strategies become progressively interdependent as ability increases.

The interdependence is not, however, only a simple quantitative increase in variance explained. It can also be seen that as the range and power of their abilities increase, not only do students differentiate more options in the learning process complex, but they discriminate between those options *according to their pattern of processing abilities*. This does not say that they will use the approaches so differentiated effectively; but that their perception of the range of options and combinations available to them is determined by their typical way of processing information.

Some comment on each of the subgroups in turn may be made.

1 *Low simultaneous/low successive.* This group is the most impoverished cognitively. Their academic performance is lowest, and the six motives and strategies coalesce into a single indifferentiated composite. They appear unable even to distinguish be-

Table 6.4 **Factor structures of learning process complex in Year 9 students of differing simultaneous and successive processing ability**

		Simultaneous ability						
		Low			High			
		1 N = 90			2 N = 72			
		I			I	II		
Low Successive Ability	SM	65				78		
	SS	49				85		
	DM	80			74			
	DS	72			71			
	AM	66			65			
	AS	80			69			
	Total %	48.3			35.2	43.9		59.1
		3 N = 70			4 N = 89			
		I	II		I	II	III	
High	SM	78				52	62	
	SS	69					86	
	DM		74		84			
	DS		85		81			
	AM	60				87		
	AS	58	62		42	58		
	Total %	30.1	30.0	60.1	27.3	24.0	19.5	70.8

Decimals and loadings <.40 omitted.

tween motives and strategies, much less to see that some 'belong' with each other while others do not. It is no wonder, then, that any strategy (usually the organizing or achieving strategy) may be a useful technique to help clear the options, irrespective of its congruence. Congruence is simply no. 1 issue at this level.

2 *High simultaneous/low successive.* This group is biased towards simultaneous processing, and tends to do well academically; better than subgroups (1) and (3), but not as well as (4). The approaches formed are the familiar Surface and Deep-Achieving. The simultaneous bias, in short, allies an organized, meaningful approach with the Achieving Motive.

3 *Low simultaneous/high successive.* This group has a bias towards successive processing of the kind used in rote memorizing; academically such students are found to perform only moderately well. Here the two approaches discriminated are Surface-Achieving and a sort of Deep-Achieving but without the Achieving Motive. In other words, the approach associated with AM is surface; to realize the goal to get good marks, they would use a Surface Approach (not necessarily successfully, of course).

4 *High simultaneous/low successive.* This group has all cognitive options equally available; not surprisingly, they do best academically. Essentially, they differentiate

all three approaches, and associate motive and strategy appropriate to each approach.

In short, the brighter groups make more discriminations than the duller, and the line-up of strategy with motive accords with the cognitive 'bias' of the students concerned. Thus, the first component of metalearning, being aware of one's motives and how one might use different strategies to realize them, shows a progressive increase in the four groups. Metalearning would appear to be least viable for the low-lows, most for the high-highs, while that for the others will be biased by their particular pattern of abilities. The full implications of the congruence hypothesis would therefore only apply to subgroup (4): those sufficiently equipped to perceive all options, and decide which motive goes with what strategy. For those less metacognitively sophisticated, it may, as Rigney (1978) suggests, be more effective simply to tell students how to go about particular tasks.

Internal locus of control seemed to be implicated in the development of deep and achieving approaches to learning and this is easy to understand. The perception of meaning, having sufficient discipline over oneself to manage time appropriately, and being aware of one's metamotivational state, are all activities that implicate an inward-looking or introspective stance. There is also a considerable literature on this variable that links it effectively with learning in school (e.g. Gammage, 1982) and university (Biggs and Das, 1973).

It is worth asking, then, whether the sort of analysis of options described above would be replicated using LC rather than ability patterns as the independent variable. In order to obtain extreme groups of adequate size, the Age 14 and Year 11 samples were divided into the top (internal) and bottom (external) 20 per cent of the LC distributions, and the six LPQ subscale scores were likewise subjected to principal components analysis with varimax rotation. The Year 11 groups produced very similar two-factor solutions (Surface and Deep-Achieving) as did the internal Age 14 students. The Age 14 externals, however, produced a single factor exactly like the low-low abilities group reported in Table 6.4. Table 6.5 gives the Age 14 results.

The internally-controlled students produce Surface and Deep-Achieving Approaches in the usual way, but the students with a high level of external control (the bottom 20 per cent on LC) seem unable, like the group low on both processing abilities, to differentiate motives and strategies or to see which one goes appropriately with what other. This pattern did not appear at Year 11; nor did it on WK at Age 14.

It seems therefore that the metacognitive ability required by the congruence hypothesis is present to some extent in most students by Year 11, but is not present at all in middle high school students who are of low all-round ability, or who are not given to the kind of introspection that leads them to reflect on their own cognitive processes.

On the development of control

The second stage of metalearning is the exercise of control over one's perceived strategic options. Brown et al. (1983) have distinguished several specific components of the regulative aspect of metacognition: planning, which itself subdivides into metaplanning, executive decision making, word knowledge decisions, plan-abstraction and specific plan decisions; monitoring; and checking. Certain of these aspects, particularly that of planning, would appear to be of direct relevance to the question of executive control in metalearning, but a superordinate factor over-riding specific

mechanisms as such would again implicate the construct of internal locus of control. The belief in one's ability to exercise control over one's own learning is prerequisite to the deployment of particular aspects of planning or checking.

Given, then, the differences in the LPQ factor structures as mediated by LC and age, as discussed above, one might ask what age-related differences might be found in the construct of LC itself. One way of looking at this is to factor analyse the items themselves that make up the present LC scale, within each age level, as shown in Table 6.6.

Table 6.5 **Factor structures of learning process complex in high Internal and high External Locus of Control students at Age 14**

	Internal LC N = 286		External LC N = 271	
	I	II		I
SM		76		65
SS				48
DM	78			74
DS	83			80
AM	71			82
AS	77			74
Total %	42.1	2[illegible]4	64.5	50.9

Decimals and loadings <.40 omitted.

Table 6.6 **Factor structures of the seven Locus of Control items at Age 14 and at Year 11**

		Age 14 (N = 1350)	Year 11 (N = 980)		
		I	I	II	
1	Good luck is more important than hard work for success	74		84	
2	There is no sense in making plans, they usually don't work out	68	62		
3	Every time I try to get ahead, something or someone stops me	62	69		
4	It's worth having a goal in life to work for		-52		
5	Getting ahead in a job depends more on good luck than hard work	70		84	
6	People like me don't have much of a chance to be successful in life	67	71		
7	When people are born, the success they are going to have is already on the cards, so they may as well accept it and not fight against it	71	51	37	
		41%	28%	24%	52%

Decimals and loadings <.35 are omitted.

At Age 14, the construct of LC seems to be poorly articulated: only one factor emerges, with only 41 per cent of the item variance accounted for. One item (No.4) is worded in the opposite direction to the others, which seems to cause it to disappear, rather than to load negatively as it does by Year 11. The construct of LC thus seems to be unstable in 14-year-olds if a complication in format of one item destroys its meaning.

In Year 11, two factors emerge, accounting for 52 per cent of the variance: (lack of) confidence in one's control over significant life events, and belief that one's life is controlled by the external factor of luck. (The method of scoring reverses the wording so that a high score indicates *internal* LC.) Item 7 refers both to control and to luck, and loads on both factors.

When the factor scores are correlated with other variables, their meaning becomes clearer (Table 6.7).

The Age 14 General factor has strongest correlations with ability, then with performance, and with Surface and Achieving Approaches, and with Deep Motive, in that order. The Self-control factor at Year 11 has relatively weaker correlations with ability than at Age 14, similar ones with performance, but stronger ones with Deep and Achieving Approaches. The Rejection-of-luck factor has a marginally stronger correlation with ability, but weak to zero ones with other variables. While the relationships between LC approach to learning, and performance may be attributable to ability at Age 14 they may be explained instead at Year 11 by the development of the metacognitive component of self-control.

If these findings are put together with those reported in the previous section, a composite model implicating ability and internal LC in the development of metacognition emerges. As 14-year-olds begin to discriminate and to match strategies with motives, metacognitive control also emerges. Two potentially important conclusions may be drawn. First, 14-year-olds typically do not appear to distinguish luck from a belief in their own executive control whereas Year 11 students do. Second, the relationships between LC, approach to learning, and performance appear to be mediated more by *cognition* (ability) in 14-year-olds, and more by *metacognition* (LC controlling approach to learning) in 17-year-olds. Some of these interactions are explicated in the next section.

Table 6.7 **Correlations between locus of control factor scores and ability, performance, and LPQ scores**

		Performance			Surface		
		WK	SRP	SAT	SM	SS	SA
Age 14 (N = 1350)	General	34**	26**	17**	−10**	−22**	−21**
Year 11 (N = 980)	Self-control	16**	23**	14**	−13**	−22**	−21**
	Reject luck	19**	−01	−05	01	−17**	−10**
		Deep			Achieving		
		DM	DS	DA	AM	AS	AA
Age 14	General	10**	05	08**	14**	09**	14**
Year 11	Self-control	13**	16**	17**	22**	17**	23**
	Reject luck	02	01	02	06	07*	08*

Decimals omitted. *$p<.05$; ** $p<.01$

Interactions with performance

The work summarized to date suggests that the effects of certain approaches to learning would vary according to the student's capability for metalearning, and that the latter may be related to such individual difference variables as general ability and locus of control. One might therefore expect, for example, that a student with internal LC would use a deep approach more effectively than a student with external LC, while the latter might be able to study more efficiently by using the less metacognitive achieving approach to structure time schedules more effectively.

Such expectations may be examined for those students whose HSC results subsequently became available. Several ANOVAs were carried out with ability (WK), LC, and in turn the three learning approaches split at the median as independent variables, and with Aggregate (sum of best four HSC examination marks) English and Mathematics as dependent variables. Several significant interactions were found, as outlined in Table 6.8.

Table 6.8 **Effects of Word Knowledge, Locus of Control and Deep and Achieving Approaches on HSC results**

($p<$)	Deep approach		Achieving approach	
Source	Aggregate	English	Aggregate	English
WK	000	000	000	000
LC	10	01	10	001
A	01	–	001	10
WK × LC	–	–	–	–
WK × A	–	–	–	10
LC × A	05	–	–	–
WK × LC × A	10(a)	–	05(b)	01(c)

The three second-order interactions (a), (b), and (c) are outlined in Figure 6.1(a), (b), and (c) respectively.

Basically, the LC × Deep Approach interaction on the Aggregate (Figure 6.1(a)) shows that the Deep Approach works more effectively with internally controlled students independently of ability. However, the second-order interaction is marginally significant, and as a glance at Figure 6.1(a) shows, the Deep Approach does not work at all with low ability externals, who would be expected to be low on metalearning capability. It is noteworthy that low ability internals using the Deep Approach appear to gain over 50 Aggregate marks, performing nearly as well as high ability externals. Clearly, locus of control does indeed appear to be mediating the operation of the Deep Approach.

Corresponding data for Achieving Approach are illustrated in Figure 6.1(b). Here, LC appears to be mediating the Achieving Approach to learning, but this time in the case of *low* ability students; low ability internals are gaining 40 Aggregate marks. The picture with high ability students is however different from that illustrated in Figure 6.1(a) in that high ability internals appear to be working at a high level consistently, independently of the Achieving Approach. In other words, amongst bright students, the Achieving Approach appears to be facilitating the performance only of the externals. It appears that the internals are already controlling their own learning

and are able to perform at a level that the externals can only reach with the specific prop of self-consciously managing their time and organizing their work.

This picture is perhaps clearer in the case of the English examination (Figure 6.1(c)). The Achieving Approach makes little difference to internals, whatever their ability, but in the case of externals the differential effects with dull and bright are striking: bright externals gain 12 marks through using AA, but dull externals actually lose marks by organizing their work.

In short, then, the Deep and Achieving Approaches interact with ability and locus of control to affect examination performance in ways that variously implicate metalearning. These interactions also help to explain why main effects or straight correlations between the approaches and performance may be small or non-significant: an approach may work positively for some students and negatively for others, the overall effect being weak or zero as opposing tendencies cancel each other out. Practically, these findings suggest what kinds of students might most usefully adopt what approaches for what tasks.

Other interactions of some educational interest involving the HSC exams were obtained. One interaction between verbal ability and Deep Motive on the English exam ($p<.005$), for example, showed that intrinsic interest was associated with good performance only in bright students. Students with a deep motive but who were below average on verbal ability did marginally worse in the exam.

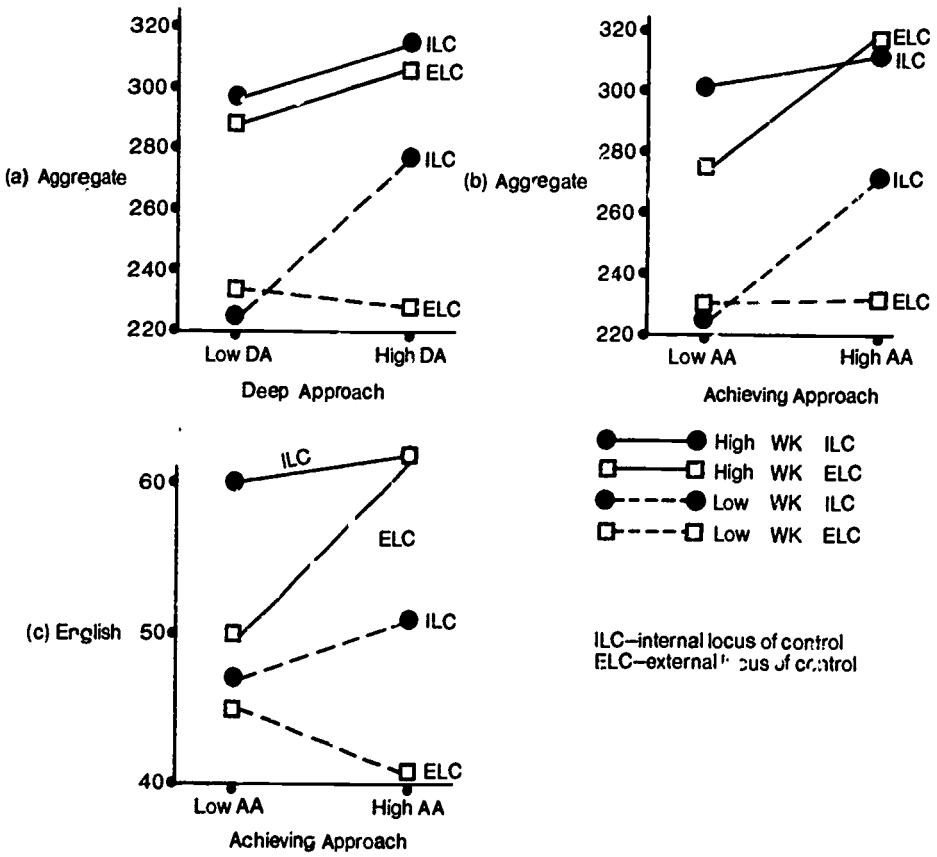


Fig. 6.1 **Effects of verbal ability (WK), Locus of Control, and Deep and Achieving Approaches on HSC results**

A somewhat similar finding, again involving the English exam, showed a highly significant interaction between Surface and Deep Strategies ($p<.001$): this is illustrated in Figure 6.2.

Wide reading, and seeking meaning in reading, coupled with avoidance of rote learning, seems to be a most useful preparation for the exam (given that it followed 15 months after the LPQ had been completed), but wide reading, combined with the strategy of focusing on rote learning detail, is associated with very poor English results: wide reading appears to generate too much material to rote learn.

It is possible to look at further interactions between learning processes and personality-type variables, but such a high surface–high deep strategy would soon overwhelm one with too much detail. The generalization emerging is that different approaches suit different people; some approaches are likely to be harmful for some and beneficial for others. However, it would involve a tremendous amount of detailed research to turn this observation into practical account: that is, to decide which approaches best suit which kinds of people under which conditions for which tasks. The problem is that noted with ATI (aptitude-treatment interaction) research; if high order interactions are involved, the most fruitful use is theoretical rather than practical (Cronbach and Snow, 1977). Person × approach × task interactions are usually too detailed and specific to be directly usable, but they are helpful for theory-building, and thus may influence practice from a position of better theory. Let us then return to the variables examined here.

We have been concerned with four main personality variables: sex and age, which have been considered mainly in earlier chapters, and verbal ability (WK) and locus of control (LC). Fortunately, apart from overall levels of scale score, the operation of the

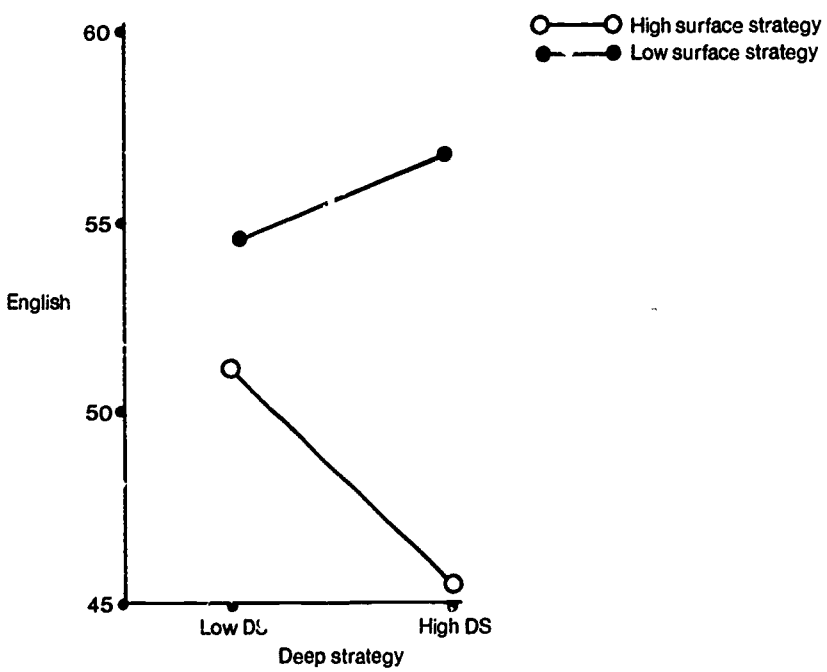


Fig. 6.2 **Effects of Surface strategy and Deep strategy on HSC English performance**

approaches does not appear to differ drastically between the sexes: this is fortunate because it would be clumsy, and even contentious, to have to recommend differently for boys as for girls. Age effects are difficult to assess in view of the fact that samples of older students are increasingly selective at both secondary and tertiary levels.

