

University Students' Perceptions of the Learning Environment and Academic Outcomes: implications for theory and practice

ALF LIZZIO, KEITHIA WILSON & ROLAND SIMONS

School of Applied Psychology, Griffith University, Australia

ABSTRACT *The relationship between university students' perceptions of their academic environment, their approaches to study, and academic outcomes was investigated at both university and faculty levels. The responses of a large, cross-disciplinary sample of undergraduate students were analysed using higher order path and regression analyses, and the results confirmed students' perceptions as influencing both 'hard' (academic achievement) and 'soft' (satisfaction, development of key skills) learning outcomes, both directly and mediated through their approaches to study. Perceptions of heavy workload and inappropriate assessment influenced students towards surface, and perceptions of good teaching towards deep, approaches to study. Students' perceptions of their current learning environment were a stronger predictor of learning outcomes at university than prior achievement at school. Protocols are proposed to guide more fine-grained analysis of students' perceptions.*

This article seeks to make both a theoretical and practical contribution to the literature regarding the nature and impact of university students' perceptions of an academic environment on their learning approaches and outcomes. We will argue that the clarity and generalisability of previous research investigating the association between presage factors in a university learning environment and students' approaches to learning in that environment are limited by a number of methodological issues in the areas of measurement of constructs, sampling and statistical analyses employed. The present study seeks, firstly, to address these, and to test further the relationships between characteristics of the academic environment, students' approaches to learning and the outcomes achieved, both in the context of specific faculties and at the level of the individual student. Secondly, we will report on the practical application of findings to teaching practice, and the development of specific protocols to elaborate the specific nature of students' perceptions of aspects of their academic environments.

Does the type of academic environment within which students are asked to learn (e.g. workload, teaching quality) have any real impact on how they approach their learning and the quality of the outcomes they are able to achieve? Or will students 'do well' and 'not so well' irrespective of their environments? Such questions are not just theoretically interesting, but also practically significant for university educators seeking to understand the impact of their course design decisions on students' perceptions and behaviour.

Research efforts addressing the impact of students' perceptions can be readily framed within Biggs's (1989) 3P model, which conceptualises the learning process as an interacting

system of three sets of variables: the learning environment and student characteristics (presage), students' approach to learning (process) and learning outcomes (product). In basic terms, the model proposes that, firstly, personal and situational factors influence a student to adopt a particular approach to learning which, in turn, mediates or influences the types of outcomes achieved; and secondly, that presage factors (e.g. perceptions of the learning environment) can also directly influence learning outcomes.

Presage factors are, as the term suggests, those which exist prior to the time of learning, and comprise two broad types: the enduring personal characteristics brought to the learning situation by the student (e.g. prior knowledge, academic ability, personality) and situational characteristics which define the learning environment (e.g. teaching methods, workload, course structure). As Biggs (1985) and others (Ramsden, 1991) have argued, the key element in the practical application of this model is the proposition that it is *students' perceptions* of their learning environment, in light of their motivations and expectations, which determine how situational factors influence approaches to learning and learning outcomes.

Process factors describe how students approach their learning. While there is some diversity in the terms used, there is a fair degree of empirical evidence that students adopt two basic orientations or approaches. A 'deep' approach to learning is described as striving for improved understanding by applying and comparing ideas. Conversely, 'surface' learning involves reproductive strategies with little attempt to integrate information (Marton & Säljö, 1976; Thomas & Bain, 1984).

Product factors describe the learning outcomes (cognitive, affective or behavioural) which students derive from the learning process. Traditionally, depth, or accuracy of learning, has been summarily described through assessment scores (grade point averages). Affective or 'felt outcomes', in a climate emphasising student evaluations of education, have become increasingly discussed. These are generally of two types—global evaluations of accomplishment or expressed satisfaction with a course, and specific perceptions of particular skill development (e.g. key or transferable skills).

