

Differential adoption of study approaches within individual students*

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Abstract. It has been claimed that the study approach adopted by a student will vary dependent, in part, upon the nature of the learning task at hand. The same student will change approaches from one task to another. The prime evidence for this claim seems to derive from two sources; reports from interview studies, and questionnaire studies comparing separate groups of students enrolled in different courses. In the present study questionnaire responses were collected from students asked to report comparatively on their learning approaches in two course units taken concurrently, and on their perceptions of how those same two units had been presented. The general support which was indeed found for the approach versus learning context claim was thus qualitatively different to, and genuinely strengthened, that from interview studies and that from between-groups studies. Moreover, relationships found between marks and both approach and learning context, within each compared course unit, provided support for a context to approach to performance model of influence.

In the literature on tertiary teaching, an oft discussed topic is that of the study approaches adopted by students. Students seem not to adopt universally similar approaches to studying for their courses, and the learning which results seems to vary dependent upon those approaches (see, e.g., Biggs 1989; Wittrock 1986).

These study approaches have been investigated from a number of different research perspectives ranging from multivariate based through phenomenographic to information processing models (Biggs 1987a; Entwistle 1987; Entwistle and Ramsden 1983; Entwistle and Waterston 1988; Harper and Kember, 1989; Marton and Saljo 1984; Ramsden 1985; Speth and Brown 1988). While the conclusions drawn do exhibit variability, there are also findings which seem consistently to recur. Commonly reported are two distinct study approaches, usually referred to as **deep versus surface**. A **deep approach** consists in studying material for its own merit, typically out of personal interest, in searching for basic meanings and structural interrelationships inherent in material, and in interpreting material against personal knowledge structures and experience. A **surface approach** is essentially the antithesis. It consists in studying to satisfy external demands, typically imposed assessment requirements, in maintaining the components of studied material as discrete and unrelated, both internally and personally, and in relying on verbatim memorization and reproduction. Although in part a function of performance criteria, tendencies to adopt deep approaches have been found to correlate positively with academic performance, and tendencies to adopt surface to correlate negatively (see, e.g., Biggs 1987a; Entwistle 1987; Meyer, Parsons, and Dunne 1990).

Also sometimes reported is a third study approach which represents something of an amalgam of deep and surface. Referred to as a **strategic** (Entwistle 1987) or **achievement** (Biggs 1987a) approach, it consists of the intent to maximize performance and grades, allocating study time and effort in systematic and

deliberate fashion, and adopting deep or surface strategies according to what is judged optimal and efficient for attaining grades. However, this third study approach seems not to be as consistently evidenced as deep and surface (Meyer and Parsons 1989).

By what are study approaches influenced? The question seems not easily answered. While perhaps not readily teachable in a simple, direct fashion (Martin and Ramsden 1987; Martin and Saljo 1984), they are nonetheless related to a range of variables. Student goals, student perceptions of course demands, pace of presentation, teacher enthusiasm, workload, elective choice, and assessment procedures are but some found to associate with the adoption of particular study approaches (Entwistle and Ramsden 1983). There are however qualifications. Patterns of associations with study approaches have been found to be clearer and stronger for deep than for surface approaches (Meyer and Muller 1990). Such patterns have been found to be more coherent amongst passing compared to failing students (Entwistle, Meyer, and Tait 1991; Meyer, Parsons and Dunne 1990).

Some of these related variables are within the student, some are within the learning environment. Study approaches thus seem to involve aspects of both the operation of relatively stable predispositions to act consistently across situations and the effect of demands perceived to come from teaching procedures, assessment requirements, and course contents. Some findings even suggest that students of particular study approach predispositions prefer, and thus might seek, courses with sympathetic teaching and assessment requirements (Entwistle and Tait 1990, second study). While some writers place greater emphasis on within student consistencies (e.g., Biggs 1987a; Entwistle 1987), others tend to emphasize the role of situation (e.g., Marton and Saljo 1984; Ramsden 1984).

Relative emphases on student versus situation notwithstanding, one claim made in the literature is that the same student can typically adopt different study approaches dependent upon the perceived situational demands residing within any given context (e.g. Ramsden 1984, 1988, in press). In its strongest form this claim connotes a model of the student as a rational decision maker who considers each learning task individually, adopting study approaches accordingly. The evidence cited seems to be drawn from two sources. First is interview studies in which students reported on their study practices (e.g., Entwistle and Ramsden 1983; Laurillard 1984; Saljo 1984), and in which they indicated variety of approach dependent upon learning task. Second is studies which compared relatively large but separate samples of students taking different courses or classes (see, e.g., Entwistle and Ramsden 1983; Entwistle and Tait 1990, first study). The findings from this latter source are usually that students studying within different complexes of course requirements report different mixes of study approaches, and that the approaches reported are systematically related to the between-group differences in the perceived course requirements.

Taken in isolation, each of these sources of evidence could be argued to suffer from interpretational constraints. Interviews need to be recognized as social settings in which students' responses to questions might reflect those students' perceptions of their roles in relation to the interviewer, and their personal constructs of what

constitutes acceptable study behaviours. Student interview reports cannot simply be assumed to be literal descriptions of motives and actions operating in a different social setting, namely during actual study (see Fleming 1986). Moreover, insofar as interview responses might involve retrospective verbal reporting of mental processes, there is always the possibility that some processes might either simply not be reported, or be reported inaccurately (see Ericsson and Simon 1980). Processes might be forgotten, or they might be so well practised that they are not readily open to conscious awareness. The reports might be verbalized interpretations of processes assumed to have been used, rather than true descriptions of processes which actually occurred.

The second source is constrained in that within-student inferences are drawn from between-student findings, while a parallel between reported study approaches and the teaching and assessment methods used with separate student classes is certainly not inconsistent with the notion that individual students adopt study approaches discriminatively, such does not demonstrate it directly. That two students each in a different teaching context are found to have adopted different study approaches does not necessarily imply that if they swapped contexts they would also swap study approaches. By themselves such between-student comparisons cannot logically distinguish an association between study approaches and teaching contexts from one between students and teaching contexts.

The point here is not that interview studies and between-group comparisons are fundamentally flawed. Rather it is that no one form of study is sufficient alone. To properly establish that individual students might discriminatively vary their study approaches dependent upon the course requirements and procedures with which they are confronted requires cumulative corroborative findings from a variety of sources. The purpose of the present study was to provide some such findings. A strong test might be to directly manipulate these course requirements and procedures, or more correctly the students' perceptions of same, and then observe the effects on the study approaches adopted. Given the difficulties inherent in trying systematically to control specific variables within a multi-variate setting like tertiary teaching, this might be an impracticable ideal. However, the least that could be attempted would be to reproduce the associations found with between-group studies, but using comparisons made with individual students. This latter was the intent of the present research.