With regard to ability and locus of control, some complicated interactions emerge. These will be explored in further detail below. Briefly, the Deep and Achieving Approaches worked according, in part, to the ability and internal or external orientation of the student. Low-ability students can make good use of Deep and Achieving Approaches given an internal locus of control, but they cannot if they have an external locus. At the high-ability level, the pattern switches: internally-controlled students work well anyway, and the Achieving Approach seems to compensate by helping externally-controlled students to achieve as well as internally-controlled ones of high ability.

These interactions appear to be suggesting that effective use of the Deep and/or Achieving Approaches requires either high ability, or an internal locus of control: one must be smart enough and/or inwardly oriented enough to make planning decisions about how best to tackle an academic task. This conclusion strongly implies metacognition, and in particular the question of the congruence of motives and strategies alluded to at the beginning of this chapter.

Motive-strategy congruence

The question of motive-strategy congruence has two aspects: the extent to which students who endorse a particular motive tend also to endorse the cognate strategy; and the extent to which congruent motive–strategy combinations are more effective than non-congruent ones. The first aspect of congruence is easily settled: such congruence between motive and strategy defines the three approaches, as found in the original second-order factor analysis (Biggs, 1978; see above pp. 8-9), where the original 10 SBQ scales factored into three dimensions, each correlating with items that referred to motives and strategies. Again, in the present data, the correlation between any motive and its cognate strategy is consistently higher, in each of the four norming samples, than that between a motive and the other strategies. These data are given in Table 6.9.

The boxed correlations are between congruent motives and strategies; the circled ones between non-congruent motives and strategies. Thus, at Age 14 the Surface Motive correlates with the Surface Strategy at .31 and with the Deep and Achieving Strategies at .02 and .18 respectively. There are three congruent correlations in each sample: 12 over all four samples. In each of 11 of these 12 comparisons, the congruent motive–strategy correlation is higher than the two non-congruent ones. Only in the CAE data is there an exception: Achieving Motive correlates with the Achieving Strategy at .31, but with the Deep Strategy at .32, which is not a significant difference.

Watkins (1982*b*) correlated SPQ motive and strategy scores with 540 students' self-ratings on brief descriptions of each motive and strategy, and found that the students' self-ratings correlated highly significantly with their appropriate motives and strategy scores, which 'supported the convergent and discriminant validity of these ratings as measures of the corresponding motive and strategy dimensions as assessed . . . by the SPQ' (p.262). More importantly, each motive correlated more highly with its cognate

Table 6.9 **Congruent (boxed) and non-congruent (circled) motive–strategy correlations**

		Year 1					
		SM	SS	DM	DS	AM	AS
	SM	--	[31]	24	(18)	26	(20)
A	SS	[31]	–	(-05)	07	(02)	18
G							
E	DM	07	(-16)	–	[60]	47	(41)
	DS	(02)	-23	[51]	–	(44)	45
1							
4	AM	23	(-02)	29	(32)	–	[45]
	AS	(18)	-28	(38)	50	[44]	–
		CAE					
	SM	–	[41]	01	(02)	26	(11)
	SS	[43]	--	(-11)	-13	(20)	04
U							
	DM	-11	(-17)	–	[58]	31	(35)
N	DS	(-10)	-26	[62]	–	(32)	50
I							
	AM	26	(22)	25	(24)	–	[31]
	AS	(10)	01	(31)	48	[31]	–

Decimals omitted.

self-rated strategy than with any other self-rated strategy; and each strategy with its congruent self-rated motive than with any other motive. This pattern conforms closely to that reported in Table 6.9.

Similarly, with a British sample, O'Neil and Child (1984) conclude that their factor analyses give 'strong support to Biggs' claim for motive strategy association in the same dimension' (p.252).

It is, then, a matter of empirical fact that students who rate themselves highly on a particular motive tend consistently to rate themselves more highly on the strategy that 'belongs' with that motive in an approach to learning than on any other strategy. This is reflected too in the fact that approach scale scores are highly internally consistent (see Table 3.8; also pp. 30-31). This is not to say that the motive and strategy subscales

measure the same thing—clearly they do not (cf. correlations between the Achieving Motive and Strategy with SRP and SAT)—but they do comprise a psychologically meaningful composite.

So far, then, the 'psycho-logic' of the compatibility of motive and strategy has been demonstrated. The second issue is whether congruent motive–strategy combinations are more *effective* than non-congruent ones. The problem then becomes in part one of defining 'effectiveness'. If effective means in relation to the student's own personal goals, one simply cannot generalize. Indeed, the idiographic argument if pushed too hard becomes circular: congruent motives and strategies are those perceived by the student to be effective for his or her own purposes. If effective means in relation to independent criteria such as examination results, congruence results in effective performance only under certain conditions, to be described below. Watkins (1982*b*) calculated direct discrepancy scores for each of the three cognate motive–strategy subscales by simply calculating the difference between SS and SM, DS and DM, and AS and AM; and an overall difference score was calculated by adding the three together. None of the correlations between the three specific and the one general discrepancy scores and performance was significant. Watkins argued from this that there was no evidence to support the contention that mismatch between congruent motives and strategies contributed to poor academic performance.

Watkins' procedure for assessing lack of congruence may be criticized on two major grounds. Methodologically, the motive and strategy subscale scores have different distribution characteristics and should not therefore simply be subtracted; that procedure compounds the inherently low reliability of different scores. Second, the congruence hypothesis is not concerned so much with the quantitative difference between *congruent* strategy motives and strategies, but with whether *non-congruent* motives and strategies lead to poor performance.

The question is: how does a strategy relate to performance independently of the motive in which it is usually embedded, or even in conjunction with a different motive? To answer that question, the two secondary and the two tertiary samples were divided into eight motivational subgroups (see Biggs, 1984, for a fuller account of this study). The three score distributions for motives—SM, DM, and AM—were split at the median, so that there were eight Low/High combinations ranging from LLL low on all three motives) through LHH (low on SM and high on both DM and AM) to HHH (high on all three). Each strategy was then correlated in turn with self-rated performance (SRP) and satisfaction with performance (SAT). If certain motive–strategy combinations were more effective than others, then this would be reflected in the correlations. The results are very complex, since there were four samples for each of SRP and SAT, and eight motivational subgroups, repeated for each of the three strategies: that is, 192 correlations in all.

It was found by a three-way ANOVA (SM × DM × AM) on SRP and SAT that there were strong motive effects and interactions over all four samples. It was thus possible to rank the eight motivational subgroups in order of overall effectiveness (in terms of both SRP and SAT). That rank order, which did not differ significantly for SRP and SAT, or between samples, is reproduced in Table 6.10, which provides a brief description of each motivational subgroup, the number of correlations that involved congruent or non-congruent motives and strategies, or were non-significant.

The majority of strategy–performance correlations was non-significant; of the 62 significant ones, 37 involved non-congruent motives and strategies, and only 25 congruent ones, and so the evidence for the congruence hypothesis is not compelling. For

example DS, which we have seen so far as a positive strategy, turns out to have negative effects in two achieving groups: 'competitive achievers' (LLH) (which is congruent) and 'defensive achievers' (HHH) (which is non-congruent, because this subgroup is high on DM and should therefore be one in which DS operates effectively). AS turns out to have positive effects over all groups, but that is mainly with SAT.

While the case for the congruency hypothesis is thus not at all strong, there is an interesting interactive effect in Table 6.10: the number of congruent effects progressively declines from most to least effective motivational groups, while the number of non-congruent effects progressively increases. As can be seen, there are no non-congruent strategy–performance correlations in the two most effective motivational groups and 11 congruent ones; and no congruent ones in the two least effective motivational groups, but 15 non-congruent ones. Such a difference is greatly beyond chance. It seems that those who have an inadequate academic self-concept (SRT and SAT) make use of any strategy, irrespective of its congruence with their poor motivation, while those who have a good academic self-concept use strategies that are effective only when they are congruent with their motivation.

Kirby and Biggs (1981) looked at the question of the relative effectiveness of congruent and non-congruent strategies on teacher-rated English and mathematics performance. They found mixtures of congruent and non-congruent motive–strategy combinations, and the patterns discovered in that study are similar to those found here. Well-motivated and achieving students selected strategies congruent with their motivational pattern and used them effectively, while poor achievers used with profit strategies (particularly AS) that were non-congruent with their prevailing motivational patterns.

There are, then, conditions under which congruent motive–strategy combinations are effective, and other conditions under which non-congruent combinations work. The difference appears to be associated with the metacognitive sophistication of the student.

More detailed evidence comes from four- and five-way ANOVAs paralleling those reported in Table 6.8 above, but with Approach split into Motive and Strategy components. For example, it was found that the LC × WK × AM × AS interaction on the

Table 6.10 **Numbers of significant correlations between strategies and SRP and eight motivational subgroups**

Motivational subgroup (rank order effectiveness)				Description of	No. sig. effects		
	SM	DM	AM	subgroup	cong.	nil	noncong.
1	L	H	H	Deep achievers	7	17	0
2	L	L	H	Competitive achievers	4	20	0
3	H	H	H	Defensive achievers	2	16	6
4	H	L	H	Surface achievers	3	19	2
5	L	H	L	Deep idealists	5	14	5
6	L	L	L	Unmotivated	4	11	9
7	H	H	L	Defensive actualizers	0	14	10
8	H	L	L	Underachievers	0	19	5
Total no. strategy effects					25	130	37

Mathematics HSC exam was significant ($p<.05$); the only other significant effects were the two main effects of WK and AM (both $p<.001$). (See Figure 6.3.)

The data have been plotted to provide the easiest comparison with Figure 6.1, with AS along the abscissa, and separate graph lines for WK and LC (but allowing for the fact that one is talking here about Mathematics performance, not English). Let us take first the achievement motivated students. The bright ones, naturally enough, do well irrespective of LC or AS (in fact it is likely that they derive and use strategies not even sampled here). There is, however, a strong disordinal interaction amongst the less able: internals make very effective use of Achieving Strategy but externals do correspondingly better without it.

The Low Achieving Motive students show quite a different pattern. Regardless of LC, able students do worse using the Achieving Strategy, which fits with the congruence hypothesis as they are inadequately motivated for it, but low ability student again irrespective of LC, do better, which is certainly not in conformity with the congruence hypothesis.

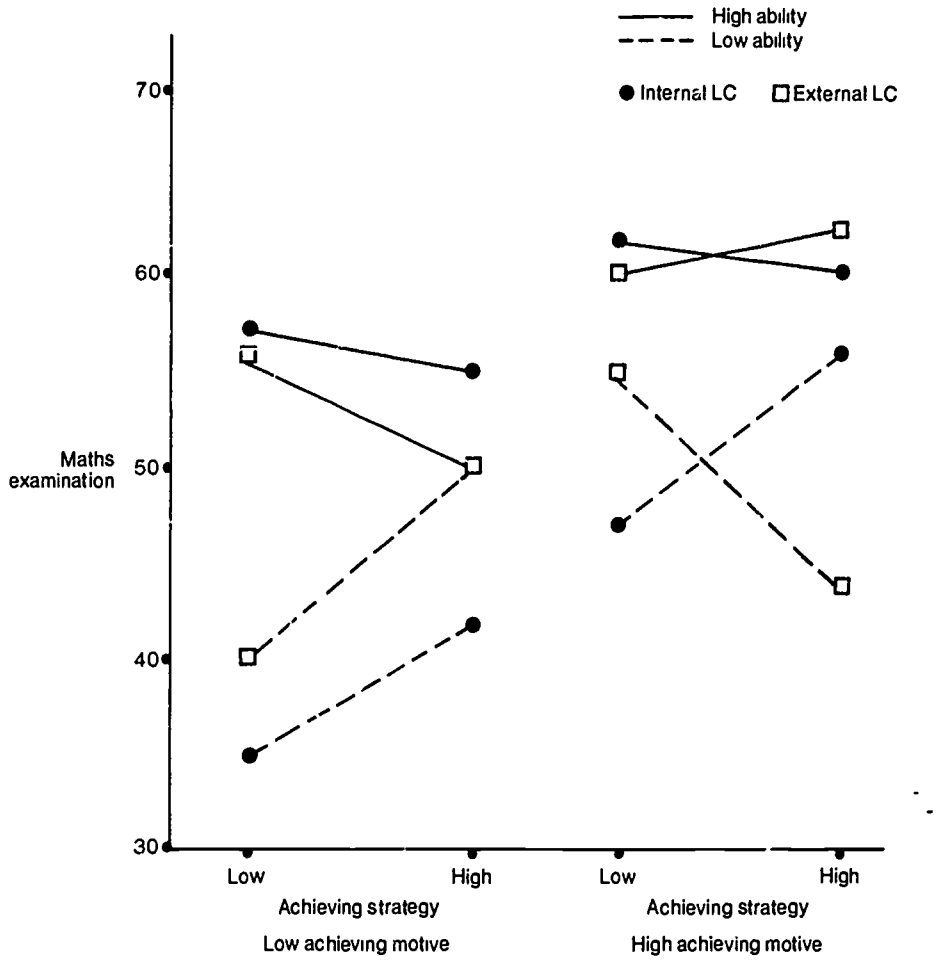
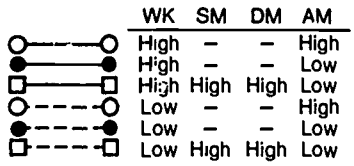


Fig. 6.3 **Effects of verbal ability (WK), Locus of Control, Achieving motive and strategy on HSC Mathematics performance**

These data, and particularly those describing when the Achieving Strategy is helpful or harmful, are explicable in terms of the extent of metalearning involved. First, the Achieving Strategy is not an issue with high ability, highly motivated students; their high performance is likely to be maintained by other strategies, particularly Deep. It is, however, an issue with lower ability students, and with high ability students who are poorly motivated. Low ability, highly motivated internals use the strategy very effectively; they appear to be making appropriate use of metalearning. Low ability highly motivated externals, and high ability poorly motivated students, whatever their locus of control, cannot make sure of it. The Achieving Strategy in these last three groups seems to get in the way, as if these students are metacognitively developed enough to be *aware* of the appropriate strategy, but not developed enough to be able to *control* it appropriately.

Finally, low ability, poorly motivated students, who might be reckoned to be the lowest in metalearning ability, nevertheless seem to use the Achieving Strategy effectively. It seems that here, as in the lowest motivational groups in Table 6.10, it does seem to help, but merely as a technique or tactic.



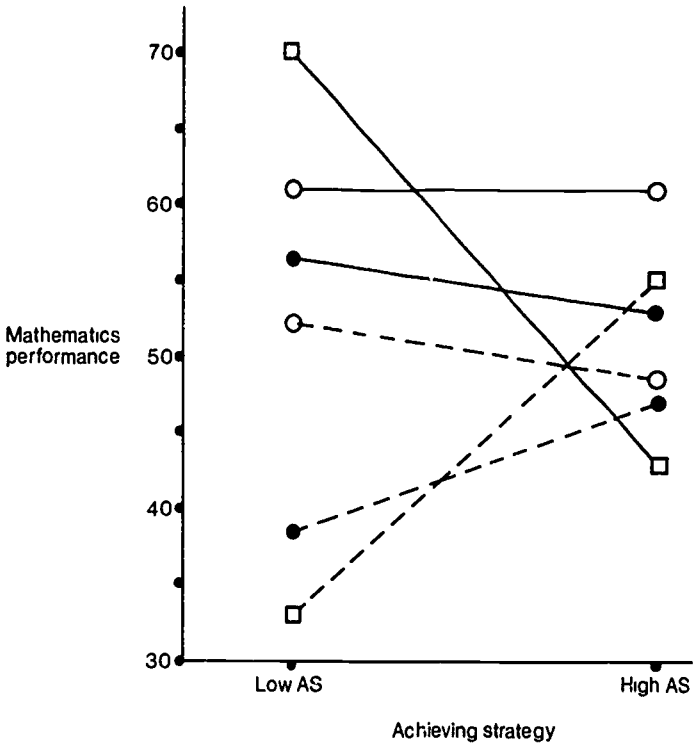


Fig. 6.4 **Selected effects of verbal ability (WK) and Surface, Deep, and Achieving motives, and Achieving strategy on 16C Mathematics performance**

In another five-way ANOVA (WK × SM × DM × AM × AS) on HSC Maths, the attempt was made to see what motivational combinations were best for AS, and whether there were any interactions with ability. Two interactions were significant: WK × AM × AS ($p<.05$) and WK × SM × DM × AM × AS ($p<.05$). Both are graphed in Figure 6.4.