It is important to note that, while the present study focuses on a primarily linear or unidirectional understanding of component relationships (i.e. student characteristics and perceptions influence student approaches which influence student outcomes), the relationships between these elements are best conceived as an interactive system (Biggs, 1993, 1999). A more complex analysis would consider, firstly, the relationships between all system components, and secondly, that such influence can be reciprocal or mediated in nature (Meyer, 1998). Trigwell & Prosser (1997) further argue that the interpretation of interactions in the model should include the concept of 'temporality', and propose that the model's elements are not a causal chain of independently constituted components over time, but are simultaneously present in students' awareness.

The present study is not concerned with systematically operationalising and testing all possible elements of the 3P model. The focus is somewhat more constrained. We seek to address three questions. Firstly, do students' perceptions of their learning environment systematically influence learning approaches and outcomes? Secondly, if so, which aspects of the learning environment have more/less influence in this regard? Finally, which influential aspects of the learning environment appear to be most amenable to change towards the goals of enhancing learning outcomes?

Ramsden & Entwistle (1981) were the first to empirically establish a relationship between approaches to learning and perceived characteristics of the academic environment. This association was explored through a concurrent factor analysis of the scales of the Approaches to Studying Inventory (ASI; Entwistle *et al.*, 1979) and the Course Perceptions Questionnaire (CPQ; Entwistle & Ramsden, 1983), based on the responses of a large,

cross-disciplinary sample of English higher education students. The resultant combined factor structure evidenced a strong association between students' perceptions of a heavy academic workload and their adoption of a reproducing or surface approach to study. However, no association was evident between students' perceptions of other aspects of the learning environment (e.g. teaching practices) and the adoption of a meaning orientation or a deep approach to learning.

Despite the clear theoretical importance and practical relevance of this work and the underlying problem of a lack of expected association between academic context and the learning approach at the level of the individual student, subsequent independent studies were slow to follow. Meyer & Parsons (1989), in an effort to directly test the generalisability of Ramsden & Entwistle's findings, replicated their methodology on a large, cross-disciplinary sample of South African students. Once again, apart from an association between course workload and a reproducing study orientation, no associations were found between any aspects of the learning environment, as measured by the CPQ, and the two main study orientations of reproducing and meaning, as measured by the ASI.

The important contribution made by Meyer & Parsons was an empirical and conceptual analysis of the instruments typically used to measure students' perceptions of academic environments and approaches to learning. From a comparison of differences in the respective factor structures obtained from English (Entwistle & Ramsden, 1983) and South African students (Meyer & Parsons, 1989), Meyer & Parsons proposed that a number of the constructs measured by the ASI may be culturally or contextually defined (e.g. syllabus boundedness, strategic approach, extrinsic motivation), with the consequence that the meaning, and therefore the structure, of some subscales may vary across different student populations, defined either in terms of cultural or institutional contexts. With regard to the CPQ, Meyer & Parsons reported difficulty in replicating the scale structure, and argued that the CPQ measures a restricted, or at least parsimonious, model of the learning environment which does not permit an adequate exploration of potential relationships between contextual factors and the approaches to study of individual students. Entwistle (1989), in response to Meyer & Parsons, agreed that there may be measurement problems with the CPQ, and suggested that the underlying concepts were relatively untried at the time of the original study. He also argued for the development of a measure more sensitive to individual perceptions of the academic environment (Entwistle & Tait, 1990).

Subsequently, research has followed Entwistle's (1989) suggestion that explorations of the relationship between approaches to studying and perceptions of the learning environment may be more productive at the faculty or departmental level, given that findings at this level may be more likely to lead directly to the review and modification of course design and teaching practices. A small number of studies, using a mixture of populations and methodologies, have addressed this task. Entwistle & Tait (1990), using a shortened version of the ASI and a theoretically derived course evaluation item pool, found a strong association between a demanding workload and a reproducing study orientation for first year Scottish engineering students. Eley (1992), using a modified version of the CPQ with a small sample of Australian second year students, found students reported more surface approaches when courses emphasised formal achievement, and more deep approaches when courses were perceived as high on supportive teaching, independent learning and clear structure. Trigwell & Prosser (1991a, 1991b) concurrently factor analysed the scores of a small sample of nursing students on the ASI and the Course Experience Questionnaire (CEQ; Ramsden, 1991) and derived a two-factor solution associating perceived heavy workloads and surface approaches to study. However, perceptions of good teaching were associated with both surface and deep approaches to study.