The basic design was to select samples of university undergraduate students, who had each just completed two concurrent course units which seemed to represent quite distinct mixes of teaching patterns and course structures. These students were then administered two questionnaires which asked them to report both on their perceptions of various aspects of the teaching of the two units, and on the study approaches typically adopted in response to the two units. In both questionnaires responses were to be specific to the two units only, and comparative of one unit relative to the other. The questionnaires were adaptations of two instruments used for similar purposes in other research (Ramsden, in press; Ramsden, Martin, and Bowden 1989; Biggs 1987b).

The overall aim in the present research was to test for associations between

students' perceptions of the teaching in their target course units and the study approaches which they reported adopting in same. To the extent that students differentially adopted study approaches within one unit compared to the other, but that those patterns of adoption nonetheless corroborated the general findings for study approaches relative to course perceptions, the claim for the individual discriminative adoption of study approaches would be supported. The gain would be that since these present findings were based on within-student comparisons they would genuinely add to previous interview and between-group findings by providing a qualitatively different source of evidence. The interpretation that students discriminatively vary their study approaches would as a result be more strongly grounded.

However, the present research offered yet a further possibility. Should some students show no differential patterns, or indeed should some students show alternative differential patterns in relation to a common pair of course units, then the present research might also allow some appraisal of the strength of the association between perceived teaching context and adopted study approach.

Method

Subjects

The course descriptions in Monash University's 1990 calendar were surveyed for pairs of second year, first semester courses in which one course unit was of a reflective nature, allowing for possible student variation in elective emphasis and interpretation of content, and in which the other was of a more defined nature, with a fixed body of content to be studied. With the extra proviso that these pairs should also reflect the range of disciplines within the university, this aim was not easy to realize. The pairs eventually chosen were thus a compromise against the availability of student samples, and were perhaps not as distinct as might be preferred. The resulting analyses were thus likely conservative tests of the effects under investigation.

Second year course units were chosen on the assumption that the students would be both more settled in their study habits, and more knowledgeable on university teaching patterns. These students should thus have been capable of careful and valid judgments in response to the questionnaire items.

Enrolment patterns in the initial pool of course pairs were studied to find pairs which had substantial numbers of fulltime students who were commonly enrolled in both units. This led to the final selection of four sub-groups of students to be administered the questionnaires. These sub-groups were 74 students enrolled in biochemistry and microbiology units, 152 in financial accounting and business law units, 54 in chemistry and either mathematics or statistics units, and 40 in English literature and either politics or philosophy units.

Materials

The two questionnaires used in the present research were adaptations of Ramsden's (Ramsden, Martin, and Bowden 1989) School Experiences Questionnaire and Biggs' (1987b) Study Process Questionnaire. Originally, the former comprised 31 5-response Likert scale questions, and the latter 42. The main adaptation made to both instruments was to recast the questions so that each required two responses, one in relation to one course unit in a pair and one in relation to the other unit (see Table 1). This also necessitated changing to past tense in that each question now related to course units which had in fact been recently completed.

In the Biggs questionnaire some further rewording was required to shift the focus from reflection on general patterns of behavior to that on patterns within the context of a specific course. In the Ramsden questionnaire rewording was also required to shift from a context of Year 12 in High School where tertiary study was in the future to one of tertiary teaching within specific course units experienced in the immediate past. In particular, the original Preparation for Higher Education Study scale was recast to represent the extent to which a course supported or fostered the kinds of student learning and study expected in higher education. The scale was re-titled Support for Higher Education Study. However, in all this recasting the original wording was adhered to as closely as possible so that the point or sense of each item was preserved. Examples of original items and their adaptations are given in Table 2.

The general instructions at the head of each questionnaire were written to be as parallel as possible, and those for the Biggs questionnaire particularly retained the key phrasings from the original. The 5-point response scales were defined equivalently in both questionnaires, except that in the modified Ramsden instrument the points represented the extent to which a statement was true of a course, and in the modified Biggs instrument they represented that to which it was true of the student. These response scales were:

- 5 = always or almost always true of the course (of me).
- 4 = frequently true (of me).
- 3 = true (of me) about half the time.
- 2 = sometimes true (of me).
- 1 = never or only rarely true of the course (of me).

One further adaptation was made to the Ramsden questionnaire. The original instrument consisted of 31 items which defined five scales. These scales were Teaching Support, Independence in Learning, Structure and Cohesiveness, Emphasis on Achievement, and Support (originally Preparation) for Higher Education Study. Recent work in the cognitive processing analysis of learning and instruction (e.g., Duffy, Rochler, Meloth, and Vavrus 1986; Leinhardt and Greeno 1986; Peterson, Swing, Braverman, and Buss 1982; Schmitt and Newby 1986; Weinstein and Mayer 1986) might suggest that a further scale could be fruitfully added. This addition could reflect the extent to which teaching was perceived to involve some

Table 1. Examples of the comparative format used for questionnaire items

Tutors and lecturers tried to find out exactly how individual students understood or thought about the things in the course	<Course A> ^a	5	4	3	2	1
	<Course B>	5	4	3	2	1
You were expected to plan your own study time in order to meet assignment deadlines	<Course A>	5	4	3	2	1
	<Course B>	5	4	3	2	1
I learned some things by rote, going over and over them until I knew them by heart	<Course A>	5	4	3	2	1
	<Course B>	5	4	3	2	1
After a lecture or lab I re-read my notes to make sure that they were legible and that I understood them	<Course A>	5	4	3	2	1
	<Course B>	5	4	3	2	1

^a For any given student, his or her actual course titles would be shown in place of <Course A> and <Course B>.