In general, the picture is once more that bright, achievement-motivated students do well regardless of AS, while bright but unmotivated do better without it. It is the dull unmotivated who appear to benefit most, much as also depicted in Figure 6.3. The interesting finding, however, concerns the motivational subgroup HHL ('defensive actualizers', see Table 6.10), who represent a strange and maladaptive motivational mix, which is incongruent with the Achieving Strategy. The bright ones plummet from 70 to 43 in the Maths exam with the use of AS, but the dull ones rise from 33 to 55. That is, the Achieving Strategy produced such massive and opposing effects that its use permitted the duller students to outperform the brighter ones. Clearly, quite different mechanisms are operating in the two groups if the same strategy can create such a reversal, causing one group to drop 27 HSC marks and the other to gain 22! This effect was not confined to Mathematics: a similar, but weaker, effect was found on the Aggregate.

The differences between the effects graphed in Figures 6.3 and 6.4 may be due to the metacognitive sophistication of the students. The present data would suggest that a complex and possibly changing mix of intelligence, an internal LC, and appropriate motivation, is required for appropriate strategy use. That is, students need to *want* to engage the task, to have an *inward* or introspective stance, and to be *bright* enough to make appropriate decisions. However, before one can match strategy, resources, and task, one must be able to differentiate between motives and strategies appropriately; to see, in fact, what the options are. If students are unable to make such differentiations, then strategies such as organizing may simply act as prosthetic devices: that is, as techniques for getting by, and used without insight.

THE DEVELOPMENT OF METALEARNING

The data reported so far permit some tentative conclusions about the nature and development of metalearning. It would be advisable at this point to broaden the discussion to note the extent of agreement between the present model of metalearning and that of metacognition in other areas.

From the factor analyses presented in Tables 6.4, 6.5 and 6.6, it would appear that while most 14-year-olds are metacognitively aware of their needs and options, they do not yet have adequate executive control over them; even by HSC, only some students have acquired such control. By age 14—probably earlier but the data are not available—most students appear to have crossed a threshold into metacognitive territory, in that they have become at least aware of their motives and how they might deploy their general learning strategies if those motivational intentions are to be realized.

Several studies of metacognition in the classroom have shown metacognitive activity in students from early primary years. For example, Myers and Paris (1978) found that second-grade children were aware that their interest in and relevant knowledge of a topic affected their comprehension when reading about it On the other

hand, they were unable to say how their comprehension was affected, still less to exert executive control and use that knowledge to improve their reading comprehension. Kirby and Moore (in Kirby, 1984) replicated the Myers and Paris study and found that effective utilization of—or control over—metacognitive knowledge for improving reading performance only occurred by Year 6 and was even counterproductive in Year 4.

The context of approaches to learning is a more complex one than that of reading from text, involving as it does considerable self-knowledge, knowledge of the academic tasks, and of ways of going about them appropriately. It is reasonable, then, that if some sort of executive control emerges by Year 6 in reading, it would emerge rather later for the much more complex and abstract processes of learning and studying. The fact that it is not apparently developed in many HSC students should occasion no surprise. However, it is encouraging that the factor analysis of the LC items at Age 14 and Year 11 showed a distinct shift at least in differentiation and possibly also in the executive control of this crucial variable in metalearning.

The kind of metacognition involved in metalearning is akin to that involved in editing and revising written text. Under normal circumstances, students in early and middle high school experience great difficulty in editing their own writing in other than trivial ways; that is, by doing more than correcting spelling and grammar, or changing the occasional word. They can, by Year 9 or so, begin to edit *other students'* work in non-trivial ways, by altering the basic discourse structure, but this does not require metacognition as such. It is only towards the upper end of high school that fundamental revision of their *own* work (which does require metacognition) can be handled satisfactorily (Burtis, Bereiter, Scardamalia, and Tetroe, 1984). Indeed, professional writers frequently report that revising is the most difficult part of writing; Kipling refers to the need to 'let the manuscript drain for a year' to distance himself from his own composing processes.

The crucial question in editing is 'How can I say this more effectively, given my intentions, my message, and my readership?' This is a paraphrase of the student's metalearning question: 'How can I learn this more effectively given my intentions, the nature of the task, and institutional requirements?'

Lawrence, Dodds, and Volet (1983) report that extremely intelligent senior high school students—well into the stage of formal operations in their subject area of science—did not carry out metaplanning effectively, whereas mature but less 'intelligent' adults typically and effectively used metaplanning in handling the same problem. It is intriguing to speculate that this observation is related to the data reviewed in Chapter 5, which showed that a rapid and steady increase in deep-related scores on the SPQ occurred after the age of 25 years. Both observations suggest that protracted experience is an important component of sophisticated metalearning. Is it possible, in that case, to train students to become more effective metalearners by providing them with enriched or structured experiences? That is an interesting and important question that is addressed in the next chapter.

How situation-specific are approaches to learning?

Some writers stress the overwhelming importance of the immediate situation in determining approach to learning. Marton (1975; 1983), Laurillard (1979), and Ramsden (1979), for example, claim that whether a deep or a surface approach is used

depends on how the student sees the immediate situation, and so the sorts of questions these writers address are specific to that situation: What kind of outcomes are expected? What time or other external pressures are there? Is the completion of the task personally important to the student? What kind of approach best fits the nature of the task? Does the student have the relevant background knowledge to see how the task components interrelate?

There are several consequences of this conceptualization:

1 The approach used is set by the situation; there is no necessary relationship between the approach an individual uses in one task and that used in the next.

2 Whether or not a deep approach is used will depend more on the way the task is presented in context, than on the individual student doing it.

3 Deep and surface approaches are mutually exclusive: the one precludes the other.

4 Assessing which approach is used must be done *in situ*. This usually means an interview or observational method of research conducted contemporaneously with the task, or immediately afterwards.

This approach to student learning might appear to differ on almost every count from that used by the present writer, and by Schmeck (1983) and Entwistle (1981). The last two writers refer to learning *styles* or *orientations* and assume that students have a persisting tendency, or predilection, to adopt deep and/or surface approaches, that persists over situations. This is not to say that approaches to learning cannot be changed—clearly they can, as is shown in the next chapter—but that such a change in approach needs to be compatible with the motivations, abilities, locus of control, and other deeper personality factors that shape those predilections. The LPQ and SPQ scales tap the interface between those predilections and the student's most likely approach to learning *in situ*.

Seen in this way, there is no conflict between the present approach and that of Marton's: each addresses rather different questions. The situation parallels the trait–state issue in personality research (see Magnussen and Endler, 1977). The questions addressed by Marton are: 'How did this student approach this task; and how did the approach used relate to the outcome?' Those state-oriented questions, and process–outcome relationships, are usually quite clear, not least because it is known that at the time the student was performing the task, it was observably being performed in the way presumed.

The question addressed by the present writer and others is a different one: 'How do students, who report that they typically use this and/or that approach, . . e.g. perform in this or that faculty, final year, type of examination?' This is a broader question implying that a persisting trait-characteristic has been measured, and because the methodology enables the use of much larger samples, it is possible to make generalizations about student populations with much more certainty. Process–outcome relationships, on the other hand, are not always clear in this methodology, mainly because it is not so certain that any given student *was* using the assumed 'usual way of studying' during the criterion performance. This kind of research stands or falls on such psychometric criteria as the facts below:

- that the original raw scores form factors that replicate over different samples;

- that the scales are internally consistent, and correlate highly significantly with each other when repeated over time periods like five months;
- that they form predictable and statistically significant relationships with examinations taken fifteen months after completing the questionnaire.

Such findings, all referring to work reported above on the LPQ and SPQ, attest to the fact that we are indeed dealing with stable tendencies; and, more to the point, that the approaches to learning that students say they typically use *are* in fact relatively stable over time and situation.

Thomas and Bain (1982; 1984) in several studies demonstrate both the stable and the situationally-specific aspects of approaches to learning. They found that students changed their approaches according to kind of assessment (multiple choice exam or assignment) and content area (psychology, mathematics, English language), but that students also operated within broad limits of an approach, particularly with regard to the deep approach; students freely using a deep approach in one subject tended also to use it in other subjects. The same was not true of surface, which was used more on the multiple choice mode of assessment than in the assignment, whereas deep did not change according to method of assessment. This seems eminently reasonable; the factors providing the cognitive back-up to a deep approach have more 'momentum' than those backing a surface approach. For one thing, a deep approach requires prior knowledge and intrinsic interest: students do not suddenly acquire knowledge about, or interest in, a topic simply because the situation demands it. It is, on the other hand, fairly easy to switch into a surface approach if interest flags, or one is tired, or there is pressure to get the task finished, or if one is instructed 'to concentrate on the facts and details . . .' (Biggs, 1979).

Indeed, that last experiment crystallizes the point. Placing the matter into the state–trait context emphasizes that the question, like the nature-nurture controversy which it closely resembles, is interactive. That is, it is not a matter of whether students change their approaches to learning according to the demands of each situation, or maintain their approach regardless of situation, but the extent to which the change that does occur (because of the situation) is affected by the student's predisposition to change. It seems that there are different answers for each of the three approaches examined here. Students high on the Surface Approach reacted very positively to the instruction to 'concentrate on facts and details'. Students high on the Deep Approach, however, produced high quality responses irrespective of the instruction to 'Concentrate on the purpose of the experiment and the evidence used to draw conclusions' (Biggs, 1979). For their part, the students high on Achieving Approach seemed to interpret the situation (an experiment extrinsic to course requirements) as not warranting anything but a surface treatment; they obtained a high facts score, which dissipated after a week, whereas the high fact score achieved by those predisposed to Surface Approach was maintained.

Similar evidence of person × situation interaction comes from the analyses of the Favourite Subject data in the HSC examinations, where correlations with Deep Approach occurred only with the students' favourite subject, not in non-favoured ones. That is, the students predisposed to a Deep Approach did not deploy that approach over all subjects but only in the ones they were interested in.

There are, then, two essential components to be considered in student learning research, as presupposed in the presage factors in Figure 2.1:

1 *Person-related factors.* Given present findings, those most implicated would be patterns of processing abilities and locus of control, to which amount of prior relevant knowledge, and general range of experience (cf. the mature age students) might be added. The most likely way in which these factors interact, both with each other and with situational and task demands, is through *metalearning*.

2 *Situational factors.* The nature of the task, the context in which it is to be performed, and the conditions imposed on its performance, provide the data specific to the task and which, in interaction with (1), determine the student's approach.

To sum up, then, the present view is that it would be simplistic to insist that approaches to learning are specific to the particular situation in which a performance occurs. The evidence is quite strong that students are consistent in their approach to different learning situations. That consistency must however be viewed within the framework of the student's own metacognitive processes: priorities change and hence motivation patterns shift, task-relevant knowledge increases, people become tired, the context and external pressures change, and hence so do approaches to learning. All of these influences simply underline the point that the student is his or her own person: and it is that 'academic personhood' that is the target of the LPQ and SPQ.

ELABORATED MODEL OF STUDENT LEARNING

The preceding series of studies provides a reasonable basis for elaborating the model of student learning outlined in Chapter 2 (see Figure 2.1). It is possible, by smoothing the bumps and filling the hollows in the terrain thus marked out, to add significant detail to that original model. Such an elaborated model is important for guiding informed practical use of the LPQ and the SPQ. The details at the three levels of presage, process, and product are elaborated and their inter-relationships are described below.

Presage variables

Three basic kinds of *personological* variable may be specified on the basis of the present research: *Abilities*, conceived both as general verbal ability (WK) and as the information-processing abilities of simultaneous and successive synthesis; *Locus of Control*; and *Experiential*, conceived both in the content-specific sense of prior knowledge relevant to a particular group of tasks, and more general experiences associated with second language learning and with maturity.

There are likely to be other personological factors that predispose individuals to select and to use effectively particular approaches to learning, but it is not possible to say on the basis of the present data what they might be. The effects of these three, at any rate, have been demonstrated. The major point arising is that they interact to produce a level of metacognitive sophistication, and that the key to understanding student learning is the mechanism of metalearning.

The *situational* factors that have emerged as significant in this research are: *Nature of Task*, as in faculty differences in performance; *Institution*, as in university and CAE differences; and *Instructions*, e.g. to attend to surface details or to meanings. Other investigators have looked at situational pressures on students such as *assessment*

(Fransson, 1977; Thomas and Bain, 1984) and student perceptions of *institutional requirements* (Ramsden, 1979, 1981; Laurillard, 1979).

Process variables

The original 'learning process complex' is considered as comprising three approaches to learning, each with its motive and strategy components. They appear to comprise a hierarchy: *Deep* has the closest linkages both with personality factors and with the most complex learning outcomes; *Achieving* is further from the personal, closer to the situational, but with considerable overlap with Deep so that a Deep-Achieving hybrid is commonly observed; and *Surface* is most personally detached and the most susceptible to situational pressure.

All may operate as the products of metalearning, but frequently Surface and sometimes Achieving may operate independently of metacognitive processes, in that students of low metacognitive sophistication may use SS and AS as prosthetics, or blind techniques, rather than as thought-out strategies. In this same category are pure techniques that are usually specific to a given task and are taught as answer-getting devices irrespective of the student's understanding of how and why they work (Brown, 1978; Snowman, in press).

Product variables

The various subjective, quantitative, and qualitative measures of performance that have been used in the present research program collectively suggest two major parameters of performance that covary with each other:

1 *Structure–Fact (S–F) Ratio.* All academic performances may be described in terms of: (a) the extent to which learning and correctly reproducting detail is paramount; and (b) the extent to which comprehending the structure in which the detail is embedded is paramount. There are in fact certain tasks in which reproduction of detail is considered to be important *per se*, rather than as being merely illustrative of the deeper structural features of the task. Such tasks would be the learning of script, orthographics, and lexicon, for example in the early stages of native or foreign language learning; or learning scientific or mathematical formulae that are only partially understood, if at all. In other tasks, structural complexity is more important, which may conveniently be operationalized by the SOLO Taxonomy (Biggs and Collis, 1982) in which the relationships that inhere between the components of a learning outcome are taken to represent the quality of that outcome. The inverse relationship between (a) and (b) is captured by the term Structure–Fact, or S–F, ratio. A task with a high S–F ratio indicates that a complex performance, where relationships between component data are to be emphasized, is required; a task with a low S–F ratio indicates that specific data are to be recorded and reproduced with fidelity, with little reference to the whole of which they are a part.

2 *Affective involvement.* The affective outcomes of learning range from highly positive, as in intrinsic motivation or in expressed student satisfaction, to quite aversive ones. The latter reaction may occur either in the case of a complexly structured task, but which the student is unable to handle appropriately, so that the outcome is poorly structured; or in the case of a task with an inherently low S–F ratio.

Although these outcome factors are conceptually distinct, they covary in practice. To the extent that the student produces a high S–F ratio outcome, the affective involvement is likely to be high and positive. As the S–F ratio of the student's product—as opposed to that of the task set—declines, the resulting affect becomes less positive, and a state of aversion may be reached. Clearly, there are *task* differences in S–F ratio, and *individual differences*, both in the extent to which a particular S–F ratio can be processed, and in that to which involvement is aroused (for example, highly creative people comfortably process tasks of very high S–F ratios). Nevertheless, the concept of a two-factor performance outcome—comprising both a structure–fact ratio and affect—is useful for describing process–outcome relationships in general terms.

The overall relationships between the three presage, process, and product stages are expressed in Figure 6.5.

Figure 6.5 is intended to suggest that a deep approach is more closely tied to personological factors, and surface to situational, with achieving in between but generally closer to deep. The arrows to performance indicate the likely ranges of S–F ratio and of involvement to be targeted by the approaches. Overlap between deep and achieving represents the deep-achieving composite that fits well with the high structure end of academic performance, while surface-achieving fits lower down the range of academic performance.

Extent of metalearning is represented as increasing vertically. At the level of task-specific tactics, metalearning is not involved at all: students do not need (or want) at this level to be aware of their own perceptions of motive, strategy, and task structure;

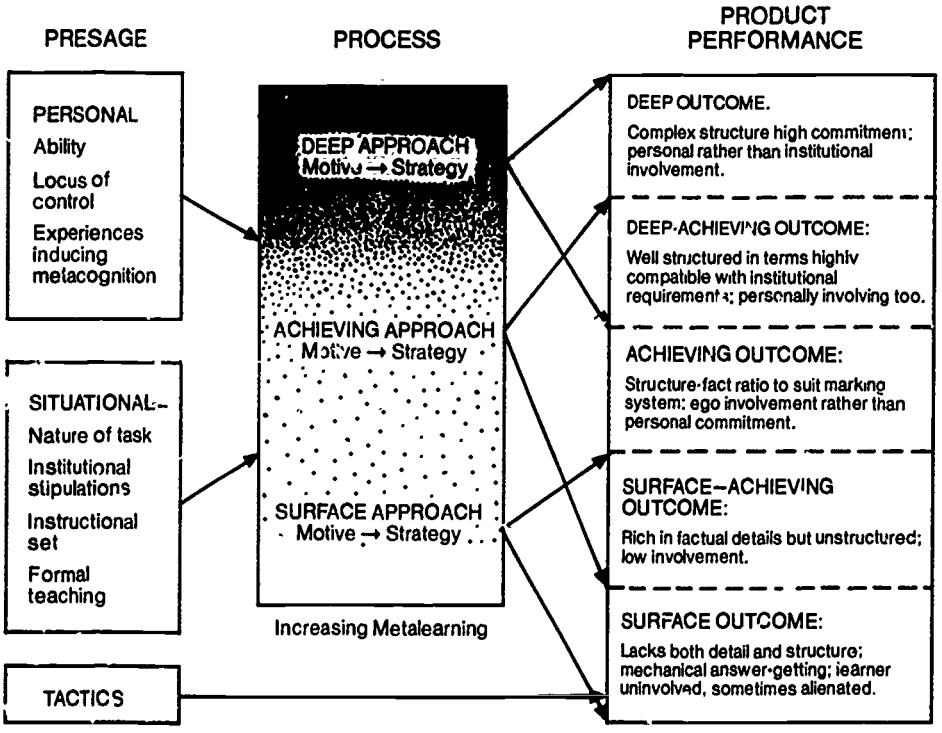


Fig. 6.5 **Elaborated model of student learning**

to be aware, that is, of why they should be doing this and not that. The surface approach too often arises out of an unaware gut-reaction to the task, and sometimes this may also be true with the achieving approach. It is however difficult to imagine the deep approach operating effectively by the upper secondary level in the absence of metacognitive awareness.