Trigwell & Prosser (1991a) distinguished between the types of learning outcomes students may derive from a course, and found that a deep approach to study was more strongly related to qualitative learning outcomes (the complexity of students' understanding of the aims of a course of study) than quantitative outcomes (assessment results). In a subsequent study (Crawford *et al.*, 1998), a modified version of the CEQ was used to fit the context of a first-year mathematics subject. A deep approach to learning was found to associate with the good teaching, clear goals and independence scales, and a surface approach with the inappropriate assessment and workload scales. Students who reported a deep approach to learning the subject also reported more integrated conceptions of the subject content both prior and subsequent to enrolment in the subject. Prosser & Trigwell (1999) report an unpublished study (Ramsden *et al.*, 1997) of a large, cross-disciplinary sample of first-year students using a subject specific version of the CEQ and a short form of the Study Process Questionnaire (SPQ; Biggs, 1979). Using factor analytic techniques, once again, the same pattern of associations between students' perceptions of their subjects on the scales of the SPQ and approaches to learning was revealed, both at a general level across subjects and also within the same subject. A consistent pattern was also obtained when students were grouped according to their scores on the questionnaires using cluster analysis.

In parallel to these more general analyses, other researchers have investigated specific aspects of students' perceptions of the learning environment in more depth. For example, Kember and his associates (Kember *et al.*, 1996; Kember & Leung, 1998) have conducted a more fine-grained set of studies with engineering students, focusing specifically on the impact of workload on student learning. These studies have not only confirmed, but also extended, our understanding of the factors influencing students' perceptions. Kember & Leung (1998), using path analysis, found a positive and reciprocal link between a surface approach and perceived heavy workload—that is, not only do perceptions affect approaches, but approaches also affect perceptions. Importantly, actual workload was not in itself a good measure of perceived workload, with the latter found to be a complex function of a range of factors. Kember *et al.* (1996) modelled the relationship between perceived workload, study behaviours and academic outcomes using both case study and path analysis, and found how students perceive workload to be a function of individual characteristics, approaches to and perceptions of the learning context. Kember *et al.* caution against interpreting questionnaire findings 'as purely a measure of the burden imposed by the curriculum, nor as an indicator of hours worked' (p. 356).

What can research to date tell us about the relationship between approaches to learning and academic outcomes? The key point, as we have discussed earlier, is to specify the type of outcome under consideration—understanding, achievement or satisfaction. In addition to previously reported studies, there appears to be an established pattern of findings that the adoption of a deep approach results in students being better able to demonstrate their understanding of material (Whelan, 1988; Balla *et al.*, 1990; Trigwell & Sleet, 1990) or develop their conceptions of material (Van Rossum & Schenk, 1984; Prosser & Millar, 1989). There is also evidence indicating that a deep approach results in students achieving higher grades (Entwistle & Ramsden, 1983; Ramsden *et al.*, 1986; Eley, 1992; Drew & Watkins, 1998). Importantly, however, the relationship between study approaches and grades is necessarily moderated by the extent to which the assessment used to measure students' achievement itself emphasises understanding or reproduction of knowledge. Finally, there is some limited evidence (Ramsden, 1992) to suggest that students adopting a deep approach report higher levels of overall satisfaction with a course of study. While it is important to establish the impact of learning environments and approaches on students' affective experiences, such associations should be interpreted cautiously, since student satisfaction and

associated processes, such as interest in a task or subject, may influence as much as result from a student's approach to study.