Table 2. Illustrations of the modifications made in adapting the course perceptions questionnaire and study process questionnaire

Original	Modified
Course perceptions questionnaire	
The teachers here are enthusiastic about their subjects	Teaching staff showed genuine enthusiasm for the course material
We are under a lot of pressure to get qualified to enter tertiary education	The importance of qualifying for a degree was impressed upon you
On the whole, both staff and students work together as a team to make this a good school	Both staff and students cooperated to make for a good course
In most of my classes we are able to work through what we have to learn in a way that suits us best	In your classes you were able to work through what you had to learn in a way which suited you best
In these classes, students are asked to think about the evidence behind statements	Students were asked to look for and think about the evidence behind statements
Study process questionnaire	
I chose my present courses largely with a view to the job situation when I graduate rather than out of intrinsic interest to me	I chose the course largely with a view to the job situation when I graduate rather than out of its intrinsic interest to me
I find that at times studying gives me a feeling of deep personal satisfaction	I found that at times studying gave me a feeling of deep personal satisfaction
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	I wanted top grades in the course so that I would be able to select from among the best positions available when I graduate
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	I thought browsing around was a waste of time so I only studied seriously that which was given out in class or in the course outline
While I am studying, I often think of real life situations to which the material that I am learning would be useful	While studying, I often thought of real life situations in which the material which I was learning would be useful
I summarize suggested readings and include these as part of my notes on a topic	I summarized suggested readings and included these as part of my notes on a topic

explicit focus on the cognitive processing evoked in the student during instruction. Seven items representative of such an emphasis, labeled Metacognitive Focus, were thus constructed and dispersed through the original 31. The six scales which now comprised the Course Perceptions Questionnaire as used are defined and illustrated in Table 3.

Table 3. Definitions and illustrations of the six scales comprising the course perceptions questionnaire

Scale	Meaning of a high score	Sample items
Teaching support (7 items)	The teaching experienced was felt to give general support and encouragement for the students' learning	The staff seemed ready to give help and advice on your studies Teaching staff willingly and readily talked about the subject area at other than just class times
Emphasis on achievement (6 items)	Students were encouraged to perform highly in examinations and formal assessments	Preparing students for examinations and assignments seemed really important Getting good grades was presented as the most important aim in the course
Structure & cohesiveness (6 items)	Goals were clearly defined and students felt that they and staff shared similar aims	Staff involved in teaching the course had similar expectations of students Right from the start, teaching staff made it clear what they required from students
Metacognitive focus (7 items)	Teaching commonly included explicit descriptions of the mental processing engaged by the student during learning	When you read and studied for your classes, the teaching staff wanted to know how you thought it through as well as what you learned Teaching staff described their own ways of thinking about and learning the things which they taught you
Independence in learning (5 items)	Emphasis was placed on the development of a capacity to learn independently	Students carried out independent investigations to test ideas Students' own ideas and suggestions were sought and used during class discussion
Support for higher education study (7 items)	The course provided support for the kinds of student study and learning expected in higher education	You got advice on how to make the best use of your time in order to study effectively Students in the course were expected to take some responsibility for planning their own work

Procedures

Envelopes were prepared containing both questionnaires, a letter with general instructions, and a reply addressed campus mail envelope. For any given student, both questionnaires always referred to the course units to be compared specifically by name, and both emphasised that student responses were to relate to those specified courses only, and not to their university studies generally. Students were informed that the general purpose of the research was to investigate whether their study habits were influenced by the nature of the material studied, and by the manner of its teaching. They were told that they should complete the questionnaires as soon as possible, but at a time when they could do so carefully and thoughtfully, preferably when alone. They were asked to return the completed questionnaires by placing them in the addressed envelope provided, and then depositing them into the university's internal mail system.

During the early weeks of the second semester, classes then attended by the students were visited and the envelopes distributed. For the most part these envelopes were given to the students directly, but a small proportion were passed to associates of students absent at the time.

Results and discussion

Of the 320 students approached, some 152 returned properly completed questionnaires suitable for analysis. Given that a small proportion of the questionnaires might not have reached their targets, this figure represented an effective return rate of something better than 47.5%. Such a return rate for mailed back responses is not at all abnormal (Babbie 1973; Seltiz, Wrightsman, and Cook 1976). Across the four sub-groups, return rates ranged from 41.4% for the Accounting/Law students to 59.3% for the Chemistry/Mathematics. The data from these 152 students constituted the basis of the analyses to be reported.

The marks on the course unit pairs for the 152 responding students and a random sampling of 54 of those not returning completed questionnaires were extracted from student records. Mean marks were 63.5 and 59.6 for the responding students compared to 55.3 and 49.5 for the non-responding. This suggests that students returning questionnaires might not have been properly representative of the full range of academic performances; lower levels may have been under-represented. Any inferences drawn from the present data might therefore need to be guarded. In that relationships between study approaches and course perceptions have been found to be clear with more academically successful students but sometimes disintegrated and incoherent with failing students (Meyer, Parsons and Dunne 1990; Entwistle, Meyer, and Tait 1991), any patterns found here should not be simply assumed to apply uniformly across the range of academic performance.

From the Study Process Questionnaire (SPQ) responses, Surface Approach, Deep Approach, and Achieving Approach scores were derived for each student using the scoring procedures prescribed by the instrument's manual (Biggs 1987b).

Two sets of scores were derived per student, one set for each designated course unit. Since the SPQ is a published instrument, validated against a number of tertiary samples, and since the modifications made for its present comparative usage were quite minimal, no extra validation of its scales was conducted. A Surface Approach is defined as the use of reproductive (often rote) learning focussed on the bare essentials of content in order to minimally meet course requirements. A Deep Approach is defined as the use of meaningful learning with content interrelated with previous relevant knowledge in order to attain competence and satisfy personal interest. An Achieving Approach is defined as a composite. It involves deliberately planning the expenditure of time and effort in order to maximize course grades and performance outcomes, regardless of personal interest.

Two sets of scores per student were also derived from the Course Perceptions Questionnaire (CPQ). Response values were summed over the questions defining each of the six scales, separately for each designated course unit. Since the CPQ was an adaptation of an earlier instrument designed primarily for specific research purposes, some check on the uniqueness of its scales seemed warranted. Each of the 38 questions was correlated against the six scale scores, separately for the first and second course units. For both sets of correlations, all but one question correlated highest against that scale to which each contributed, and both misfits in fact involved the same question.

As a further check, Cronbach Alpha reliabilities were calculated on each scale, using first course unit responses, and these were compared to correlations amongst the scales (see Table 4). For four scales the reliabilities were greater than their correlations against the remaining scales. For two scales (Independence in Learning and Support for Higher Education Study) this was not so, but the reliabilities were nevertheless still close to the highest correlations. In general terms then it would seem reasonable to treat the CPQ scales as distinct. Given that the questions were essentially intended to reflect prior conceptualizations, and not simply to maximize interscale orthogonality, that the scales intercorrelated need not be surprising. A strong correlation between two scales need not automatically be taken to indicate an absence of uniqueness. The underlying conceptualizations could still be distinct and yet functionally interdependent.