The performance domain depicts, vertically, an increasing ratio of structural-to-factual outcomes, and increasing positive affective involvement. A range of typical academic performance is suggested (relative to the level of institutional learning in question), which mostly falls within the overlap between deep and achieving approaches. Performance which exceeds that range, where the task is complex in the extreme and where involvement may even be ecstatically high, would include, for example, fiction writing or research activity. At the other extreme, there is a corresponding range of unstructured and reproductive tasks that may be legitimate in the psychological laboratory, but should be rare in the classroom. It may well be, however, as many studies of student perceptions would indicate (for example, Marton, Hounsell, and Entwistle, 1984), that students wilfully or out of desperation perceive classroom tasks to be thus unstructured.

SUMMARY AND CONCLUSIONS

In this chapter, a number of research studies have been reviewed from the point of view of their theoretical significance. The major points are summarized below.

Qualitative effects on performance

While the three approaches to learning correlate significantly with performance, the correlations themselves do not capture the complexities of the relationships. Some of the more important complications are:

(a) Relationships with both Deep and Achieving Approaches are stronger in preferred than in non-preferred subjects.

(b) Surface Approach can be used adaptively to enhance performance when a high factual recall is actually desired, but this is attained at the expense of complexity of response.

(c) Achieving, and especially Deep, Approaches are associated with increasing structural complexity of performance.

(d) Aspects of Deep and Achieving Approaches are related to student academic self concept (self-rated ability and satisfaction).

(e) Strategies and approaches relate to performance differently according to interactions with person related variables, as elaborated below.

Effects of ability and locus of control on metalearning

Two components appear to be involved in metalearning: *awareness* of the learning processes one may use, and executive *control* in deploying them effectively. The congruence hypothesis refers to both. First, it seems that all but cognitively deficient or strongly externally oriented 14-year-olds can perceive the motive and strategy options, and relate them appropriately. Second, however, the development of the executive control component may not occur in many students until Year 11. The

evidence is that it develops increasingly, with age and experience, and in some students more than in others.

Thus, the congruence hypothesis, is part of a larger theory, involving the LPQ and SPQ, of metalearning. Ways of helping students with their approaches to learning would thus depend on their metalearning capability.

Interactions with performance

(a) Deep Approach is associated with high HSC Aggregate results with all high ability students but only with low ability students if they have an internal LC.

(b) Achieving Approach is helpful in English and HSC Aggregate in bringing external LC students up to level of internal LCs, but as with DA, is helpful with low ability students only if they have an internal LC.

(c) Deep Motive was associated with high English performance in high ability students but with poorer performance in low ability students.

(d) A Deep Strategy associated with a Surface Strategy resulted in very poor English performance, the wide reading producing more data than the reproducing strategy could handle.

(e) In general, deep-related scores seem to be most adaptive in metacognitively sophisticated students, and achieving-related scores either in sophisticated, or in low level and poorly motivated students.

Motive–strategy congruence

(a) Both congruent and non-congruent strategy effects were found in an array of 192 correlations, but all the congruent ones were found in well-motivated and achieving students; all the non-congruent strategy effects were found in poorly motivated groups.

(b) High ability students tended to do well regardless of the Achieving Strategy. The effects of the Achieving Strategy with low ability students, however, varied according to their Achieving Motive and locus of control: high AM students did well with AS only if internal LC (congruent), those with external LC doing poorly with AS (non-congruent). Less able students with low Achieving Motive were able to lean on AS as a support (non-congruent), but bright low AM students apparently tried to use AS metacognitively (non-congruent), but with disastrous results. Thus, for the Achieving Strategy, congruence was an issue only in the middle ranges of metalearning.

(c) Low ability students at Year 9 seemed unable to differentiate motives from strategies or to pair them appropriately, whereas high ability students could do so.

(d) Highly external LC students were as poor at motive–strategy differentiation as the low ability students in (c).

(e) Patterns of 'bias' in information processing abilities were associated with correspondingly 'lop-sided' motive–strategy pairings.

(f) Locus of control becomes differentiated into 'luck' and executive control components between Age 14 and Year 11, and only the latter is associated with effective approaches to learning although both have similar levels of correlation with verbal ability.

Are approaches to learning situation-specific?

Given the preceding, approaches to learning cannot be *exclusively* determined by the immediate situation. Reference was made to predilections for surface, deep, and achieving approaches that are stable over time, but with differences in sensitivity to situational circumstances. It is easier to induce a surface approach than a deep approach. This whole question changes its complexion when seen as involving metalearning, which itself presupposes a person × situation interaction.

The elaborated model of student learning

The above findings were put together and it was found that they elaborated on the model first outlined in Chapter 2 (Figure 2.1) in important ways. While this model is necessarily still something of an oversimplification, it links the presage factors of personality and situation, the process factors incorporating students' approaches to learning, and the quality of the performance outcome. Equally as important, the concept of metalearning emerges as the dynamic link between student, task, and outcome. The essential aspects of the mediating learning process complex are measured by the LPQ and the SPQ, in the motive, strategy, and approach subscale and scale scores.

It remains, then, to show how the model described here may be used to facilitate teaching and learning, or to alleviate existing problems of teaching and learning; and in particular to describe the role of the LPQ and SPQ in this. This task is taken up in the final chapter.

7 Applied Research and Implications for Practice

The elaborated model described in the previous chapter provides the framework for construing the learning process from the student's point of view. This chapter, then, discusses the applications of the model to teaching, counselling, and to research, and how the LPQ and SPQ can be used to operationalize some aspects of the model to help those concerned to make better professional decisions.

Each of these three professional groups will concentrate on different aspects. Teachers, for example, are more concerned with within-classroom performance of essentially 'normal' students. Individualized instructions and humane respect for the individual notwithstanding, the teacher's *main* concern is with students in general, not any student in particular. Following from that, the teacher tends to concentrate on the *external* features of the model in Figure 6.5; that is on *situational factors* and *performance*. This is not to say that teachers are unconcerned with personality factors or with approaches to learning; they are concerned with them, but indirectly. Thus, if students are using inappropriate approaches to learning, the teacher's recourse is to change some situational aspect that will either change the student's approach, or if that cannot be changed easily, accommodate to that approach, for example by changing the S–F ratio in the performance objectives.

Counsellors, for their part, take over where the teacher leaves off; their main (but again not exclusive) concern is with the *internal* features of the model; that is, with *personal* factors and *approaches to learning*. Another difference is that counsellors often deal with students in a one-to-one context.

Researchers are concerned with all aspects of the model and their interrelationships. Their concern is twofold: *instrumental*, using the LPQ and/or SPQ as tools for finding out more about their use and viability; and *substantive*, which is finding out more about the nature of student learning itself.

Figure 6.5 suggests that the metalearning capability of the student determines strongly how that individual's learning process complex is structured; and following from that, the learning orientation that the individual displays. As the research summarized in Chapter 2 indicates, the learning process complex subsumes many individual difference variables that are relevant to institutional learning—such as divergence, cognitive complexity, etc.—representing them as consistent motivational

and strategic syndromes, which the LPQ and SPQ operationalize in scale and subscale profiles. These profiles thus represent an individual's general orientation to learning: that is, a composite of motivational state and strategy deployment that is consistent over situations. A convenient way of referring to these LPQ and SPQ profiles uses the conventional order of referral: Surface, Deep, and Achieving, with motives before strategies. We thus have the order: SM and SS, DM and DS, and AM and AS. If now we signify a high score on any subscale as '+', a low score as '−' and a middle or irrelevant score as '0', it is possible to characterize students very conveniently. For example, '00 ++ ++' is a 'deep-achieving student' who may or may not be high on any of the surface subscales, while a '−− ++ ++' is a deep achiever who is exclusively deep-achieving. The 'Stanford Syndrome' (see below) might be represented as '+− 0− +−'; high on Surface Approach, medium on Deep Motive but low on Deep Strategy, and high on Achieving Motive but low on Achieving Strategy. Whether a '+', '−' or '0' is to be registered is a matter of professional decision. Deciles of 10 and 1 definitely belong as a '+' and '−', respectively, and 4 to 7 as '0'; but whether 8 and 9 should also be included as '+', and 2 and 3 as '−', is a matter of judgement (see *User's Manual* for further discussion of norms and scale and subscale scores). Such decisions depend on the user's purposes, for example whether one wants to be sure of dealing only with extreme cases, or to obtain a broad screening for group treatment.

We now turn to specific professional applications.

TEACHING

For teachers, two main uses of LPQ and SPQ scores may be distinguished: making *instructional* decisions, and making *referral* decisions.

1 Instructional decisions

The most commonly occurring patterns emerging from the LPQ and SPQ will be congruent ones, because the congruent factor structures on which the approach scores are based picked up about 60 per cent of the common LPQ and SPQ variance. Thus, the majority of students met with in the classroom will display one or other of these congruent patterns, that is, they will display one of the four basic approaches (including deep-achieving). It might be useful for the teacher to think of each of these patterns as exemplifying a 'learning style' (Schmeck, 1983: Entwistle, 1981).

A congruent pattern thus reflects an approach score: it is saying that a student high on a particular approach is motivated in a stable way, and goes about learning in a typical way. Approach scores thus constitute one way of looking at individual differences in the classroom. While approach, or scale, scores are relatively stable, the teacher may nevertheless change them to some extent. There are situational pressures that encourage a surface approach and discourage a deep one; while if existing objectives are unreasonable, in that an established approach is not meeting them, and the approach cannot be sufficiently modified, then the S–F ratio acceptable for that task can be changed.

Common patterns or styles include:

(a) Surface (++ 00 00; ++ −− −−). Students showing either pattern (the second of these two patterns is the more extreme) have been shown to have a poor academic self-concept—to rate their own performance low relative to peers and to be dissatis-

fied with their performance—to perform poorly on objective criteria; to plan to drop out of school or university prematurely; but to do well under circumstances where rote learning is appropriate, at the expense of structural complexity.

The surface approach in students is encouraged by pressure, for example anxiety over examinations, meeting deadlines, fulfilling rigid institutional requirements, surveillance, and so on. The teacher's role is not to carry out therapy (within the Personal domain in Figure 6.5) but to alleviate these situational stressors. A theoretical alternative is to reset objectives with a decreased S–F ratio—that is, it becomes acceptable to reproduce unrelated factual content—but this is not often likely to be desirable educationally.

The high surface student is unlikely to be a competent metalearner, motivated to use high level strategies, or to achieve complex outcomes. In that case, the teacher may have little choice but to teach task-specific devices, in a high structure situation, so that the student can at least get by.

The question of what to do about the high Surface student highlights a dilemma familiar in the aptitude-treatment interaction (ATI) literature (Cronbach and Snow, 1977): to *match* student with treatment (for example to teach SA students factually, with high structure) or to *mismatch* student and treatment (to teach in a way encouraging a deep approach, with high S–F objectives). The first accepts the student's current way of operating and optimizes on that; the second attempts to improve the way the student operates. The answer hinges around the extent to which the student's approach is modifiable (either by mismatched teaching, or by referring the student to the counsellor) and on the extremity of the case. Probably sound strategy would be to teach at first in a 'surface-discouraging' way; say, if the pattern was ++ 00 00 rather than ++ −− −−. The fallback teaching strategy would then be to provide high factual goals and teach low level survival strategies for each task. Mastery learning strategy (Block, 1971) is one example of an approach that seems well suited to the surface learner: the content and task objectives are highly structured for the student, and the high success rate is specifically aimed at improving the student's academic self-concept (Bloom, op. cit.).

(b) Deep (00 ++ 00; −− ++ −−). Deep-predominant students in general do well academically, if not quite as well as deep-achieving. A pure deep (−− ++ −−) approach may not be as good for attainment as deep predominant (00 ++ 00), because students using the former attend only to their own goals and pursue them in their own way. If these happen not to be institutional goals, the student will in a formal sense appear to be doing badly, no matter how satisfactory learning might be from the individual's perspective.

A good strategy for handling deep students is to intervene minimally. The original name for the Deep Approach in the SPQ was 'Internalizing' (Biggs, 1978), which emphasizes that DA students are interested in following their own interests, relating to their own previous experience, generating their own examples, and following up their own leads. As noted, if taken to extremes such a solipsistic style may be maladaptive, particularly if the HSC is around the corner. However, if teachers become too directive in turning DA students towards more acceptable goals, these students may either drop out, or simply approach those goals with a surface approach. A pure deep approach may be called the 'early seventies style' of do-your-own-thing. It is close to the personality, and less mutable than any of the other approaches, and perhaps the best way to meet its maladaptive aspects is to use it in combination with others. Deep-achieving is the

most compatible: i.e. the −− ++ −− student needs to be built up on achieving to become more like −− ++ ++, but that is either a job for the counsellor or for experience. Many students, or ex-students, who carry an early seventies style into the eighties seem either to acquire the motivation to achieve, and with that the appropriate strategies to 'get their act together', or to acquire a tract of land in a subtropical rain-forest. In either event, their strategies are congruent with their predominant motives.

DA students who have elements of achieving, however, are self-reliant, working well on individual assignments and projects, and if sufficiently interested in the task, are likely to be amenable to suggestions as to how to organize carrying out the task and to work more efficiently. If the student is sufficiently interested in the area to want to study it at a higher level—whether at university if currently at high school, or for a research higher degree if currently an undergraduate—that itself creates the need to achieve: to obtain a good aggregate, or to obtain a good class of Honours, is a necessary prerequisite. Often it will be that kind of long-term planning that will increase the viability of the pure DA student.

(c) Achieving (00 00 ++; −− −− ++). The achieving-predominant student is interested primarily in getting good marks, and is deliberate, careful in planning, and single-minded about achieving that goal. These students tend both to achieve a high academic self concept and to perform well in formal examinations.

The teaching context in the traditional selective secondary schools, with the emphasis upon prizes, scholarships, competition, highly syllabus-oriented coaching, norm-referenced evaluation, scheduled study times, organized note-taking, exam question practice, etc., is made for the high Achieving student. The obverse of the coin is that those features create undesirable pressure on other students, particularly those low on achieving motive and predisposed to a surface approach to learning. The learning of the pure AA student might be described as 'opportunistic', as seen for instance in the Biggs (1979) study when such students took part in a learning experiment that did not form part of the course: they rote learned what was required very well, but forgot the material within a week (unlike surface approach students who also rote learned the material but retained it). In normal academic circumstances, however, the achieving approach relates consistently to most aspects of performance, including affective ones such as satisfaction.

(d) Deep-Achieving (00 ++ ++; −− ++ ++). It emerges from these 'pen portraits' of students that the vices of (b) and (c) are complementary: the pure deep is in danger of academic solipsism in being too out of touch with institutional goals, and the pure achiever in being too opportunistic, such that the race for high grades may prompt some academic short cuts. Combining the deep approach with careful plans related to the syllabus, the result would be the student who is highly adaptive, typically performing in terms both deep-achieving of S–F ratio and of affective involvement at the top of the range of academic performance (see Figure 6.5).

If a deep-achieving student is *not* doing well, there are likely to be quite specific reasons, a common one being language problems. It seems that the experiences of bilingualism and of immigration require the individual to monitor what is said, to translate into or from the mother tongue, to want to 'get on' (no doubt with parental pressure too) and to organize ways of cutting down the cognitive load, all of which encourages metalearning and the characteristics of a deep-achieving approach. On the other hand, if second language learning is not very secure, then achievement

assessed in that language cannot be expected to be great: thus, a 'good' approach may be associated with poor performance.

At school, the correlation between verbal ability (WK) and the Deep-Achieving Scale is zero in both sexes and both at Age 14 and in Year 11, yet DAA itself correlates positively with achievement. This means that DAA students tend to perform at a higher level than would be predicted on the basis of their verbal ability, so that DAA students who are achieving at an average level could indeed be well below average in verbal ability. However, that should not in itself because for concern: certainly their approach ought not be changed. They should not, for example, be given work of a low S–F ratio, but should be allowed to pursue their reasonably complex goals in their own way.

The problem of low achieving DAA students at tertiary level may also be due to difficulties associated with an ESL background, and many of the same comments therefore apply. Another potentially low achieving DAA group at tertiary level are mature-age students, whose low achievement is associated with a lack of confidence in their studying and writing skills, their actual sophisticated approach notwithstanding. They need therefore to have that confidence restored by counselling courses in study skills (essentially the achieving strategy which, as we have seen, increases academic self-concept even if performance is not necessarily enhanced), essay writing, speed reading, and the like. The study problems of many mature age students, in other words, are more often imagined than indicative of a genuine inferiority of approach (see also Moylan and Biggs, 1983).