A further contribution of this article is a more extensive analysis of the association between students' perceptions and types of academic outcomes. In addition to traditional concerns of academic achievement and student satisfaction, there is also a pressing need to better understand how learning environments influence the acquisition of generic skills or competencies—that is, the process skills which help students to effectively apply the content or subject skills learnt in higher education to work environments (MacNair, 1990). These skills (variously termed key skills, core competencies or generic attributes) include problem-solving, analytic skills, teamwork and the ability to plan work. While there has been considerable recent interest in how such skills may be best provided (Bennett *et al.*, 1998) or incorporated into course designs (Arnold *et al.*, 1999), there is little direct empirical evidence of the impact of the learning environment and student approaches on the development of generic capabilities.

Overall, the evidence to date would seem to indicate that there are clear relationships between students' perceptions, approaches and outcomes. The most consistent finding would appear to be that perceptions of heavy workloads influence a surface or reproducing approach to study. Much less clear is whether a deep approach is facilitated by perceptions of the academic environment, and whether in fact this consistently leads to superior academic outcomes. Importantly, the commonly used procedure of concurrently factor analysing students' responses on different measures to derive associative factors does not permit direct testing of the relative paths of influence of variables. Thus, the extent to which students' perceptions of their learning environment directly impact on their academic outcomes, or whether the process involves a more indirect or mediated path of perceptions influencing approaches, which in turn influence academic outcomes, remains unclear.

Studies to date have also not included a direct test of the relative influence of personal and perceived situational presage factors; that is, a direct comparative test of the questions: will students who have 'done well at school' also do well at university, irrespective of the teaching environment they perceive themselves to be in, or will their perceptions of their learning environment (e.g. teaching quality, workloads) be a stronger predictor of success? Given that school leaving performance, operationalised in a variety of ways (e.g. tertiary entrance score [Hong, 1982]; Scholastic Achievement Test results (Maugher & Kolmodin, 1975; Bean & Bradley, 1986), has been found to be a significant predictor of achievement at university, one would expect a relationship between students' high school and university performance. However, the association is modest at best, and some studies have found secondary school grades not to predict academic achievement (McManus *et al.*, 1998). The direction of findings may also be influenced by the choice of statistical procedure. For example, Crawford *et al.* (1998) found mathematics students' tertiary entrance rankings not to be associated with a deep approach, using factor analytic procedures, but found a relationship using hierarchical cluster analysis. As Lindblom-Ylänne *et al.* (1999) argue, the picture remains unclear as to the relative contribution of secondary school achievement and other factors to students' future learning potential. A goal of the present study, therefore, is to clarify the relative contribution of the students' previous patterns of success and the teachers' current learning environment.

While studies to date have been useful in elucidating and strengthening the case for an association between perceptions of context, approaches and outcomes, the confidence with which this can be asserted as a generalisable or universal proposition is, however, limited by a number of factors: the restriction of samples to defined populations (primarily first years or discipline-specific groupings); small sample sizes; the use of untested modifications of

instruments to measure, in particular, aspects of the academic environment; and statistical procedures which do not permit direct testing of paths of influence. Given these concerns, further work in this area is suggested as important and timely. In practical terms, the task is to establish whether, irrespective of students' predispositions towards a deep or surface approach to learning and the context of particular courses of study, good teaching and effective course design can positively influence, or 'deepen', students' approaches to the curriculum and academic outcomes. The present study sought to address this task and, in particular, sought to respond to some of the potential methodological limitations of previous studies.