Table 4. Intercorrelations amongst CPQ scales, using responses for the first named course units

	Teach supp	Emph ach	Struc & coh	Meta focus	Indep lrng	H ed study
Teaching support	865^a	061	661	619	646	515
Emph on achievement		692	189	378	137	304
Struct & cohesiveness			697	619	562	477
Metacog focus				709	673	606
Indep in learning					615	528
Higher ed study						578

^a Figures in bold along the diagonal are Cronbach alpha reliability coefficients. Decimal points omitted.

Overall patterns of perceptions versus study approaches

The first concern addressed in the analysis was the simple relationship between a student's perception of the teaching environment and the study approach adopted. Table 5 summarizes the correlations between the three SPQ measures and the six CPQ. Clearly, a pattern emerged, and it was replicated across the two sets of responses. A tendency to report surface approaches was higher when courses were perceived to emphasize performance in formal assessment (Emphasis on Achievement), and lower when they were perceived to emphasize independent learning (Independence in Learning). A tendency to report deep approaches was higher when courses were perceived as high on each of Teaching Support, Structure and Cohesiveness, Metacognitive Focus, Independence in Learning, and Support for Higher Education (HE) Study. The reporting of achievement approaches related positively to Emphasis on Achievement, Structure and Cohesiveness, and Support for HE Study. This pattern is entirely consistent with previous findings.

Comparisons between sub-groups

The next concern was whether the present data would match earlier findings showing different approaches reported for independent class groups (e.g., Entwistle and Tait 1990). One-way analyses of variance were used to compare the four sub-groups on SPQ and CPQ measures. In each analysis the dependent variable was that measure derived from the responses relating to the first of the compared course units. Second course unit responses were not used since within two of the sub-groups not all subjects were reporting on exactly the same unit. Sub-group means on the measures analyzed are summarized in Figure 1 (and also Table 10).

Significant effects were found for the surface and deep approach SPQ measures ($F(3,148)=21.18, p<0.0001$ and $F(3,148)=15.97, p<0.0001$), but not for achievement approach ($F=1.62, p>0.15$). Contrasts were used to detail the nature of these effects. The tendency to report surface approaches was higher in the accounting students

Table 5. Correlations between CPQ and SPQ measures

Approach	Teach supp	Emph ach	Struc & coh	Meta focus	Indep lrng	H ed study
Surface	-.201 ^a	.264*	-.101	-.138	-.268*	-.093
	-.194	.308*	-.059	-.112	-.214*	-.045
Deep	.424*	.182	.378*	.464*	.492*	.538*
	.372*	.173	.296*	.388*	.356*	.429*
Achievement	.191	.151	.244*	.188	.261*	.263*
	.111	.274*	.220*	.206	.205	.271*

^a First figure relates to responses for first course unit, second to second course unit. Decimal points omitted.

* significant and $p<0.01$.

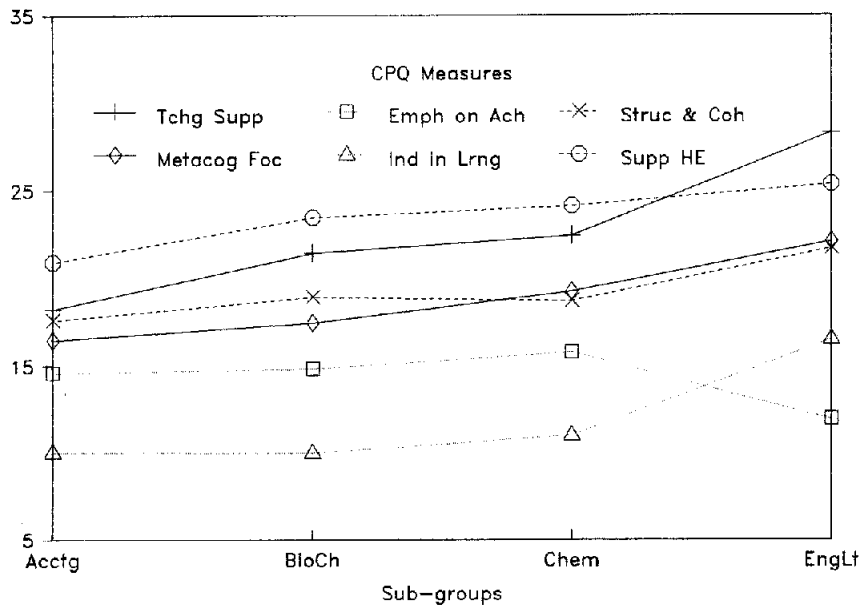
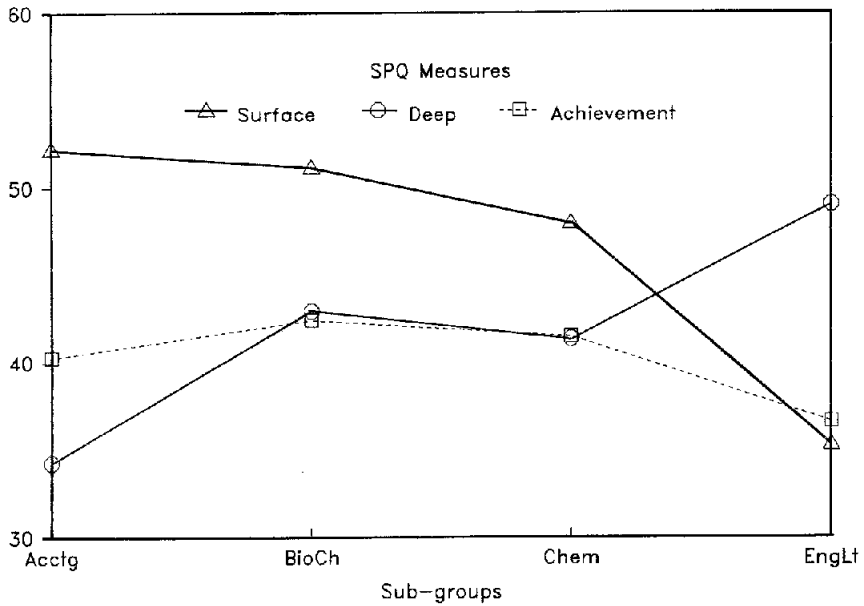


Fig. 1. Mean scores on SPQ and CPQ measures separately, for each sub-group of students, for first named course units.

than the chemistry and English students, higher in the biochemistry students than the English students, and higher in the chemistry students than the English. The differences between accounting and biochemistry, and biochemistry and chemistry,

were not significant. On the deep approach measure the ordering was essentially reversed. The tendency to report deep approaches was higher in the English students than all other sub-groups, and lower in accounting students than all others. The biochemistry and chemistry students were not significantly different. As would be expected, deep and surface approaches would seem somewhat inversely related.