(e) Surface-Achieving (++ 00 +−). This slightly anomalous syndrome arose most commonly in the tertiary samples. Examples were students of armed services personnel attending CAEs, and graziers' children attending universities, and in one exaggerated form in the Stanford students reviewed in the next section. SAA students are motivated to achieve but adopt a surface approach to do so. They are, however, unlikely to be successful, and indeed the syndrome is an incongruent one. If SAA *is* successful, perhaps it should not be. Instructional decisions that adapt teaching to meet this approach—frequent multiple choice testing of trivia, factual detail, or more generally giving credit for low S–F ratio material—might reasonably be regarded in general as poor teaching decisions.[1] If SAA students have sufficient metalearning capability, as may usually be assumed at tertiary level, it would be appropriate to refer them to the counsellor, with the aim of building up the achieving strategy.

(f) Low-Achieving (00 00 −−; ++ 00 −−). There are many variations in the low-achieving pattern, depending on the balance of surface and deep components. The general syndrome is in essence based upon low achievement motivation, and as seen in Table 6.10, low AM was common to all four of the poorest performing groups (in terms of self-rated performance and satisfaction), while the poorest performers of all were those high on Surface as well as Achieving Motive. This last combination refers to students whose motive to avoid failure (SM) is stronger than their need to achieve success (AM), a combination (+0 00 −0) defining the group Atkinson (1964) calls 'low need-achievers'. These students are not necessarily of low intelligence, but are highly defensive when their competence is being publicly evaluated, especially in a competi-

1 The qualification 'in general' is important. It is certainly arguable that in Third World countries, where competence in the *'teaching'* language is low and cultural factors discourage metalearning, an SAA approach to teaching and the curriculum is eminently sensible in basic professional preparation (see Biggs, Maddock, and Telfer, 1983).

tive situation: their greatest fear is the loss of face resulting from failing. Consequently these students are skilled task avoiders, through strategies such as 'forgetting' crucial assignments, setting impossibly high or trivially low goals (either way, they are off the hook), psychosomatic illness (Maehr and Sjögren, 1971). All of these will be recognized as behaviours typical of the under-achieving student.

The under-achieving syndrome has its roots in personality, and its effective treatment is undoubtedly a matter for the counsellor. Nevertheless, there is a lot the teacher can do, or perhaps more importantly, there are several things the teacher can avoid doing, to make school a more productive experience than it usually is for these students. One important step would be to avoid norm-referenced testing, with the public display of rank orders of competence. Evaluation should be criterion-referenced, with the comparison being with how that student performed previously, not as compared to peers. Mastery learning, which concentrates on a high success rate on basic skills (Bloom, Hastings, and Madaus, 1971), is particularly appropriate to improve the self-concept of such students through success (Block, 1971). It is also important that the teacher encourage the student to attribute *success* to his or her own *ability* (hence encouraging an optimistic prognosis) but *failure* to *lack of effort* (which the student can do something about) (Dweck, 1975). Usually, low achieving students make the worst attributions, blaming themselves for failure (which leads them to continue to expect failure), and attributing success to luck (which leads them not to expect further success).

Having outlined the most frequent styles or approaches to learning, the question of what the teacher needs to do about them arises, in terms of what instructional (as opposed to referral) decisions might best be made. Instructional decisions may be at a formal or informal level. Formal decisions involve changes made to the curriculum, to instructional method, or to evaluation procedures, and ultimately raise the question of ATI, already referred to.

In the ATI model (Cronbach and Snow, 1977) students having a particular aptitude (such as a particular approach to learning) would be allocated to a particular instructional treatment group, and those with another approach to another treatment group. (Whether those treatments reinforce (match) or compensate (mismatch) the approach is a separate question, alluded to earlier.) Thus DA students would be in one group, DAA in another, AA in another, and SA yet another. Usually, that would not be practicable within the resources of the ordinary school.

At the informal level, knowledge of each student's approach to learning would modify the *interaction* between the teacher and that particular student: less pressure would be put on the DA student, more on the AA, the SA would be guided and directed closely, and so on, along the lines of the preceding discussion of these different student 'types'. One problem with that approach is that the adjustment is intuitive and presupposes a high degree of flexibility in the normal classroom; another is that it demands a lot from the teacher.

It is of course possible to compromise where different streams or levels in a subject exist: the top stream might be a mixture of AA and DAA, lower streams with higher proportions of SA and various combinations of low achievement motivated students, so that in broad terms some adjustment can be made to curriculum objectives, and instructional and evaluational procedures. These possibilities are summarized at the end of the chapter.

2 Referral decisions

The second main use of LPQ and SPQ scores is to identify cases for referral, usually to the counsellor. A quick review of the bulk of the research reported earlier suggests that problems are likely with two main categories of student: surface approach (++00 00), and low need-achievers (+0 00 −0).[2] We have discussed the teacher's decisions about the most common variants of each; the counsellor's role is discussed below.

It is suggested, in short, that direct classroom evidence of poor achievement might be augmented with information from the LPQ and SPQ to facilitate further professional decision making.

Summary

As far as the teacher is concerned, the most helpful use of the LPQ and SPQ is for identifying the most common learning approaches currently displayed by students in a particular class. That knowledge would then temper decisions concerning appropriate curriculum objectives, and instructional and evaluation processes. The S–F ratio is a helpful concept in thinking about the match between objectives and assessment: a poor match, for example, would be a high structure objective, when assessment is on a factual basis. Similarly, instructional and evaluational procedures may encourage a surface approach and discourage deep, although some such stressors may encourage achieving students.

These points are summarized in Table 7.1. Five common profile-types are outlined with brief suggestions as to what might be done, first by way of instructional decisions; and second, if and when the students with the profiles in question should be referred, and to whom.

The contents of Table 7.1 obviously only hint at many complex issues, each deserving extended discussion, such as individualizing instruction, the use of competition and norm-referenced testing, strategies of mastery learning, the operationalization of 'low' and 'high' structure, and the fit of each of these with the motivations and learning strategies of students. To do this would be too great a task for the present context. General discussion of all these concepts may be found in many educational psychology texts; for example, Chapters 1, 3, and 4 of Biggs and Telfer (1987). Further references to sources of particular proposed instructional procedures may also be found there.

COUNSELLING

If the teacher's main task is to make instructional decisions affecting groups of students during their normal learning, that of the counsellor (usually) is to give individual treatment to those whose learning falls short of 'normal', whether that is measured in terms of peer comparisons or in terms of inadequate self-realization. At the risk of oversimplifying, the counsellor's main target is the individual student, whereas the teacher's is the cognitive (and affective) growth of all students. In the present context, the counsellor concentrates more on the personal factors in Figure 6.5, and on the student's approaches to learning.

2 This is not to suggest that these are the only categories. It is intended to cumulate a databank of profiles, and to determine which turn out to be the more commonly recurring ones that are more frequently associated with learning difficulties. In fact, LPQ and SPQ users are strongly recommended to maintain their own files, containing profiles, problems, and notes on action taken.

Table 7.1 Teaching decisions and some LPQ and SPQ profiles

Basic Student profile		Type of Decision: Instructional	Type of Decision: Referral
1	Deep 00 ++ 00	Low structure; individualized where possible; guide into DAA to best pursue interests.	Possibly not, except if help needed to promote DAA.
2	Achieving 00 00 ++	High structure: emphasize competition, exam-technique, but try to lead towards DAA to avoid opportunism.	Probably not necessary.
3	Deep-Achieving 00 ++ ++	Low structure; no further action where achievement high. If low, suspect ESL or mature age (at tertiary).	To ESL teacher if appropriate. If mature age, to counsellor for confidence-building.
4	Surface-Achieving ++ 00 +–	Only in exceptional circumstances is this likely to be congruent with educational goals. Encourage AS, discourage SS, in interaction with student.	Refer to counsllor; better able to tackle student study strategies directly.
5	Surface ++ 00 00	High structure if educationally justifiable. Specify tasks and answer-getting techniques; emphasize organisation, details, algorithms. Avoid competition, norm-referencing, use mastery testing.	To counsellor, to train from SS to AS; improve motivation.
6	Low-Achieving 00 00 –0 +0 00 –0	Criterion-referenced/ mastery testing; avoid competition, stress. Attribute success to ability, failure to insufficient effort.	To counsellor: a variety of low- and under-achieving possibilities here.

Training in study technique

One of the counsellor's more common tasks is to help students to study more effectively. This is a controversial area. Gibbs (1977) puts the question succinctly but with some scepticism: 'Can students be taught how to study?' His answer is 'No'; learning to him is a self-defined and self-discovered process that one needs to encounter and negotiate for oneself. Indeed, Tabberer (1984) cites many examples of secondary, even sixth form, students being untouched by, or actively resisting, the advice given in study skills courses. Some research supports this view (Cooper and Foy, 1969; Gibbons and Savage, 1965; Shatin, 1967). On the other hand, the literature contains apparently successful reports of teaching study skills. Gates (1917) was possibly one of the first to report a controlled experiment, and there have been many since (see for example, Arnold, 1942; Shaw, 1955; Annis and Davis, 1977). The ready availability of 'how to study' texts and recent reprints such as Robinson (1961), who pioneered the SQ3R method as 'the Australian crawl of study methods (*sic*)', Morgan and Deese (1957), Anderson, Durston, Katz, Poole, and Horton (1969), and Pauk (1974), suggests that there are at any rate enough students around who believe that being told how to study is going to benefit them. Is it simply a matter, as the data reported in the present volume might suggest, that the Achieving Strategy (which mostly comprises organizing, scheduling, note-taking—those things that are stressed in 'how to study' books and courses)—is a kind of academic placebo: increasing satisfaction, making the student feel better, but actually bringing about few measurable gains in performance itself?

Gibbs (1977) explains the problem as being the familiar metacognitive one: *knowing* how to do something is no guarantee that one will *do* it. Organizing, speed reading, and so on, are techniques, he says, that must fit the student's scheme of things, and be seen to have a purpose within that scheme, if they are to work. Anderson (1979) divides the metacognitive decisions a student needs to make, in a task such as reading from text, into three phases:

1 *Prereading:* 'Do I feel like study now?' 'What do I want or do I intend to get out of this study session?' 'What do I already know that is relevant?'

2 *Reading:* Students need to be trained to be aware of the 'clicks' of comprehension and the 'clunks' of incomprehension by active search and questioning: simple underlining and note-taking is not effective unless comprehension is actively monitored.

3 *Post-reading:* Notes, reading, and recitation are not effective—students need to actively map out the links between facts and ideas.

In short, good students utilizing any approach do so by becoming metacognitively aware of their own learning processes. The link between this conception and the congruence hypothesis is obvious: formulating intentions, ways of realizing those intentions, and deciding what are likely to be the most effective in the circumstances, are activities that would produce congruent motive–strategy decisions. If study skills courses can produce this kind of self-awareness, given that students are sufficiently motivated, it would seem highly likely that students could indeed be trained to become better learners.

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' analyses of their own resources in relation to task

demands, this would seem to be potentially very useful. After an extensive review of a similar problem, Wagner and Sternberg (1984) conclude that 'Emphasis on metacognitive training does result in some degree of durability and transfer' (p 199). Thus, if study skills courses—to call them that for the moment—can produce a level of self-awareness such that students can perceive what they want and how to get it, and they want it sufficiently, then it is likely that the students concerned could indeed become better learners.

If, however, that sort of self-awareness cannot be induced, for whatever reason, then it seems that one is left with teaching highly specific tactics that are close to the task, and 'do the trick' without requiring necessarily any metacognitive insight on the part of the student.

These considerations suggest a two-stage intervention model, in which the student's metalearning capability is taken as the point of departure for determining the style of intervention (Table 7.2).

Table 7.2 An intervention model based on students' capability for metalearning

Metalearning		Approach to learning	Type of intervention
1	High to medium: students cognitively sophisticated and already well motivated or capable of becoming so.	Deep-oriented: motive-strategy congruence important, and can engage tasks with a view to high transfer.	Non-directive: students' metacognitive processes the target for intervention.
2	Low: students with external LC, poorly motivated, and low abilities profile (probably).	Surface-oriented: motive-strategy congruence not an issue. Specific, low transfer, tactics linked to particular tasks.	Directive: task-specific tactics and algorithms the target, not students' comprehension or self-monitoring.

At the lowest level, the counsellor will be training the student in survival tactics, in dealing with anxiety, and in raising confidence; this is not to say that these tasks are themselves low level, but they do not necessarily involve metalearning. A speed reading course, for instance, might allay anxiety because the student now believes it is possible to read the wealth of prescribed material whereas before it seemed overwhelming, without the student developing very much insight into his or her own approach to learning. Speed reading in this case is simply a technique that has been learned.

Operating at a medium level of metalearning, the counsellor might help the student to see why, given the student's (possibly unconscious) predilection for procrastination, study periods should be scheduled at times to suit the student's program, and then rigidly adhered to, possibly with contractual reinforcement. Higher still would be a program where highly motivated students were brought to recognize, through training in self-knowledge and in study skills relating to that knowledge, that a deep-achieving approach is better adapted to their goals than surface-achieving.

Probably the highest levels of metalearning are presumed by Johnson Abercrombie

(1969). She ran small groups of medical students in an encounter-group atmosphere in order to improve their skills of diagnosis:

> My hypothesis is that we may learn to make better judgments if we can become aware of some of the factors that influence their formation. . . . the student learns by comparing his observations with ten or so of his peers. He compares not only the results, but how the results were arrived at . . . What the student learns, it is hoped, is not only how to make a more correct response when he is confronted with a similar problem, but more generally to gain firmer control of his behaviour by understanding better his own ways of working. (p.18–19)

It would be difficult to improve upon that as a definition of metalearning. It is, however, a process that is highly sophisticated and needs skilful handling, both on the part of the student participants and on that of the group co-ordinator. By all accounts, her groups were extremely successful, as were similar group-oriented approaches described by Judge (1969) and by Winter, Griffith, and Kolb (1970).

In this kind of metalearning situation, it seems helpful if the participants are taught a model of learning so that they can talk about *what happens* when they learn something, as opposed to *what* that something was that they learned. In this way, the learner can dissociate the process of learning from the content of learning. It is then possible to talk about one's own learning from an outsider's point of view—a process that is greatly enhanced when other people in the group are talking about their learnings of a common topic.

The difficult phase, and the one truly involving metalearning, is the second one: applying the model to oneself. Cornell (in progress), for example, taught the SOLO Taxonomy to bright Year 11s and within three or four lessons they had mastered the concepts and could apply them to responses in poetry appreciation with a high degree of accuracy. What few of them could do, however, was to use that knowledge to structure their *own* responses. In other words, most students knew what extended abstract responses were—they could reliably recognize them and explain why this was an instance and that was not—but they couldn't themselves generate an extended abstract response to a new item if they hadn't produced such responses before. Their performance was cognitive to a high level; but it was not yet *meta*cognitive. Whether it would have become so over a longer period of training is not known, but certainly by tertiary level many students are capable of this kind of metalearning, as Johnson Abercrombie's work demonstrates.

A study that monitors intervention using the SPQ was first reported as Biggs and Rihn (1984); the present version presents more fine-grained detail as to the SPQ scales, and subsequent performance information not previously available.

The Learning Assistance Center (LAC) at Stanford University provides a course ('LAC-1: Effective Learning Skills') for students who are dissatisfied with their grades. It needs to be understood that Stanford is an élite private university with highly competitive entry and expensive term fees. Students who perceive themselves 'at risk' there are already bright and highly motivated: what they see themselves as lacking is an appropriate approach to study. Two intakes of students enrolling in the nine week (one term) course LAC-1 were tested with a minimally but essentially reworded SPQ both on entry into the course, and after the course was completed. The picture at entry is given in Figure 7.1; for comparative purpose the Australian universities' means are given.

The motives and strategies are separated in order to draw attention to the main feature: the LAC-1 students are 'surface achievers' motivationally (see Table 7.6) in that they are significantly higher than Australian students on SM and AM, while their

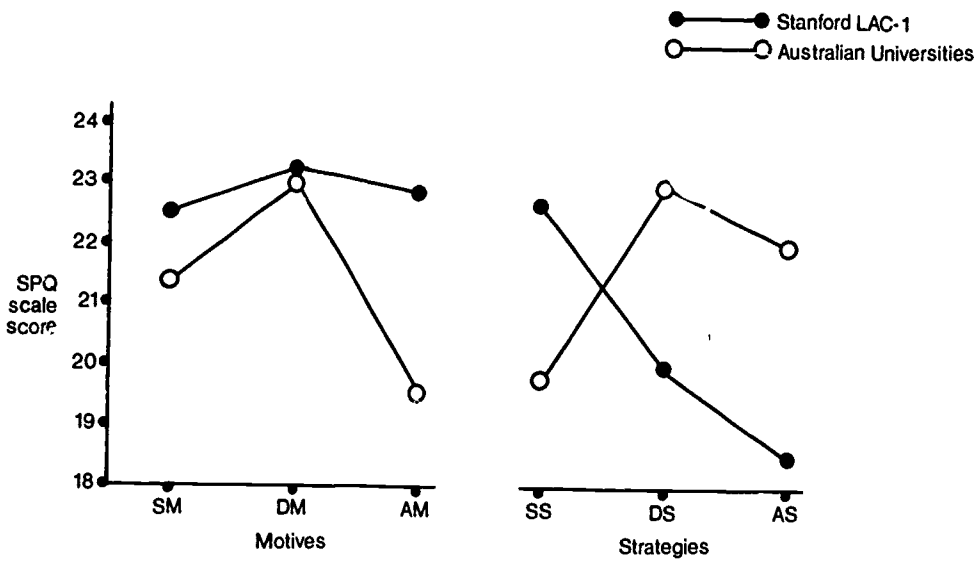


Fig. 7.1 **Stanford LAC–1 Pretest: SPQ scores compared to Australian university students**

strategies are quite unsuitable: significantly higher than Australian students on SS, and significantly lower on DS and AS. The match between motive and strategy in the Deep and Achieving Approaches is clearly inappropriate: the picture is one of high motivation and inadequate use of the appropriate strategy in each case. The only congruent match is with SM and SS: the LAC-1 students are trying to cope with a high-pressure academic situation with a classic surface approach.