With regard to the measurement of approaches to studying, three considerations were salient in constructing a measure appropriate for associations between approaches and the learning environment at the level of the individual student. Firstly, there is a consistent pattern of findings which identify two primary study approaches—meaning and reproducing orientations—across the four primary groupings of ASI subscales (Clark, 1986; Entwistle & Waterston, 1988; Harper & Kember, 1989). Secondly, and relatedly, the balance of constructs measured by the ASI (e.g. syllabus boundedness, strategic approach, extrinsic motivation) appear to vary somewhat in their structures and associations with primary orientations across institutional and cultural contexts, and in this sense, have been proposed as contextually dependent. Thirdly, there is a need to develop reliable and robust short forms of current approaches to study instruments (Richardson, 1990, 1994). Brevity is not only useful to facilitate use of instruments in classroom contexts, but also critical to ensuring reasonable response rates in large, cross-disciplinary surveys, as in the present study.

Accordingly, an attempt was made in the light of previous research to test two brief (six-item) generic approaches to study scales, one representing meaning or deep, and the second reproducing or surface, orientations, which specifically avoided items or subscales identified by previous research as potentially context-dependent. Thus, for the deep or meaning orientation scale, items were selected from the Deep, Relating Ideas, and Use of Evidence and Logic subscales, and for the surface or reproducing scale, from the Surface and Improvidence subscales. A similar short form has been previously analysed using the responses of a small sample ($N = 122$) of Australian nursing students, and found to yield two reliable factors—the deep and relating ideas forming a first, and the reproducing/surface items forming a second, factor (Trigwell & Prosser, 1991b).

With regard to measurement of the academic environment, most previous research investigating the relationship between environment and approaches to study at the cross-faculty or individual student level has used the Course Perceptions Questionnaire (CPQ; Entwistle & Ramsden, 1983). The psychometric limitations of the instrument may be particularly relevant to understanding why there may have been some difficulties in establishing associations between context and approach. This is reinforced by a clearer pattern of findings from more recent studies using modified versions of the CEQ (Prosser & Trigwell, 1999). Thus, in the present study, it was proposed to use the most recent form of the CPQ, namely, the Course Experience Questionnaire (CEQ; Ramsden, 1991; Wilson *et al.* 1997) to measure aspects of the learning environment. The CEQ has been specifically designed as a performance indicator of teaching effectiveness at the level of the whole course or degree. Thus, all items have been designed to measure aspects of the learning environment across disciplines and institutions. It is, therefore, currently the most suitable instrument for measuring aspects of the learning environment at the general or individual level. The conceptual framework underlying the scales of the CEQ is presented in Appendix 1. The structure includes 36 items, with five scales measuring key aspects of the learning context, namely Good Teaching, Clear Goals and Standards, Appropriate Assessment, Appropriate

Workload, and an emphasis on Independence, and a sixth scale (Generic Skills) measuring the reported acquisition of transferable skills. More recently, the instrument has undergone extensive and rigorous cross-validation of its structure across several large, multidisciplinary samples, using a combination of exploratory and confirmatory factor analysis, as well as predictive and discriminatory validity procedures (Wilson *et al.*, 1997). Findings confirmed the stability and validity of the instrument as a measure of the learning environment at the degree level.

Finally, with regard to considerations of sampling and analysis, the present study sought to extend on previous work by, firstly, sampling students in three contrasting disciplines (humanities, science, commerce) across all years of undergraduate study, in a systematic attempt to establish both general and discipline-specific patterns. If the proposed relationships function at the 'level of the individual student', we would expect to find them consistently across disciplines and years of study. Secondly, the present study sought to apply more rigorous and precise tests of relationships than has previously been the case with factor analytic and correlational procedures, through the use of higher order path analysis. This approach to analysis will allow direct tests of both direct and indirect paths of influence between presage characteristics, students' approaches and academic outcomes at both general and discipline-specific levels.