On the CPQ measures, significant effects were found for all six ($F(3,148)$ ranging from 3.18 to 20.59). Contrasts revealed that in general terms the differences between sub-groups here were sympathetic to those found for the SPQ measures, and in a fashion consistent with the correlation patterns evident in Table 5. On Teaching Support, reported ratings were highest with English literature students and lowest with accounting students, the difference between chemistry and biochemistry being the only comparison to prove nonreliable. On Emphasis on Achievement, reported ratings were significantly lower with English students compared to each of the other sub-groups, those others being not significantly different. On Structure and Cohesiveness, English students reported significantly higher ratings than each other sub-group, with those being not significantly different. On Metacognitive Focus, English students reported significantly higher ratings than their accounting or biochemistry students, and the chemistry students' ratings were significantly higher than the accounting students', but other pairwise comparisons were nonsignificant. On Independence in Learning, English students reported significantly higher ratings than all others, and those others were not significantly different. On Support for HE Study, the pattern was for accounting students to report significantly lower ratings than all others, with those others being not significantly different.

These between sub-group findings clearly parallel the correlational results. The higher the tendency for a sub-group to report deep approaches, the lower its tendency to report surface approaches, and the more likely it reported higher ratings on each of Teaching Support, Structure and Cohesiveness, Metacognitive Focus, Independence in Learning, and Support for HE Study, and lower ratings on Emphasis on Achievement. When students perceived their course units to be generally supportive and encouraging of their learning, clear in the definition of unit goals, sensitive to student mental processing in learning, concerned with their capacity to learn independently, and supportive of study practices expected for higher education, they tended to adopt deeper approaches to their studies. When these perceptions were in the reverse, and when the units were as well perceived to emphasize performance in formal assessments, they tended to adopt more surface oriented study approaches. This pattern fits very closely with, and thus corroborates, the findings from earlier between-group studies.

As clear as these relationships between the SPQ and CPQ measures might be, they ought yet be kept in some perspective by consideration of their strength. Frequency distributions were calculated for each of the first course measures analyzed in the above sub-group comparisons, abbreviated to counts of individuals scoring above, at, or below the mid-scale points (see Table 6). While the relativities amongst the sub-groups on these distributions certainly reflected the comparison analyses, variations within the sub-groups were nonetheless indicated. For instance, the accounting sub-group had the highest surface approach and lowest deep approach

Table 6. Distributions of SPQ and CPQ measures on first named course units, relative to scale mid-points, for each sub-group

Scale		Acctg Law	Biochem Micro	Chem Math/St	EngLit Pol/Phil
Surface approach	Above	92.1(58) ^a	90.0(36)	75.0(24)	29.4(5)
	Mid	0.0(0)	0.0(0)	0.0(0)	0.0(0)
	Below	7.9(5)	10.0(4)	25.0(8)	70.6(12)
Deep approach	Above	19.0(12)	40.0(16)	56.2(18)	76.4(13)
	Mid	3.2(2)	7.5(3)	0.0(0)	5.9(1)
	Below	77.8(49)	52.5(21)	43.8(14)	17.6(3)
Achievement approach	Above	39.7(25)	47.5(19)	46.9(15)	23.5(4)
	Mid	1.6(1)	2.5(1)	3.1(1)	0.0(0)
	Below	58.7(37)	50.0(20)	50.0(16)	76.5(13)
Teaching support	Above	31.7(20)	42.5(17)	65.6(21)	82.4(14)
	Mid	7.9(5)	12.5(5)	9.4(3)	0.0(0)
	Below	60.3(38)	45.0(18)	25.0(8)	17.6(3)
Emph on achievement	Above	17.5(11)	12.5(5)	28.1(9)	5.9(1)
	Mid	15.9(10)	10.0(4)	15.6(5)	5.9(1)
	Below	66.7(42)	77.5(31)	56.3(18)	88.2(15)
Struct & cohesiveness	Above	44.4(28)	55.0(22)	68.0(22)	76.5(13)
	Mid	12.7(8)	7.5(3)	3.1(1)	0.0(0)
	Below	42.9(27)	37.5(15)	28.1(9)	23.5(4)
Metacog focus	Above	11.1(7)	17.5(7)	21.9(7)	58.8(10)
	Mid	4.8(3)	7.5(3)	12.5(4)	11.8(2)
	Below	84.1(53)	75.0(30)	65.6(21)	29.4(5)
Indep in learning	Above	3.2(2)	10.0(4)	9.4(3)	70.6(12)
	Mid	1.6(1)	0.0(0)	3.1(1)	5.9(1)
	Below	95.2(60)	90.0(36)	87.5(28)	23.5(4)
Higher ed study	Above	42.9(27)	75.0(30)	78.1(25)	82.4(14)
	Mid	6.3(4)	7.5(3)	6.3(2)	11.8(2)
	Below	50.8(32)	17.5(7)	15.6(5)	5.9(1)

^a Each cell entry shows the percentage and number scoring above, at, and below the scale midpoint.

means, and the English sub-group the lowest and highest respectively. But both sub-groups had minorities scoring in the contrary half of the scale on both of these approach measures. Similar reversals were apparent in the CPQ distributions. For instance, while the English sub-group was relatively high on Teaching Support, some 17% of the students scored below mid-scale. While the biochemistry sub-group was relatively high on Emphasis on Achievement, some 12% scored below mid-scale. While the accounting sub-group was relatively low on Support for HE Study, some 42% scored above mid-scale. Although the correlation and sub-group comparison findings might evidence general relationships between students' perceptions of their teaching and their adopted study approaches, these present distributions would indicate that there remains variability within each sub-group. It would be quite improper to translate the present comparisons between sub-groups into hard characterizations of the respective course units in any absolute sense.

Change analyses within individual students

The next concern addressed was that which was the prime purpose of the present research, namely the extent to which individual students could be shown to alter their adopted study approaches dependent upon their perceptions of the teaching environment. First to be considered was whether individual students did indeed show variability in their SPQ measures between their compared course units. Change scores were calculated by subtracting the measures for the second designated course unit from those for the first. These scores were then classed into five categories dependent upon the magnitude of the change. No change cases were naturally assigned to the 0-category. Changes no greater than that produced by a shift of one Likert scale point on each of the questions defining the measure were assigned to the +1 or -1 categories, dependent upon the direction of the change. Changes of greater magnitude were assigned to the +2 or -2 categories. Category distributions for each SPQ measure for the 152 responding students are summarized in Table 7.