The course, LAC-1, was designed to overcome this deficiency. It takes nine weeks to complete and is offered for credit towards a degree on a pass/no credit basis. Some of the topics addressed are: time management, goal and priority setting, self-management, understanding and remembering what one reads, nutrition, relaxation, and the like. They are dealt with in a situation involving interaction with peers acting as counsellors, to whom students have to report on a regular basis. Pauk (1974) is used as a basic text, and emphasis throughout is on becoming aware of setting one's own goals, and becoming aware of whether, and how well, those goals are being met, both through self-evaluation and through peer interaction.

In short, the students are encouraged to reflect on their own learning and to match learning strategies with their intentions; this seems clearly to constitute their major deficiency to date. Given this program, and the background of the students, one would expect decreases in surface-related scores, increases in deep-related, and an increase in AS (but not AM as this is already high). Two cohorts of students, 32 males and 23 females in one term (Autumn 1981), and 35 males and 23 females in the following term (Winter 1982) were monitored, and the results are given in Table 7.3.

Apart from a few sex interactions, the results are exactly as one would expect. SM declined for males in Autumn Term, and for both sexes in Winter; SS declined for all in both terms. DM increased in Winter for both sexes; in Autumn for males only. DS increased in both terms. AM did not change at either time; AS increased both times. Thus while there was a sex difference with respect to motivation in one intake, change

Table 7.3 **Effects of intervention program (LAC-1: 'Effective Learning Skills') on SPQ subscale scores**

		Autumn '81				Winter '82			
		M(32)	F(23)	Source*	$p<$	M(35)	F(23)	Source	$p<$
SM	Pre	22.5	21.6	0	–	23.0	23.0	0	05
	Post	21.6	22.5	O × S	05	22.3	21.8	O × S	–
SS	Pre	22.4	22.2	0	05	23.1	21.8	0	05
	Post	21.6	21.5	O × S	–	22.3	20.7	O × S	–
DM	Pre	22.9	24.0	0	05	21.0	21.5	0	000
	Post	25.3	23.6	O × S	05	22.5	25.3	O × S	01
DS	Pre	20.2	20.2	0	001	18.2	19.7	0	000
	Post	21.5	22.0	O × S	–	21.2	22.3	O × S	–
AM	Pre	24.5	22.3	0	–	23.9	21.1	0	–
	Post	24.4	21.8	O × S	–	24..	20.9	O × S	–
AS	Pre	18.3	21.8	0	005	17.7	18 0	0	000
	Post	22.2	22.3	O × S	05	20.9	21.8	O × S	–

* O = Occasion (pre/post-test); S = Sex.

in relation to strategies was uniformly significant and in the expected direction, with surface-related scores declining, and deep- and achieving-related scores increasing.

Figure 7.2 summarizes the data by averaging the effect of intervention program over sex and term, and converting to s-scores. Thus, Surface Strategy decreased by nearly half a standard deviation, Deep Approach increased by nearly one, and Achieving Strategy by over one standard deviation. These last two effects are surprisingly large, and collectively what they do, of course, is to restore the balance so clearly lacking in Figure 7.1 above.

The important result is that this subject is reflected in performance. Prior to LAC-1, the grade-point average (GPA) of the students in the Winter term was 1.89; immediately at the end of the Winter course it was 3.12; and a full term later it was 3.15 (A = 4, B = 3, etc.). Thus, the mean GPA of LAC-1 students had risen following the course, and it was maintained for at least a full term after that. (Unfortunately, the corresponding data for the Autumn class are not available.)

It is clear that intervention in the present example was successful, not only in changing the 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. They were also very highly motivated, but specifically lacking those strategies for which they were well prepared motivationally.

An intervention study along somewhat similar lines, but which was conducted in two regular Year 11 Australian classrooms, is that of Edwards (1986). The intervention program was based on the commercially available[3] Study Habits Evaluation

3 SHEIK is available from the Australian Council for Educational Research.

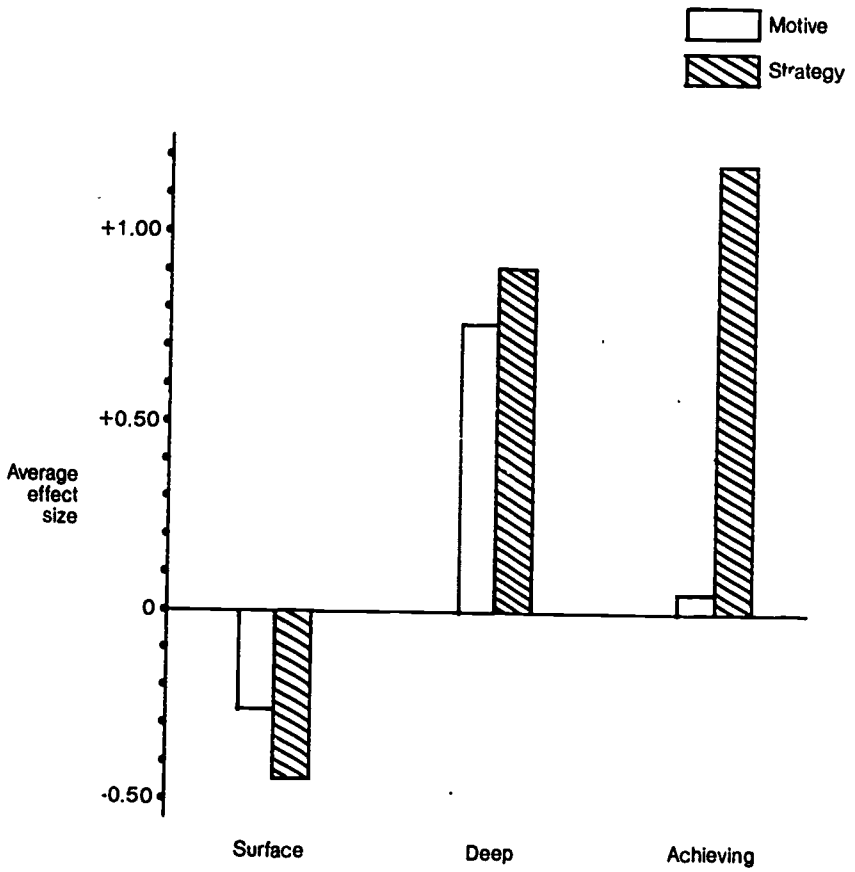


Fig. 7.2 **Average effect sizes for SPQ subscales of intervention program LAC–1, 'Effective Learning Skills'**

and Instruction Kit (Jackson, Reid, and Croft, 1979) and was administered by a school counsellor in ten weekly class periods.

The program 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. This was followed by seven weekly classroom sessions, each of which focused on a specific topic for metalearning awareness, each topic being illustrated with a sample piece of learning in which the student was involved: place of study, study times, organizing for study, textbook reading skills, taking notes, studying for exams, and exam techniques.

There were two experimental classes in two different schools (total N = 41) and one control class in a third school (N = 22). Schools were chosen from si nilar SES backgrounds, and all students intended to complete Year 12 and sit for the HSC. Pre- and post-test measures were taken on the LPQ to monitor changes in the learning process complex, and performance was monitored by reference to subsequent HSC performance at the end of the following year. It was not logistically possible to apply comparable performance tests across the three schools, but teachers' ratings and other criteria suggested that the classes were equivalent at the outset.

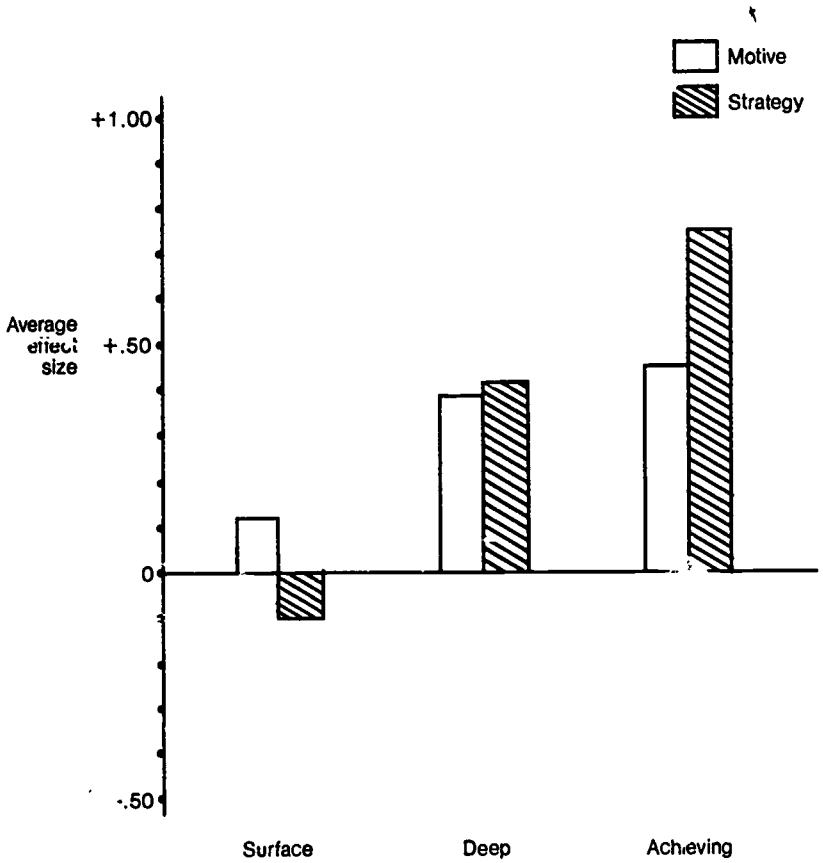


Fig. 7.3 **Average effect sizes for LPQ subscales of intervention program 'SHEIK'**

The results showed that there were no pre- or post-test differences between the two experimental classes, so these were combined for analysis. It was found that there was no change in the Surface scales, but there was a highly significant shift in the Deep-Achieving scale ($p<.001$) in the experimental groups: and that pre-test and post-test differences in the control group were non-significant for all scales. The intervention pre-test and post-test differences were converted to effect sizes, expressed in s-units, and a graph corresponding to Figure 7.2 is given in Figure 7.3.

The similarity between Figure 7.2 and 7.3 is clear. Indeed, if one takes into account that the Stanford groups were abnormally high on Surface Motive and Stragegy, and Achieving Motive, the effect of intervention is identical in both cases. The Stanford group needed to lower Surface but to maintain Achieving Motive, whereas the Australian group needed rather to build up on Deep-Achieving including Achieving Motive: the intervention did what was required in both cases.

The HSC mean Aggregate for the the intervention students was 286.6, and that of the controls 251.2 ($t = 2.40$, $p<.01$). Again, then, we have evidence that building up the deep-achieving components of the learning process complex is associated with improved performance that is still evident over a significant period of time.

The Ec[illegible]dy is particularl[illegible]portant as it is dealing not with a highly selected group of ter[illegible]dents, but with [illegible]rmal Year 11 students who are planning to com-

plete Year 12 and take their HSC. Further, the intervention was not of an intensive 'hothouse' kind, but one that is commercially available and may be dealt with in regular class periods. Probably the most important feature of the program is the emphasis on encouraging the students to introspect and be metacognitive about their learning.

It appears, then, that there are indeed conditions under which students can successfully be taught how to study. Some of these conditions would include:

(a) *a degree of maturity.* It is not known if SHEIK would work with younger students, but it does with motivated Year 11s. This would agree with work reported earlier in this chapter which indicates that normal Year 11s are mature enough to master the main awareness and control components of metalearning.

(b) *high motivation.* Both the Stanford and the Australian groups were reasonably well motivated: the first in that they sought help in their studying, and the second in that they planned to sit for the HSC.

(c) *a program that emphasizes metacognition.* In each case, the cognitive skills so taught were applied by the student in a self-analytic and self-aware fashion, in conjunction with concurrent content learning. It is also possible that this self-aware aspect is enhanced by dealing with self-analysis in groups, so that, as in the Johnson Abercrombie studies, students could compare themselves with how other students handled identical tasks. Again, this group discussion component was a feature of both the Stanford and the Edwards groups.

The key to the problem of training in study technique thus seems to involve the need to evoke metalearning. If 'study skills' are simply taught as directives—'do this, that or the other'—then students are unlikely to see the point, and even if they do it, will not gain from doing so, as Tabberer (1984) found, even with students of Year 11 maturity. Such tactical use of learning is most relevant only in the case when the tactic taught relates to the performance of a specific task (Snowman, in press). Proper *strategic* use of study technique needs to be nested in adequate motivation and deployed with an understanding that encompasses both the task and oneself.

VOCATIONAL DECISION-MAKING AND CAREER DEVELOPMENT

Another interesting and practically important issue, particularly for counsellors and guidance officers, is the extent to which students' motives and learning strategies might be related to the way they structure their future choices, in particular those concerning the world of work. When the LPQ was being normed, the Australian Council for Educational Research was simultaneously norming an Australian adaptation of the Career Development Inventory (CDI) (Super, Thompson, Lindeman, Jordaan, and Myers, 1981) on the same norming samples (Age 14 and Year 11). This meant that it was possible to interrelate both sets of data, and thus to explore relationships between career decision-making (CDM) and approaches to learning. The following account reports the main points as they affect the LPQ; fuller details may be found in Lokan and Biggs (1982).

The CDI has three attitudinal scales: Extent of Planning, Extent of Information about Preferred Occupations, and the Use of Resources; and two cognitive scales, Knowledge of the World of Work, and Knowledge and Application of Decision-

making Principles. The Cronbach alphas of these five scales range from .78 to .87. The scales are designed to assess the 'vocational maturity' of students; that is, the extent to which students are aware of the need to plan their careers, and to possess information, or know how to go about getting the appropriate information, about various aspects of the world of work. There is a 'clear *prima facie* relationship between a student's attitudes and motives for school learning, and ways of going about school academic tasks, and the extensions of those motives and strategies to the future and to the larger world outside. In many respects, the metacognitive aspects, of knowing one's own motives and abilities and making appropriate decisions on that basis, are the same.

In the General Information Questionnaire administered with the LPQ, several questions were asked that related to career planning, apart from the CDI: the kind of job aspired to (rated on the Broom-Jones categories, so that a high score indicates low status; see Table 4.10); the certainty felt about that career decision; adequacy of the information available about the career decision; and the extent of self-knowledge deemed necessary to make that decision. These ratings were correlated with the approaches to learning within each sample, separately for males and females. This information is given in Table 7.4.

The Surface Approach is related to low status of projected career by both boys and girls, and in both years. By Year 11, but not at Age 14, students high on Surface Approach think that they do not have the self-knowledge to make good career decisions; this may indicate at least the beginnings of appropriate metacognition. Both Deep and Achieving Approaches correlate with all the other variables in adaptive ways; frequently the correlations are stronger in the Year 11 sample. These data make sense: those students who are interested, who study for meaning in an organized way, and are ambitious, would be expected to approach decisions about the world of work in a similar kind of way to that used for school studies, the more so as that world moves nearer.

Table 7.4 **Correlations between Surface, Deep, and Achieving Approaches and career planning ratings: (a) Age 14, (b) Year 11**

	Approach					
	Surface		Deep		Achieving	
	M	F	M	F	M	F
(a) Age 14						
Self SES (1 = high)	13**	16**	−15**	−15**	−17**	−14**
Occ Cert	02	04	15**	23**	10*	16**
Job Int	−01	02	15**	18**	14**	14**
Self-Knowl	01	−01	20**	19**	17**	13**
(b) Year 11						
Self SES (1 = high)	14**	16**	−12**	−04	−17**	−09*
Occ Cert	−01	−02	19**	15**	22**	12**
Job Int	−08	−03	23**	15**	19**	17**
Self-Knowl	−15**	−09*	25**	18**	15**	20**

These data were then combined with the CDI scales, together with all the other information available about the students. The career variables formed the 'criterion' set of variables in a canonical correlation, the personological data the 'predictors'. The aim was to see what significant patterns of career development could be discovered, and what kinds of students tended to make what kind of career choice (Table 7.5).

Three patterns of career decision-making that involve LPQ scores appeared in each sample,[4] with some differences between the two.

Table 7.5 Canonical correlations for LPQ scales, demographic and personal-related variables and career development, at age 14 and year 11

	Age 14			Year 11		
Variable	I	II	III	I	II	III
Predictors						
Sex (1 = M)						
Year			46	–	–	–
WK	75			71		–44
Father SES (1 high)						
Ethnicity (1 = ESL)						–35
Ed. Plans	65	44	–55	80		46
SRP	47			46		
SAT						
LC	71			51	44	
LPQ: SM						
SS	–35			–47		
DM		63			44	49
DS		72			62	51
AM		35				41
AS		56			51	59
Criteria						
SES (SR) (1 high)	–56	–46	69	–70	48	–50
Job Certainty			37		36	
Job Information		37	37		4.	
Self Information		38	38		49	
CD: Planning	37	59	55		74	
Job Inf.		43	48		60	
Resources		60	47		65	55
Occ. Inf.	81	–35		61		
Knowl. DM	84			82		–41
Canonical Correlations	74	19	43	74	48	45

Decimals, loadings <.35 omitted.