Method

Sample

A broad-based survey of students from the same university was conducted, with 5000 students being randomly selected from within the university to represent approximately equal numbers of males and females across 14 faculties (including humanities, business, commerce, environmental sciences, computing sciences, social sciences, law, education, health sciences, and visual and performing arts) and all years of study. Questionnaires were mailed to individual students' home addresses, approximately 3 months after the completion of the academic year, to be returned directly to the research project base within the university. Up to three follow-up letters were sent in order to achieve a minimum response rate of 30% within each faculty, and 50% overall for the university. A total of 2130 usable responses (response rate 54%) was obtained, comprising 1043 female (49%) and 1087 male (51%) students. From this total sample, faculties with a sample size large enough to produce valid and reliable results using path analysis ($n > 150$) were selected for inclusion in the analysis. This final university sample of 646 comprised the disciplines of commerce ($n = 249$), humanities ($n = 210$), and science ($n = 187$).

Measures

Presage variables. Two personal (gender, prior academic ability) and two environmental (students' perceptions of teaching quality and workload) variables were selected to measure the presage domain.

Prior Academic Ability—prior academic ability was operationalised by students' Tertiary Entrance (TE) scores. Based on their performance in years 11 and 12 of their secondary education, students earn a rating from 1 (low) to 999 (high achievement), which is used to determine order of entrance to tertiary courses. TE scores were available, from official university records, for 614 students in the present sample. The range of students' TE scores

in the present sample was 717 to 999, with a mean of 783.02, a standard deviation of 47.19, a modal score of 758, and a median score of 770.5.

Teaching Environment—perceptions of the teaching environment were measured by students' ratings on the CEQ (Ramsden, 1991). The CEQ was designed as a performance indicator of teaching effectiveness at the level of whole course or degree in those aspects of teaching about which students have direct experience, and are therefore validly able to comment (namely, quality of teaching, clear goals and standards, workload, assessment, and emphasis on independence). The higher order structure of the CEQ has been established, using confirmatory factor analysis, as comprising two factors—a teaching quality factor (defined by the good teaching, clear goals and standards, appropriate assessment, and emphasis on independence scales) and a level of workload factor (defined by the appropriate workload scale alone) (Wilson *et al.*, 1997). Based on this structure, perceptions of the teaching environment were measured by separately summing students' course ratings across the scales related to teaching quality and workload. While the two-factor higher order structure of the CEQ will be used in the path analysis, supplementary regression analyses using the five scales as separate predictors will also be conducted to enable a more precise examination of relationships between perceptions and both approaches and outcomes.

Process variables. Two approaches to learning (deep approach, intrinsic motivation and emphasis on meaning, and surface approach, extrinsic motivation and emphasis on reproduction) were selected to measure the process domain.

Approaches to learning—two short scales (six items each) were constructed, using items from the ASI (Entwistle *et al.*, 1979) to represent deep and surface approaches. Analysis of student responses from the present sample evidenced moderate levels of internal consistency (Cronbach's alpha coefficients of 0.67 for deep approach, and 0.69 for surface approach), in excess of those typically reported for these subscales (Entwistle *et al.*, 1979; Entwistle & Kozeki, 1985), and close to the limit of 0.71 suggested by Comrey (1973) as indicating high internal consistency. Construct validity was confirmed by means of a principal components factor analysis with a varimax rotation on the 12-item set. Two distinct factors, accounting for 40% of the variance (Factor 1 = 24%; Factor 2 = 16%) were clearly identifiable, with all six deep items and all six surface items loading in excess of 0.30 on the first and second factors respectively. A significant negative correlation (-0.21 , $p < 0.001$) between the two scales further supports their construct validity as measures of deep and surface approaches to learning.

Product variables. The outcome domain was represented by three variables: academic achievement, course satisfaction, and generic skills development.

Academic Achievement—academic achievement was represented by calculating, using university academic records, students' grade point average (GPA), measured on a scale from 1 (low) to 7 (high), from the commencement of their degree to the point at which the survey was conducted.

Course Satisfaction—course satisfaction was measured by students' responses to the item 'Overall, I am satisfied with the quality of this course', rated on a 5-point Likert scale from 1, disagree, to 5, agree.