Two points are immediately apparent from these distributions. First, changes in reported study approaches clearly occurred. Some 83%, 95%, and 85% of the students evidenced change in their reported study approach measures for the surface, deep, and achievement measures respectively. Second however, the magnitudes of those individual changes seem not to have been great. No students

Table 7. Frequencies of changes in both SPQ and CPQ measures by size of change

Approach		Size category				
		-2	-1	0	+1	+2
Changes in SPQ measures						
Surface	N	0	46	25	81	0
	%	0	30.3	16.4	53.3	0
Deep	N	19	75	7	51	0
	%	12.5	49.3	4.6	33.6	0
Achievement	N	4	68	22	58	0
	%	2.6	44.7	14.5	38.2	0
Changes in CPQ measures						
Teaching support	N	18	54	14	66	0
	%	11.8	35.5	9.2	43.4	0
Emphasis on achievement	N	2	52	41	57	0
	%	1.3	34.2	27.0	37.5	0
Structure & cohesiveness	N	17	49	21	65	0
	%	11.2	32.2	13.8	42.8	0
Metacognitive focus	N	19	62	17	54	0
	%	12.5	40.8	11.2	35.5	0
Independence in learning	N	14	61	28	49	0
	%	9.2	40.1	18.4	32.2	0
Support for HE study	N	12	77	29	34	0
	%	7.9	50.7	19.1	22.4	0

evidenced surface approach changes in the extreme categories, and only some 12% and 2% evidenced such changes for the deep and achievement measures. Two interpretations are suggested. The pairs of course units chosen in the present research may not have been sufficiently distinct, even though they were selected with that purpose in mind. The effect of variations in course unit environment might manifest only as overlays on strong study approach predilections already extant within the student. These two interpretations need not of course be antagonistic.

What of the CPQ measures? Was there variability amongst individual students on their comparative perceptions of course teaching environments? Change scores were calculated and categorized for each of the six CPQ measures, using similar procedures to those used for the SPQ. The resulting category distributions are also shown in Table 7.

The pattern for the CPQ measures would seem very similar to that for the SPQ. Across the six measures, changes from one course unit to the other occurred for between 73% and 90% of the students. But again, the magnitudes of the changes seemed small. The 12% of students evidencing an extreme change category for Metacognitive Focus was the largest such proportion. These findings support the former of the interpretations offered above. While differences in the teaching environments of the compared course units were certainly perceived, for the majority of students those differences seem not to have been large. This of course is irrespective of whether strong study approach predilections might yet have operated as well.

What of the relationship between the SPQ and CPQ changes? Do the changes for individual students on the SPQ measures reflect the changes on the CPQ measures? As one assessment of this the change scores for each of the SPQ measures were correlated against those for the CPQ measures. The correlations are summarized in Table 8. The pattern of correlations which resulted fitted well with expectations. The strongest relationships were those with deep approach change scores. When a course unit was perceived to be greater than its comparison on each of Teaching Support, Structure and Cohesiveness, Metacognitive Focus, Independence in Learning, and Support for HE Study, then there were significant increases in the tendency to report the adoption of deeper study approaches. Increases in perceived Independence in Learning and Support for HE Study ratings were accompanied by significant decreases in the tendency to report surface approaches. Increases in all six measures were associated with significant increases in tendency to adopt achievement oriented approaches.

The only counter finding was a significant positive correlation between change scores for deep approach and those for Emphasis on Achievement perceptions. The expectation was that if anything, increased perceptions of achievement emphases should instead have been associated with increased tendencies towards surface approaches. However, the magnitude of the correlation coefficient was small, and from Table 7 it can be seen that the Emphasis on Achievement measure showed the largest number of subjects with no change from one course unit to the other. Given that Emphasis on Achievement did relate predictably to surface approach tendencies in general, perhaps the present change score correlation might indicate

Table 8. Correlations between CPQ change scores and SPQ change scores, for total sample, and for high and low academic performance groupings

Approach	Teach supp	Emph ach	Struc & coh	Meta focus	Indep lrng	H ed study
Surface	-101*	093	-078	-066	-253*	-243*
	-215	059	-130	-183	-437*	-318*
	001	148	-060	070	001	-107
Deep	501*	257*	438*	557*	628*	584*
	553*	207	498*	636*	653*	651*
	498*	309*	443*	522*	624*	519*
Achievement	423*	369*	482*	443*	451*	399*
	401*	265*	489*	387*	322*	388*
	469*	450*	514*	520*	594*	443*

* in each cell, top entry is for total sample, second is for high performance grouping, and third is for low performance grouping.

* significant at $p < 0.01$. Decimal points omitted.

that there were indeed small perceived changes in emphases on performances in formal assessments between the two course units, but that their effects were overridden by those of the other course perception scales. It was not that increases in Emphasis on Achievement had influenced increases in deep approach tendencies, but rather that these latter increases were due to the other course perception variables, and were despite the Emphasis on Achievement influence.

An alternative interpretation of this counter finding however might be that it reflected variations of influence dependent upon academic ability. Students failing in their studies have been reported as lacking the expected coherent pattern of associations between study approaches and course perceptions (Entwistle, Meyer, and Tait 1991). To assess this possibility the correlations (see Table 8 also) between SPQ and CPQ change scores were calculated separately on lower (at least one course unit mark less than 55%) versus higher (the rest) performing students. The patterns proved very similar for both groupings of students, except for two aspects. The negative relationships between change in reported surface approach and changes in each of perceived Independence in Learning and Support for HE Study held for the higher performing students but not for the lower. The troublesome correlation between changes in reported deep approach and in perceived Emphasis on Achievement still remained for both groupings, although it was slightly stronger for the lower than the higher. While these findings might indicate something of the pattern disintegration reported in other research, overall such indication is at best mild. The earlier interpretation that perceived changes in Emphasis on Achievement were real, but that their influence was overridden by other course perception factors might yet be reasonable.

As a further means of assessing the relationship between changes in CPQ and those in SPQ, dependent samples *t*-tests were calculated within each of the four sub-groups. These analyses used the CPQ and SPQ measures as separate dependent variables, with the course unit comparisons defining the tested effect in each case.