4 Four patterns were reported in Lokan and Biggs (1982). The fourth vector in each sample, while significant, accounted for only a small percentage of variance and in each case did not involve any LPQ scores.

Age 14

1 High status, characterized by high educational and occupational aspirations, good knowledge both of the world of work and of decision-making. Students endorsing this have high WK and internal LC, intention to continue with formal education. high self-rated achievement, and avoidance of Surface Approach.

2 High status, characterized by the affective CDI scales: Planning, Use of Resources, and Job Information but low Knowledge of the World of Work. Students endorsing this adopt a Deep-Achieving Approach to learning and intend to continue their formal education.

3 Early leavers, characterized by low status job aspirations, plan to leave school early, especially the 14-year-olds in higher Years. They score reasonably well on the affective scales of the CDI but do not score high or low on any LPQ scores.

Year 11

1 High status, much the same as at Age 14.

2 Low status, but associated with high planning, resource use and job information, and endorsed by students with high internal LC and all components of Deep-Achieving except for AM (which is not surprising given the low aspirations).

3 High status, but with few CD components and indeed low knowledge of vocational decision-making. Students endorsing this tend to be of low verbal ability, have English as their second language, but adopt a Deep-Achieving Approach.

The first vector is much the same in both groups and reflects an obvious pattern endorsed by bright students, who know a good deal about the workforce, aim high, and use the educational system to get there. The second and third patterns are however rather different. At Age 14, the more attitudinal aspects of CDM are associated either with high aspirations and a Deep-Achieving Approach to learning, or with intentions to drop out to low status jobs. At Year 11, on the other hand, those with low aspirations have an internal LC, a Deep-Approach, and a degree of vocational maturity: 'low' aspirations of such a 17-year-old are obviously different from those of an intending 14-year-old 'drop out' and possibly refer to careers requiring a deep-organized approach outside formal education. The other high-aspiring Year 11 has a non-Australian ethnic background, low verbal ability and low knowledge of decision-making but a deep approach to learning. This student may risk inappropriate CDM, and is probably a good target for counselling.

In interpreting these findings, as a guide to counselling, it must be emphasized that the basic data were gathered in 1979, and the youth employment scene has of course changed drastically since then. With that caveat in mind, the three basic patterns of CDM at Age 14 seem basically sound; after the 'academic' and the 'achieving' routes, even the third one of leaving school early and seeking low status work—granted that it can be found—reflects a realistic self-assessment.

Those three patterns, however, still leave about 40 per cent of the CDI variance unaccounted for, which suggests that there are many students who do not have thought-out ideas about CDM and who are likely therefore to need training in CDM itself, not just specific advice about this or that job. It would be beyond the scope and the expertise of the present writer to suggest how such counselling might proceed, but the identification of students who would probably be in need of career counselling

can be greatly assisted by selecting students who are of medium to low verbal ability, and low scoring (say 3 and below) on the DAA scale. The specific problem areas on their CDM can then be picked up on the Career Development Inventory to guide further counselling.

The Year 11s present a slightly more complex problem, in that most DAA components are associated with two types of decision—high status and low status. The low status one actually seems the more adaptive, the other being associated with low verbal ability and ESL background (a combination that was suggested above might be in need of counselling, or referral to an ESL resource teacher, in any event). The general issue thereafter remains much the same: there is a large number of Year 11 students who are likely to be in need of career counselling, and again, identifying those students could be facilitated by the LPQ, and their counselling by the CDI.

General counselling

The preceding issues—study technique training and career counselling—represent only some of the many roles of the school counsellor. In order to deal with more general issues we shall match the counsellor's decision-making to the 'types' of LPQ profiles identified in the preceding sections on teaching. The teacher refers students with the profiles in question to the counsellor: the latter now needs to take appropriate action.

1 Deep (00 ++ 00). DA students are not likely to be a frequent concern of the counsellor, unless they are too 'early seventies', in which case some general counselling on career or personal development lines might be appropriate. DA students with academic interests might be encouraged to organize their approach to their favourite subject so that they can pursue it at a higher level. A kit such as SHEIK (Jackson, Reid, and Croft, 1979) might be a helpful resource in this (see above, pp. 113–116).

2 Achieving (00 00 ++). This group is unlikely to give rise to too much cause for concern over their approach to learning as such, but there may be secondary difficulties. One potential source of such difficulty lies in the development of 'opportunism' brought about by too single-minded a response to competition; for example, opportunistic achievers have been known to read essential references in the library as quickly as possible, and then redistribute copies randomly within the library stacks so that other students cannot find them; to refuse to help friends with an assignment, or even to discuss it with them, for fear of giving something away. Another sort of problem might arise when extreme achievers work too hard in their search for top grades, thus creating physical or social problems for themselves; for example, there were recent press reports of HSC students studying until midnight, every night of the week, throughout the year.

In treating students for these secondary problems, it would be advantageous to promote more interest in the topic and less concern with the formal trappings of excellence: in essence, to shift from AA to DAA. It would be worthwhile trying to convince them that the evidence actually favours the DAA approach. DAA students are in fact likely to do better with a more relaxed approach that allows them the luxury of ranging beyond the confines of the syllabus itself.

3 Deep-Achieving (00 ++ ++). If DAA students are performing badly, or feel that they are, two possibilities were suggested in the present research: an ESL background,

in which case the appropriate referral would be to an ESL teacher. The approach to learning is fine; it is just that a major tool of learning, language, has not been mastered adequately. The second possibility is not dissimilar: that the learner thinks that a major tool for learning ('study skills', 'essay-writing ability', etc.) has not been mastered. As noted, this belief is particularly likely to occur in mature age students, and while their reasons for so thinking are understandable enough, it turns out that in fact many of them have better approaches to learning than their younger colleagues. The problem is not one of approach to learning, as they might think, but rather one of a lack of self-confidence in what is perceived to be an ego-threatening and highly competitive situation. Such a confidence crisis might well be alleviated by a course on study skills (again, such as SHEIK) or on essay-writing, not because it is necessary *per se*, but because it may allay anxiety.

4 Surface-Achieving (++00 +0). This is a not infrequent pattern, found in school in students of high successive/low simultaneous ability and in tertiary institutions in students who appear simply to have misjudged appropriate ways of approaching learning. If it is the latter, and they are sufficiently motivated to want to learn, the task for the counsellor may be relatively easy, as in the Biggs and Rihn study which essentially used a metacognitive approach to study skills.

5 Surface (++00 00). This group is rather different from the previous one in that achievement motivation is not present to facilitate metalearning, and students showing this pattern at high school may be assumed to be poor metalearners. Certainly, Figure 6.3 suggests that AS may be used as a convenient prop, even when it is metacognitively incongruent with the student's motives. Another target for the counsellor would be to change the student's motivation, in particular to lower SM and to increase AM or DM. A particular variant of the SA pattern is where high SM is associated with low AM, the low achieving pattern, which is dealt with below.

6 Low Achieving (+0 00 −0). This is probably the most common pattern encountered by counsellors, and is defined motivationally rather than in terms of congruent or non-congruent strategies. The problem has two stages:

(a) Dealing with the fear of failure. The real basis of this pattern may be found in early childhood and possibly in genetic factors (Veroff. 1969), so that the counsellor is faced with the difficult task of trying to change the individual, and with the less difficult but still complex task of changing the environment. We have seen how the instructional environment may be changed—by mastery learning, eliminating norm-referenced assessment etc.—and the counsellor may play an important facilitative role in this, in consultation with the teacher. The counsellor may play an even more important role in the matter of inducing the student to make healthier attributions, by helping the student come to believe that success when it occurs is not due to luck but to competence that is likely to endure and produce similar results in future; and that failure is due to insufficient effort on that particular occasion rather than to an enduring incompetence. All too frequently, the cues that such students get from themselves, their peers, and sometimes their teachers and parents, are in the opposite direction; they are led to believe that failure arises from their incompetence, and such self-knowledge is not only painful, but crippling, as it engenders the belief that any future effort will be likewise ineffectual. Hence these students shy away from the situation giving rise to those cues: the school and school tasks. The job of the teacher and counsellor collectively is to reverse that feedback so that these students begin to feel that it is possible to succeed.

(b) Dealing with the absence of strategies to deploy. Unlike the pure SA student, the low-achiever has little in the way of strategic strength. As Maehr and Sjogren (1971) point out, many of these students tell themselves that the task is either impossibly difficult or ridiculously easy, and so rationalize their way out of doing anything. At least the SA student tackles the task by rote learning; the low need-achiever tackles the task by not engaging it at all. This observation thus provides the second string to the counsellor's bow: to teach the student some techniques of engaging the task. These will be quite low level much of the time and will often be task-specific, such as simple organizing techniques, even rote learning. On the other hand, since the correlation with IQ is not that high, there will also be quite bright low-achievers who, given interest and protection for their ego, *could* engage the task at quite a high level. Indeed, it is remarkable how many students exhibiting this kind of 'learned helplessness' (Thomas, 1979) in school, discover when they leave that it is not a fundamental threat to their being to tackle tasks in 'real life', and with that discovery, display both competence and dignity in their lives.

Summary

In discussing what the counsellor might do on a one-to-one basis, there appear to be five levels of intervention, which differ in the extent of metalearning involved. These levels are suggested in Table 7.6.

At the top comes 'idiosyncratic metalearning' where the student compares his or her own learning to that of others in the group, with the aid of a language about learning, and judges how learning might be improved for the task in question. It is a highly sophisticated technique and may work only with the very brightest high school student (this assertion has yet to be adequately tested and so ought not to be taken as dissuasion).

The next group involves 'deep-achieving metalearning': some self-knowledge, but the ways of structuring one's own learning in relation to the tasks are suggested. This requires a high amount of motivation and involvement. The third is a common situation, which may or may not involve much self-insight, and seems suited to bright, motivated students in general and to three patterns in particular: deep students who are too 'out of touch' and who need some organization; the deep-

Table 7.6 **Levels of metalearning in some counselling procedures**

Metalearning	Example	Type of student
1 Idiosyncratic metalearning	Johnson Abercrombie (1969)	Bright tertiary
2 Deep-achieving metalearning	LAC-1 at Stanford; SHEIK; skill training	Bright surface-achiever; Senior secondary students who are motivated to achieve
3 Minimal metalearning	Attribution training	Low achieving; learned helpless
4 Survival tactics	Task specific skills	Dull SA; Low achieving

achiever who lacks confidence; and the bright surface-achiever who needs to develop the surface strategy and replace it with the achieving strategy.

The second to bottom group involves some enforced metacognition ('I achieved that because I *am* good at it, not because I was just lucky that time'). Such students are clearly beginning to see themselves as self-aware agents who may have some control over their approach to learning. Finally, there is training in sheer survival tactics that are close to the task and do not involve metalearning: students just learn to do the appropriate thing. In all this, counsellor and teacher clearly need to work closely together and create compatible environments for their students in common. The organization of that is a question of policy for each institution. The present point is to demonstrate how the LPQ and SPQ may play a role in facilitating these important and mutually reinforcing professional interactions.

The LPQ and SPQ have not created a new typology of students-at-risk: they simply provide a quick and convenient means of collecting information relevant to existing diagnosis and remediation. If a student is not performing well, an observant and experienced teacher, or a sensitive counsellor, would ordinarily distinguish a disenchanted 'early seventies' deep, an inappropriately working surface-achiever, or a low achiever, and take the action appropriate to each: an LPQ profile provides helpful and speedy confirmation to the expert, and facilitates diagnosis for the less-than-expert. The possibilities for screening are fully discussed in the *Users' Manual*.

RESEARCH

Research uses of the LPQ and SPQ fall into two major categories: as instruments in research and development projects and in institutional research; and basic research into the concepts and principles underlying theories of student learning. A little needs to be said about each category.

Research and development

This type of research is concerned with the instruments as means of improving teaching, curricula, evaluating course development, and comparing institutional approaches to teaching; the instruments are used as tools to help improve knowledge about practical problems. There are two kinds of use: where the LPQ and SPQ are used to define the *independent* variables, as in identifying students' typical approaches to learning; and where the scores are used as *dependent* variables, as in assessing change in approach to learning as a result of counselling.

1 As independent variables

If the performance of a group of deep-achieving students is compared with that of a group of surface approach students, any performance differences are assumed to depend upon the DAA or SA values: here, the performance is the dependent, and the latter are independent variables. If, however, we put a group of students through a study skills course, and we want to see if their study processes have changed, the scale scores now are dependent variables, because any changes are presumed to depend upon the intervention. In this section, we are interested in the LPQ and SPQ scale and subscale scores as independent variables; usually, this means that the instruments would be used to characterize groups of students.

It is important for practitioners to realize that educational research, and more particularly the practice based on such research, is *context specific*. The suggestions under *Teaching* and *Counselling* above either derived from research carried out on the scales, or were based on the assumption that the present scales assessed the same constructs as were used in work carried out by others. In either event, they really need independent investigation with respect to the particular contexts with which the practitioner is concerned. The educational process is so complex that practice needs to be rooted in the immediate context in which the practitioner is working: it needs to be 'ecologically valid' (Snow, 1974). Now this is not to dismiss the suggestions on teaching and counselling in the preceding sections as plausible but unsubstantiated intuitions on the part of the writer: they *are* based on research, but like all practical applications of research, they need to be made within that context by the practitioner. The phrase 'R & D' in effect means that teacher and counsellor are both researchers and developers when they adopt a new technique or a new application.

For example, the practitioner might do some informal research by selecting fairly extreme SA, DA, AA, DAA low achievers, etc. and study them in the existing ecology of their classroom. How do they approach their work? As expected, according to the theory? If not, how are they different? What are their strengths and their weaknesses? Were there any surprises? Perhaps the most important thing to emerge from this would be a 'feel' for what the terms SA, DA, and so on, might mean in one's own immediate context. The next step is to work out, still within that context, how best to deal with the students so designated.

It is important to dispel the notion that one is 'typecasting' students; and worse, doing so with value judgments attached ('Well, he's only a surface-achiever, you know; won't get much out of him. But Jane's good value: she's a deep. . .'). Unlike other labels referring to race, intelligence, or sex, the present labels refer to approaches to learning that students are currently adopting for whatever situational and personal reasons and which may be changed if it is educationally important to do so. If a student is going about an academic task in an inappropriate way, and this seems to be a prevailing pattern, then it is in the student's interests to try and induce other more appropriate ways that are consonant with the student's perception of the task, the motives currently impelling behaviour, and with the nature of the task itself.

Alternatively, it may be more practicable to adapt instruction to the student's approach, as in the more formal aptitude-treatment interaction (ATI) studies. As noted earlier, there are likely to be practical difficulties in setting up treatments suitable for each of surface, deep, deep-achieving, low-achieving students, and so on, but it is quite likely that different streams would contain concentrations of some of these patterns. For example, the lower streams would be likely to contain a high proportion of surface-predominant students and low need-achievers, and higher streams students high on the achieving approach. If this is the case, the instructional climates can be adjusted accordingly.

A paradigm is suggested in Table 7.7 below.

It is assumed that there are two classes of roughly equivalent ability and that it is feasible to teach the same subject in two different ways: Treatment 1, which emphasizes competition, whole class work, norm-referenced testing, and a high structure teaching mode; and Treatment 2, which emphasizes independent research assignments, library research, one-to-one consultation, and in general low structure.

Table 7.7 **A possible paradigm for ATI research using LPQ scale scores**

Classes 1 and 2. (Year 9; the two top streams, high proportion of AA, DAA and DA students)

Student profiles	Class 1 Treatment 1 (Emphasises competitive group work; high structure)	Class 2 Treatment 2 (Emphasises independent low structure)
AA: 00 00 ++	High gain*	Low gain
DAA: 00 ++ ++	High gain	High gain
DA: 00 ++ 00	Low gain	High gain
Other	Low gain	Low gain

* expected outcome under Treatment (postest in relation to pretest).

One might then categorize the students into four groups: Achieving, Deep-achieving, Deep and the remainder. These groups would be expected to react differently to the treatments. In order to find out, a pre-test would be given (this would have to be carefully designed so that it did not favour either Treatment 1 or Treatment 2) and then a post-test, after perhaps a term or, it is hoped, even longer. Ideally, the groups should be 'equalized' on the pre-test and then compared on the post-test.

The expectation would probably be that AA would surpass DA on Treatment 1, and DA would surpass AA on Treatment 2, with possibly DAA doing well under both, and if Other contained many high SA students, it would be expected to be low on under each treatment. It would be useful also to ask students how they liked the treatments, irrespective of how they performed.

There are other variations of the ATI model, for example, comparing groups of students split on the same variable, such as low and high on AA, but such a discussion would take us too far afield. The present point is simply that in order to implement the above recommendations and suggestions, one would need to experiment within one's own context and find out how to put to best educational use the fact that students use typical but different approaches to learning.

2 As dependent variables

A counsellor might wish to know if a study skills, essay writing, or speed reading course is having any effect on students' approaches to learning. In this case, one might administer the LPQ or SPQ before and after the course and, using analysis of covariance or some other appropriate technique, determine if any changes might be attributed to the course. This procedure was in essence that adopted by Biggs and Rihn (1984) and by Edwards (1986).

Other research of this kind might focus upon institutional differences: Chapter 5 contains a wealth of data reflecting such differences, and which make sense in view of the functions and/or selection procedures of the institutions, and of the nature of the academic tasks typically carried out in different faculties.