Generic Skills—generic skills development was measured by averaging students' responses to the six items of the generic skills scale of the CEQ. This scale measures process skills relevant to employability and lifelong learning, such as written communication, problem-solving, analytic skills, teamwork, ability to plan one's own work and confidence in tackling new situations.

Results and Discussion

The relationship between the presage, process and product aspects of the learning environment were investigated in a three stage process using multiple regression and structural equation modelling techniques (EQS; Bentler, 1989). In the first step, a global model of hypothesised relationships, using the higher order structure of the CEQ, was tested at the level of the whole university or individual student. Secondly, the generalisability of this model was tested at the faculty level for the disciplines of science, commerce and humanities. Finally, the general relationships identified through the path analysis were further elaborated using the individual scale structure of the CEQ to more specifically assess components of the learning environment.

Prior to the reporting of results, it is important to outline the assumptions underpinning our interpretation of the path analysis. Higher order path analysis permits the direct testing of the theoretically proposed 3P model, through the calculation of a measure of fit between the proposed model and the optimal model derived from estimates of the various relationships. All significant relationships indicate an alpha level equal to or greater than 0.05. While EQS provides several goodness-of-fit indices as a guide to interpretation, current research recommends the use of a two-index presentation strategy to evaluate model fit (Hu & Bentler, 1999). We have chosen the comparative fit index (CFI; the agreement between the empirical results and the results expected by the model), and the standardised root mean squared residual (SRMR; an index of the degree to which the initial correlation matrix is not reproduced by the estimated factor model). A good fit is generally indicated by a CFI close to 0.95 (the maximum value is 1.0), and an SRMR less than 0.08 (Hu & Bentler, 1999). The correlation matrix, means and standard deviations for each variable were used as input for the structural analysis.

University Level Analysis

Initially, data were analysed separately for men and women to test for gender differences, but none were found. Thus, the sample was combined for all analyses. The results revealed a good overall fit of the data to the model at the university level (CFI = 0.96 based on 5 degrees of freedom; SRMR = 0.007). The results for the university-level path analysis are presented in Fig. 1.

Prior academic achievement. Students' tertiary entrance (TE) score was positively, but weakly, associated with a surface approach to university study. That is, students who overall appeared to 'do better' at school reported themselves as being slightly more likely to employ surface or reproductive study strategies at university. Consistently, school-based achievement was not associated with a deep approach to university study.

Students' TE score was overall also positively, but weakly, associated with students' achievement at university, as measured by GPA. That is, how well students achieved at high school was a positive, but weak, predictor of their 'academic success' at university. This finding should perhaps be interpreted cautiously, given the inherent restriction of the range of TE scores for students entering university compared to the wider population of school leavers. In a broader sense, this relationship may be stronger than present findings indicate.

Importantly, prior academic achievement did not systematically influence students' perceptions of their university learning environment. That is, how well a student performed at school (as evidenced by their TE score) did not predict their evaluations of the quality of university teaching or the level of workload. This would seem, to some extent, to run contrary