The tested means are summarized in Table 9. For two sub-groups, those comparing accounting and business law units and those comparing biochemistry and microbiology units, the findings were clear, and supportive. For both sub-groups, the course unit perceived as having a significantly greater metacognitive focus, higher emphasis on independent learning, and better support for higher education study, was the unit for which higher rates of deep approaches and lower rates of surface approaches were reported. For the other two sub-groups, the within-group findings were not so much contrary as simply inconclusive. These latter two sub-groups both had some inherent variability in that their respective second course units were not the same units for all students within the sub-group. The two would thus have constituted a conservative test of the effect anyhow, and thus the lack of conclusive findings is perhaps not too surprising.

Both the correlation and the within sub-group analyses support the same conclusion. The changes in perceptions of the teaching environment and in reported

Table 9. Summary of sub-group and total sample means on CPQ and SPQ scales

Scale	Sub-group				
	Total	1	2	3	4
	Course A Course B	Acctg Law	Biochem Micro	Chem Math/St	EngLit Pol/Phil
Surface approach	49.11 ^a	52.17 ^c	51.12 ^c	47.93	35.29
14(42)70 ^b	42.37	49.65	48.51	46.99	37.00
Deep approach	39.52	34.26 ^c	42.92 ^c	41.35	49.01
14(42)70	42.37	41.43	45.52	38.87	45.06
Achievement approach	40.68	40.25 ^c	42.41	41.50	36.65
14(42)70	40.98	41.80	43.02	40.09	34.82
Teaching support	21.05	18.19	21.40	22.41 ^c	28.28
7(21)35	20.79	18.99	22.64	19.59	25.35
Emph on achievement	14.59	14.57	14.82	15.75 ^c	11.95
6(18)35	14.43	14.85	14.62	14.65	11.95
Struct & cohesiveness	18.61	17.57	18.89	18.68	21.67
6(18)35	18.58	17.72	19.52	18.76	19.22
Metacog focus	17.90	16.41 ^c	17.42 ^c	19.22 ^c	22.08
7(21)35	19.01	19.39	18.78	17.12	21.69
Indep in learning	10.95	10.03 ^c	10.01 ^c	11.00 ^c	16.47
5(15)25	11.83	12.58	10.77	9.78	15.35
Higher Ed study	22.74	20.91 ^c	23.45 ^c	24.09 ^c	25.33
7(21)35	24.49	25.31	24.05	22.81	25.61
<i>n</i>	152	63	40	32	17
Percent return	47.5	41.4	54.1	59.3	42.5

^a First figure refers to the first named course unit for the column, second figure refers to the second named.

^b Specifies theoretical minimum, (mid), and maximum points on the scale.

^c Dependent samples *t*-test significant at at least $p < 0.05$, two-tailed.

study approaches, although small, were systematically related. The very same teaching characteristics which predicted deeper study approaches within separate course groups also predicted within individual students. Individual students were found to alter their reported study approaches between course units, and both the nature and direction of those shifts were predictable from those students' different perceptions of the teaching offered in those units. Clearly, these present findings support the claim that individual students do adopt study approaches differentially dependent upon their discriminative perceptions of a course unit's teaching.

But how consistent are students in their differential adoption of study approaches? It might be that the correlational and sub-group comparison findings above mask considerable variability between students. To assess such consistency, deep approach change score signs were compared to those for each of the CPQ change scores. Deep approach changes associated with opposite sign changes on Teaching Support, Structure and Cohesiveness, Metacognitive Focus, Independence in Learning, and Support for HE Study, and with like sign changes on Emphasis on Achievement, were categorized as mismatches. The frequencies of such mismatches are summarized in Table 10. Chi-square tests showed no significant distribution differences across sub-groups, so the mismatches for the total student sample only are given.

As would be expected from the preceding analyses, on each CPQ measure the majority of students reported deep approach changes consistent with their reported teaching perception changes. But of interest here is that on each CPQ measure a substantial proportion of students were inconsistent in their change patterns. For Independence in Learning some 17% of the students changed their reported study approaches in the reverse of what would be expected, for Emphasis on Achievement such was true of some 41% of the students (which also fits with the previous discussion of the contrary deep approach correlation), and for the other measures the proportions ranged between. Moreover, comparisons between the lower and higher performing groupings used before showed no significant differences in the distributions of these mismatches. Clearly the present findings' support for the differential adoption of study approaches should be qualified. While perceptions of a course unit certainly influenced the study approaches adopted, the relationship would now seem not to be a dominant one. It was not the case here that some students simply reported no changes in response to perceived course differences, but rather that substantial numbers reported contrary changes. For these students the

Table 10. Mismatches of changes in deep approach against changes in CPQ measures

		Teach supp	Emph ach	Struc & coh	Meta focus	Indep lrng	H Ed study
Mismatches	N	40	63	36	39	27	27
	%	26.3	41.4	23.7	25.7	17.8	17.8
No Mismatch	N	112	89	116	113	125	125
	%	73.7	58.6	76.3	74.3	82.2	82.2

influence of course perceptions was not simply lessened, it was reversed.

Associations with academic performance

In a final analysis the relationships of the SPQ and CPQ measures to academic performance were tested. Final percentage marks in the first listed course units were correlated against each of the SPQ and CPQ measures for those same course units. The correlations are summarized in Table 11. Tendencies to report surface oriented approaches correlated with lower marks, and tendencies to report deep or achievement oriented approaches both correlated with higher marks. These findings are a straightforward affirmation of those from previous research.

Interestingly, the CPQ measures were for the most part uncorrelated with marks. Only Emphasis on Achievement correlated significantly, negatively as would be expected. However, this absence of correlations is nonetheless interpretable as fitting with students having adopted study approaches differentially. CPQ measures did relate clearly and consistently to the SPQ, and as just noted the SPQ measures related predictably to marks. This suggests that the CPQ measures might be seen not so much as unrelated to academic performance, but rather as related indirectly. Such indirect relationship would certainly be predicted by the directions of influence inherent in the notion of differential study approaches. Academic performance is seen to be partly a function of the study approaches adopted, which in turn are partly a function of a student's perception of course unit's teaching. Clearly a number of influences intervene between course perceptions, of which the CPQ measures are indices, and eventual performance, of which marks are an indicator. It would be entirely reasonable for the correlations between factors distant in this chain of influence to be low.