A particular example of research and development which has considerable potential derives from work done by Kirby and Biggs (1981), summarized in Chapter 6 (see Table 6.2 and surrounding text). It will be recalled that it was possible by using the LPQ subscale scores to discriminate between lower and higher stages of competence

in the learning of particular tasks. As students' competence grew, in other words, they needed to do different things to the data, or the components comprising the task, in order to reach the next higher stage in their learning.

The examples looked at there concerned a poetry appreciation task, and a creative writing essay, at Year 9: the motive and strategy involvements at each transition differed between the tasks. This is in a way unfortunate, as it complicates the picture, in that each task will have its own process involvements. It does, however, reinforce the point made earlier about ecological validity for each task within each context.

Nevertheless, there were transitions that made considerable sense given the nature of the tasks. For example, in creative writing, the achieving strategy was significantly in evidence when students were moving from a unistructural to a multistructural level of competence, but at the next shift, from multistructural to relational, that strategy was significantly negative In other words, when young writers need to drop stereotypical language usage and become authors in their own right, the external organization provided by AS was inadequate and needed to be dropped, to be replaced by successive processing ability, so that the students would internalize and use their memory to put the components in the order their psycho-logic dictated.

This kind of information about the 'how' and the 'what' of growth in competence is what teachers need in order to hasten the growth of their own students, with respect to the academic tasks that concern them. There are likely to be times when rote learning (SS) is just what is required to do a task at a certain level; and equally, there are times at higher levels of competence in that task when SS is disastrous, but DS or AS might be precisely appropriate. Again, this kind of information can only come from research, carried out with the particular tasks the teacher has in mind for the students in question.

To summarize, then, a great deal more research and development needs to be done, particularly at the 'grass roots' level, as practitioners experiment with ways of using the information which can be derived from the LPQ and SPQ. The two main categories of use are (a) identifying students who typically adopt certain motives, strategies or approaches, so that educational decisions can be more finely tuned to their needs, and (b) comparing different groups of students on their motives, strategies, and approaches. It is hoped that, as such work progresses, reports of these developmental experiments find their way into the professional literature.

Further research

At the applied level, much useful work remains to be performed in extending the LPQ and SPQ to tasks and populations not yet studied, and in seeking more dimensions to include in the instruments. For example, the relationship between the LPQ and SPQ and the kinds of tasks used in Technical and Further Education has so far not been investigated. Again, an extension of the scales that has been considered is a Social Approach, comprising a Social Motive and a Social Strategy, to include those students who attend institutions and select their courses because of peer or other conformity pressures. In a different context, Social Strategies seem implicated in students who find they learn best from other people, in discussion: the Johnson Abercrombie groups made use of social interaction to further a deep approach to the making of diagnostic judgments. This is a very complex area, however, and several dimensions to a Social Approach can be distinguished, which *prima facie* seem to lead to both deep and surface approaches, and to great variation in outcomes.

There may well be benefit in such research, but it seems to skirt the major issue, which emerged with increasing force throughout Chapter 6: the issue of metalearning, and more generally of metacognition. As the interactions involving approaches to learning, individual differences, and task emerge in all their complexity, it seems that metacognition is the key to understanding good student learning.

Several questions may be asked about metalearning.

1 Do we teach metacognitive skills, or develop metalearning capability?

In discussing the role of metacognition in education, Brown (1984) suggests that

> . . . some form of metacognitive theory could offer valuable contributions to the arguments about a core curriculum. Selection of problem-solving tasks in school might then be based not only upon subjects deemed to be valuable in terms of their contents, but also upon essential metacognitive skills which improved the efficiency of the children's cognitions. Metacognition may succeed where formal disciplines failed. (p.218).

Wagner and Sternberg (1984) also suggest that metacognitive processes might be the direct target of schooling, because these skills are important and have a demonstrably broader degree of transfer than do cognitive strategies as such; students are typically lacking in such skills; and that these skills are not taught already.

These suggestions seem also to grow out of the present model. Improving students' metacognitive skills would deepen their approaches to learning, which in turn (cf. Figure 6.5) would increase the structural complexity of their learning, and the amount of satisfaction derived from it. The Edwards and Stanford studies seem to have demonstrated just that.

Both Brown, and Wagner and Sternberg, refer to metacognitive skills as if they are readily definable and detachable behaviours. Viewed as such, it is difficult then to distinguish them from *cognitive* skills. The skills listed in SHEIK, for example, organizing for study, taking notes, exam techniques, etc.. are metacognitive in one sense, but may just as easily be interpretable as cognitive. It is not the skill itself, but how the *learner* deals with the skill, that determines whether it is metacognitive or cognitive. If the student is not metacognitive about how to use the skill appropriately, but simply learns it as primary content, then it displaces the content the student should be learning.

The interesting feature about both the Stanford and the Edwards studies was that the *learning process complex* itself was changed in the deep-achieving direction, and that such a change was associated with improved performance. We need therefore to make a distinction between metalearning readiness, and metalearning capability. The shifts in the learning process complex suggest a reasonably permanent shift in metalearning *capability*, but it seems unlikely that such a shift could be induced in students that were not *ready*, metacognitively speaking. Such readiness seems to be associated with growing older in an appropriate environment, possessing or developing an internal locus of control, having a reasonable depth and spread of basic information processing abilities, and experiencing appropriate motivational states. These are personological features that develop slowly, and that are unlikely to be hastened easily. But granted sufficient 'momentum' has been acquired, then it does seem that training in cognitive skills can become metacognitive, with a consequent increase in the student's metalearning capability, and as indexed by changes in deep-achieving direction in the learning process complex.

Educationally speaking, then, there are two quite distinct issues.

First, some hard thinking needs to be done, as Brown (1984) urges, about what precisely we mean by metacognitive skills and how they may be taught. The SHEIK program seems to be one example of this. Here, metacognitive theory would define the content of teaching.

Second, there are the separate issues of metalearning readiness and capability, which raise a host of questions, the like of which are familiar from the individual differences literature: can metalearning readiness be enhanced, and if so, how? How can metalearning fruitfully be treated as an aptitude in aptitude-treatment interaction designs? Here, metacognitive theory would help shape the process of teaching.

2 How does metalearning develop?

The resolution of questions such as those asked above would help, first, to define what are the crucial aspects of metalearning in determining a student's approach to an academic task. Second, one could then discover more about how those aspects develop, and with which individual difference variables they are associated. The present research has implicated *age*, and, perhaps more especially, experience of a kind that encourages one to monitor one's own cognitive processes, such as immersion in a non-native language culture, or the demands of adult living; *abilities*, such as simultaneous and successive, and verbal ability; *internal locus of control*, which is possibly at least partly a result of the appropriate experience, which emphasizes executive control; and adequate *motivation*.

Clearly, there are other possible factors. One of the likely ones is the Piagetian notion of formal operations, which includes the ability to dissociate the form or structure of an argument from its content, and thus to think about oneself as an object (Elkind, 1967). Formal operations, however, is not so much an ability that develops as a description of *a level of abstraction* (Biggs and Collis, 1982). In other words, to observe and control one's learning processes is an abstract task, but to say this is simply to say what kind of task it is, not how it may be carried out. The level of abstraction in formal thinking refers to structure-as-opposed-to-content and may apply to both internal and external objects of thought, while metalearning applies only internally.

The ability to work at an abstract level is thus an important part of metalearning but it is not the only one. Wanting to be introspective, having the appropriate mental set to be introspective, and being intelligent enough to be, are all likely to be part of the matrix incorporating metalearning, as we have seen. Further research is needed to see what other factors still might be implicated.

3 Measuring metalearning

It is both theoretically and practically important to be able to define and then measure the various components of metalearning, and their stage of development at any time. The theoretical importance lies in being able to carry out the much-needed research, and the practical importance lies in being able to decide at what level students are, so that the appropriate level of intervention might be designed (see Table 7.7).

4 Can metalearning be hastened?

As we have seen there are certain types of experience that do seem to encourage metacognition in general, chief of these being those that are cognitively demanding and that force one to monitor one's own thought. It is likely that some academically-oriented experiences will prove better at facilitating metalearning than others; for example, the Stanford and Edwards studies showed that students could be trained to be metacognitive about their approaches to learning, where previously they had

shown little such awareness and control. While the Johnson Abercrombie approach may be too sophisticated or demanding for middle high school students, it may not be, particularly if suitably modified. The appropriate research has yet to be done.

Answers to these questions will both be practically important, and will help fill in a few more of the bumps and hollows in Figure 6.5, the elaborated model. That model must still be regarded as in its formative stages, however, for all its development from Figure 2.1. The final version is a long way off yet.

If, then, we review the progress of the research into student learning from the earlier studies, we can see the convergence of two major trends. The present writer's work arose in the nomothetic/psychometric tradition, as outlined in Chapter 2, and as it progressed it became more and more involved with the student's perspective. The other tradition, stemming mainly from Marton and the Gothenburg School, arose from phenomenology, which specifically rejected psychometrics and generalizations across student populations.

As we saw in Chapter 6, on the issue of situation-specificity of learning approaches, there is still some difference of opinion about the status of approaches to learning, particularly whether they refer to traits or states, or to the interaction between traits and situation. There is, however, consensus on one vitally important issue: metacognition.

How do students come to know about their own learning processes? How can they use that knowledge so that they may learn more effectively? Those are the questions with which future researchers should be concerned, and it is hoped that the LPQ and SPQ will play their parts in arriving at answers, so that in turn, both classroom and lectureroom will become more enriching environments for students.

Appendix: Administration

The theory of the two instruments, and the meaning of the scales, were described in the text. In this Appendix, the administration procedures of the LPQ and SPQ are given together with copies of the instruments.

ADMINISTRATION — LPQ

The LPQ was administered in class, and the instructions printed on the front page were read by the student. The administrator introduced the student to the LPQ with a few general words about why the student was completing the instrument: 'You probably need some help with your approach to your studies. I have some questions here that will help find out if you do need help, and what sort of help, so answer as honestly as you can.' When the form was given out, the administrator said: 'Now, read the instructions through and let me know if there is anything you don't understand.'

In the case of students with suspected reading difficulties, the instructions were read out loud with them. However, as students were expected to read the LPQ items themselves unaided, students who had serious reading difficulties were excluded. The reading level of the LPQ instructions and items is about Year 6 level.

Questions about the meaning of an item were dealt with as non-directively a possible; that is, the meaning of the item was explained without suggesting to the students how they should respond.

The LPQ items were as follows, in the order SM, DM, AM, SS, DS, AS:

1 I chose my present subjects mainly because of career prospects when I leave school, not because I'm particularly interested in them.

2 I find that at times my school work can give me a feeling of deep personal satisfaction.

3 I try to obtain high marks in all my subjects because of the advantage this gives me in competing with others when I leave school.

4 I tend to study only what's set; I usually don't do anything extra.

5 While I am studying, I often try to think of how useful the material that I am learning would be in real life.

6 I regularly take notes from suggested readings and put them with my class notes on a topic.

7 I am put off by a poor mark on a test and worry about how I will do on the next test.

8 While I realize that others sometimes know better than I do, I feel I have to say what I think is right.

9 I have a strong desire to do best in all of my studies.

10 I find that the only way to learn many subjects is to memorize them by heart.

11 In reading new material, I am often reminded of material I already know and see the latter in a new light.

12 I try to work solidly throughout the term and revise regularly when the exams are close.

13 Whether I like it or not, I can see that studying is for me a good way to get a well-paid or secure job.

14 I find that many subjects can become very interesting once you get into them.

15 I like the results of tests to be put up publicly so I can see by how much I beat some others in the class.

16 I prefer subjects in which I have to learn just facts to ones which require a lot of reading and understanding of material.

17 I find that I have to do enough work on a topic so that I can form my own point of view before I am satisfied.

18 I always try to do all of my assignments as soon as they are given to me.

19 Even when I have studied hard for a test, I worry that I may not be able to do well on it.

20 I find that studying some topics can be really exciting.

21 I would rather be highly successful in school even though this might make me unpopular with some of my class mates.

22 In most subjects I try to work things so that I do only enough to make sure I pass, and no more.

23 I try to relate what I have learned in one subject to what I already know in other subjects.

24 Soon after a class or lab, I re-read my notes to make sure I can read them and understand them.

25 I think that teachers shouldn't expect secondary school students to work on topics that are outside the set course.

26 I feel that I might one day be able to change things in the world that I see now to be wrong.

27 I will work for top marks in a subject whether or not I like the subject.

28 I find it better to learn just the facts and details about a topic rather than try to understand all about it.

29 I find most new topics interesting and often spend extra time trying to find out more about them.

30 When a test is returned, I go over it carefully correcting all errors and trying to understand why I made the original mistakes.

31 I will continue my studies only for as long as necessary to get a good job.

32 My main aim in life is to find out what to believe in and then to act accordingly.

33 I see doing well in school as a sort of game, and I play to win.

34 I don't spend time on learning things that I know won't be asked in the exams.

35 I spend a great deal of my free time finding out more about interesting topics which have been discussed in different classes

36 I usually try to read all the references and things my teacher says we should.

ADMINISTRATION — SPQ

The SPQ was administered in class, and the instructions printed on the front page were read by the student [illegible] dministrator introduced the student to the SPQ with a few general words abc [illegible]y the student was completing the instrument. 'You probably need some help with your approach to your studies. I have some questions here that will help find out if you do need help, and what sort of help, so answer as honestly as you can.' When the form was given out, the administrator said: 'Now, read the instructions through and let me know if there is anything you don't understand.' Any questions about the meaning of an item were to be dealt with as nondirectly as possible; that is, the meaning of the item was to be explained without suggesting to students how they 'should' respond.

The SPQ items were as follows, in the order SM, DM, AM, SS, DS, AS:

1 I chose my present courses largely with a view to the job situation when I graduate rather than out of their intrinsic interest to me.

2 I find that at times studying gives me a feeling of deep personal satisfaction.

3 I want top grades in most or all of my courses so that I will be able to select from among the best positions available when I graduate.

4 I think browsing around is a waste of time, so I only study seriously what's given out in class or in the course outlines.

5 While I am studying, I often think of real life situations to which the material that I am learning would be useful.

6 I summarize suggested readings and include these as part of my notes on a topic.

7 I am discouraged by a poor mark on a test and worry about how I will do on the next test.

8 While I realize that truth is forever changing as knowledge is increasing, I feel compelled to discover what appears to me to be the truth at this time.

9 I have a strong desire to excel in all my studies.

10 I learn some things by rote, going over and over them until I know them by heart.

11 In reading new material I often find that I'm continually reminded of material I already know and see the latter in a new light.

12 I try to work consistently throughout the term and review regularly when the exams are close.

13 Whether I like it or not, I can see that further education is for me a good way to get a well-paid or secure job.

14 I feel that virtually any topic can be highly interesting once I get into it.

15 I would see myself basically as an ambitious person and want to get to the top, whatever I do.

16 I tend to choose subjects with a lot of factual content rather than theoretical kinds of subjects.

17 I find that I have to do enough work on a topic so that I can form my own point of view before I am satisfied.

18 I try to do all my assignments as soon as possible after they are given out.

19 Even when I have studied hard for a test, I worry that I may not be able to do well in it.

20 I find that studying academic topics can at times be as exciting as a good novel or movie.

21 If it came to the point, I would be prepared to sacrifice immediate popularity with my fellow students for success in my studies and subsequent career.

22 I generally restrict my study to what is specifically set as I think it is unnecessary to do anything extra.

23 I try to relate what I have learned in one subject to that in another.

24 After a lecture or lab I re-read my notes to make sure that they are legible and that I understand them.

25 Lecturers shouldn't expect students to spend significant amounts of time studying material everyone knows won't be examined.

26 I usually become increasingly absorbed in my work the more I do.

27 One of the most important considerations in choosing a course is whether or not I will be able to get top marks in it.

28 I learn best from lecturers who work from carefully prepared notes and outline major points neatly on the blackboard.

29 I find most new topics interesting and often spend extra time trying to obtain more information about them.

30 I test myself on important topics until I understand them completely.

31 I almost resent having to spend a further three or four years studying after leaving school, but feel that the end results will make it worthwhile.

32 I believe strongly that my main aim in life is to discover my own philosophy and belief system and to act strictly in accordance with it.

33 I see getting high grades as a kind of competitive game, and I play to win.

34 I find it best to accept the statements and ideas of my lecturers and question them only under special circumstances.

35 I spend a lot of my free time finding out more about interesting topics which have been discussed in different classes.

36 I make a point of looking at most of the suggested readings that go with the lectures.

37 I am at college/university mainly because I feel that I will be able to obtain a better job if I have a tertiary qualification.

38 My studies have changed my views about such things as politics, my religion, and my philosophy of life.

39 I believe that society is based on competition and schools and universities should reflect this.

40 I am very aware that lecturers know a lot more than I do and so I concentrate on what they say is important rather than rely on my own judgment.

41 I try to relate new material, as I am reading it, to what I already know on that topic.

42 I keep neat, well-organized notes for most subjects.

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Subject Index

Student Approaches to Learning and Studying *formulates a theory of student learning which, together with the instruments deriving from it, has important implications for teaching practice at the secondary and tertiary level.*

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Student Approaches to Learning and Studying *consists of:*

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- SPQ Manual *which gives data on reliability and validity and describes a 42-item* Study Process Questionnaire *for which an* OMR Answer Sheet *and* Score Key Overlay *are available.*

John Biggs is currently Professor of Education at the University of Newcastle, and Dean of the Faculty. His interest in student approaches to learning goes back to 1966, when he was Educational Research Officer at Monash University. Since then he has published some forty papers and several books relating to student learning, and has conducted workshops for secondary and tertiary teachers showing how knowledge of students' learning can improve teaching and assessment procedures.