Conclusions

In previous research the claim has been made that the study approaches adopted by students are determined in part by the perceptions which they form of the teaching

Table 11. Correlations of first course unit marks against associated SPQ and CPQ measures

SPQ measures		CPQ measures	
Surface approach	-233*	Teaching support	205
Deep approach	216*	Emphasis on achievement	-247*
Achievement approach	347*	Structure & cohesiveness	136
		Metacognitive focus	056
		Independence in learning	096
		Support for HIE study	127

* Significant at $p < 0.01$. Decimal points omitted.

in their courses. In response to different teaching environments the same student might adopt quite different study approaches. The support cited for such a claim has typically come from either retrospective interview data or from studies comparing correlational patterns between separate groups. The purpose of the present research was to seek to extend the basic findings of this previous work but in the context of a within-subjects, comparative response framework, thus providing stronger evidence for the claim. The findings here clearly satisfied this purpose.

The more a course unit was perceived as supportive of student learning, as having clearly defined goals and structure, as explicitly focussing on the mental processing in learning, as emphasizing a capacity for independent learning, and as providing support for modes of learning and study typical of higher education, the more likely that deeper approaches to study would be reported. This basic pattern of relationships was evidenced in the correlations amongst SPQ and CPQ measures across the total student sample, and in the comparisons between sub-groups on those same measures. But importantly, it was also evidenced in the comparisons made by individual students between two recently completed concurrent course unit enrolments. This latter finding provided clear evidence that study approaches can vary within individual students sympathetically to those students' perceptions of variations in their teaching environments. Further, the finding that study approach seemed to relate to academic performance more definitely than did course perceptions gave support to the direction of influence being from perceptions to study approaches and then to learning.

This support for the differential adoption of study approaches has clear implications for university teaching. Teachers can expect that changing the ways in which their courses are taught can influence the ways in which their students study the material. Indeed, recent pilot work (Parsons and Meyer 1990) suggests that some such influence might even be had by altering students' course perceptions alone, without altering the courses themselves. But whatever, the point is that teachers are not powerless. There are course related variables which they can manipulate, and which can have an effect on the sorts of learning in which their students engage.

However, the present findings also allowed for qualifications. First, within any group of students experiencing what is presumably the same course unit, variability in both course perceptions and study approaches seems nonetheless the norm. Within each sub-group in the present research a minority of students exhibited scores which were not just less than the majority's, but were counter to them. On each of the course perception and study approach measures these minorities scored in the opposite half of the scales to their majority peers. This suggests that between-group findings notwithstanding, there can still be quite considerable differences amongst the members of a single class group. While the majority of a class group might perceive a course unit to support student learning, foster independence, and provide explicit cognitive learning prompts, a minority can yet perceive the reverse.

Second, the variabilities shown by individual students in their course perceptions and their study approaches from one course unit to another seem generally quite small in magnitude. This suggests either or both of two explanations. The course units in which students typically enrol in combination do in reality have quite

common teaching patterns, and the study approaches prompted are thus also expectedly similar. Alternatively, students enter tertiary study with well established predispositions towards particular patterns of study, and they tend to select course units which fit. Either way, the implication might be that to bring about any marked degree of change in students' study approaches could necessitate quite clear and definite changes in their teaching environments.

Finally, and perhaps of most interest here, the relationship between course perceptions and adopted study approaches seems not so strong as to ensure that changes in the former lead consistently to sympathetic changes in the latter. Although this relationship was evidenced in general terms, a substantial minority of the students nevertheless exhibited individual response patterns which were counter to expectations. On each course perception scale, something like a fifth to a quarter of the students reported changes in their adoption of deep approaches which were contrary to the direction expected from their reported changes in course perceptions. While the present findings certainly confirm and extend the claim that the ways in which students study the content of their course units depends in part on how the demands and requirements of those units are perceived, these minority converse patterns suggest that stronger influences can sometimes prevail.

In summary terms, the present research can perhaps be seen as providing for a more balanced overall interpretation. The importance of students' perceptions of their teaching in determining the study approaches which they then individually adopt clearly seems now to be better established. But equally, the influence of other strong factors on those same student study and learning practices has also been emphasized. Although not the target of the present research, these other factors might speculatively include things like the place of a course unit in the framework of a student's overall study goals (e.g., Sharp 1990). Further, level of academic performance might yet interact. As previously noted, with failing students perceptions of teaching environment do not always relate coherently with study approaches (Entwistle, Meyer, and Tait 1991). Although no strong variation in findings dependent upon performance level was obvious here, it should be recalled that low performing students might have been under-represented. The lowest here might not have been failing enough. However, the point is that no matter how strong the evidence for any particular influence, student learning can never be seen as anything other than a multivariate phenomenon. On this point the present minority converse change patterns can serve as a useful caution.

A specific extension in the present research was to add the Metacognitive Focus scale to the Course Perceptions Questionnaire. The intent was that such a scale should reflect the extent to which teaching was perceived as providing some explicit emphasis on, or description or prescription of, the cognitive processes which the student might invoke during learning. The scale would seem to have been a useful addition. Its Cronbach Alpha was greater than any of its correlations with the other CPQ scales, indicating that it could be treated as relatively distinct. Metacognitive Focus together with Independence in Learning and Support for HE Study showed the strongest correlations with a tendency to report deeper study approaches. Those same three showed the strongest correlations of change scores with deep approach

change scores. These findings suggest that focussing on the cognitive learning processes of the student, as a deliberate and explicit teaching practice, might quite properly be part of the definition of what it means to teach for deeper study approaches.

There is some support for this suggestion from the literature. Two recent studies (Entwistle and Waterston 1988; Speth and Brown 1988) both had students complete questionnaires on their study approaches and their engaged learning processes. Both found that reports of deeper study approaches tended to ally with reports of more elaborative or integrative learning processes. The suggestion is that what is characterized as deeper study approaches might at a more specific level of analysis comprise or result in these more elaborative learning processes. The connection with the present Metacognitive Focus findings is that the Metacognitive Focus scale was intended to reflect teaching practices which were complementary to such learning processes. Certainly the point must here remain speculative, but an increased research targeting of how instruction affects the student's cognitive processing might be indicated.

As a concluding note, the present findings must overall be seen to increase the optimism of university teachers. The very factors which have been confirmed here as influencing the study approaches adopted by students are all within the teachers' domain of control. While acknowledging that there are no panaceas, providing student support, defining clear goals and course structures, explicitly discussing how students are to learn the presented material, and de-emphasizing performance on formal assessments (or perhaps changing the emphasis to personal competence and understanding), can all be reasonably expected to result in positive changes in the study and learning of the students. And moreover, the unit of influence is the individual student.

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