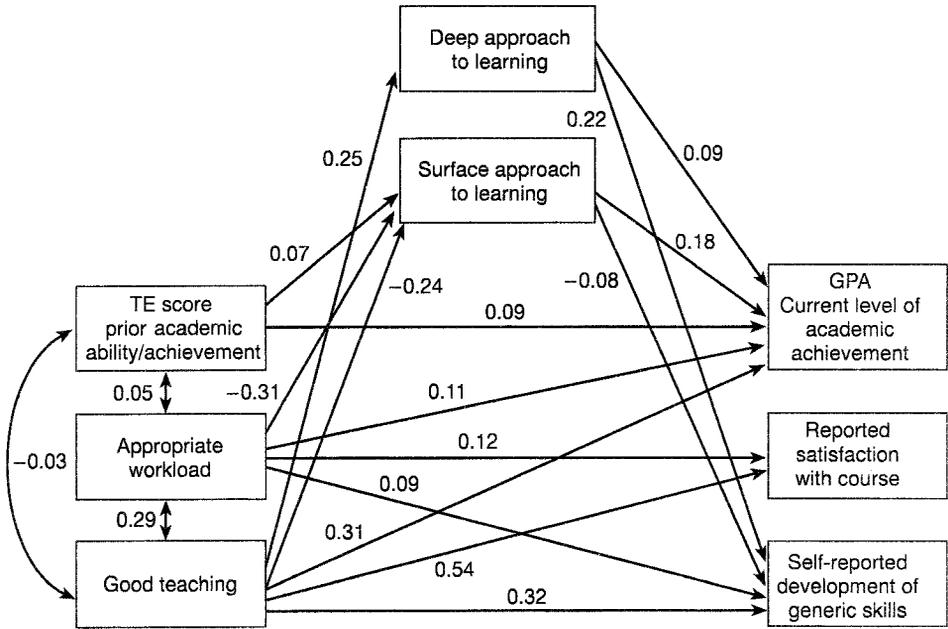


FIG. 1. The relationship between the academic environment, approaches to study, and academic outcomes at the level of the whole university.

to the proposition that students’ evaluations are confounded by academic ability: specifically, that so termed ‘better students’ would evaluate university teaching more critically.

Academic environment. Workload: students’ perceptions of the appropriateness of the workload in their course of study were associated with their reported levels of satisfaction and development of generic skills or metacompetencies, and their level of academic achievement. That perceptions of workload would be related to an attitudinal outcome variable, such as satisfaction, is not surprising. Students are also, however, linking their perceptions of course workload with their actual learning outcomes. While the association is small, students are indicating that they are developing higher levels of generic and transferable skills in courses which are ‘less packed’ and which presumably, therefore, allow greater opportunities and time for the use of analytic, problem-solving and interactive learning processes that facilitate the synthesis, integration and application of knowledge. The effect of high workload on learning outcomes also appears to be mediated by its encouragement of surface processing of the curriculum, which, in turn, is negatively associated with generic skill development. Both the direct and mediated paths between workload and generic skills support the course design principle of appropriate balancing of the breadth and depth of curriculum, to allow opportunities for students to engage in higher order learning activities. The direct association of workload and academic achievement (GPA) should not be surprising. Students who ‘do better’ have, on average, probably managed the workload more effectively, and consequently ‘perceive it’ to be at more appropriate levels. This proposition is not entirely straightforward, however. Kember & Leung (1998), in a study of engineering students, found GPA to have little influence on perception of workload. Clearly, further investigation of a potentially reciprocal relationship would be useful in this regard.

Overall, students’ perceptions of workload in the present study function consistently

with previously reported patterns, which link higher workloads to increased surface processing and generally poorer learning outcomes and satisfaction with the learning environment.

Good Teaching: the higher order construct of good teaching (an aggregation of the good teaching, appropriate assessment, clear goals and standards, and independence in learning scales of the CEQ) was positively associated with students' reporting a deep approach to their study. That is, students who perceive their learning environments to evidence good teaching report themselves as more likely to adopt 'meaning-based', and less likely to adopt reproductive, learning strategies. Such deep approaches are, in turn, clearly associated with students' self-reported development of generic skills, and have a small association with academic achievement as measured by GPA. Thus, this path describes a process whereby good teaching has a positive effect on academic outcomes, which is mediated by students' approaches to learning. In addition to contributing to the adoption of deep approaches by students, good teaching was also directly, and strongly, associated with all three academic outcome measures. That is, irrespective of their approaches to study, students in such academic environments report greater satisfaction and generic skill development, and achieve higher grades. Clearly, a teaching environment which students perceive as effective, consistent with Biggs's (1985) notion of dual influence, makes both direct and indirect (through approaches) contributions to learning outcomes.

It is important to note the comparative contributions of the presage factors of prior academic achievement and perceptions of the academic environment. While, consistent with previous research, TE score (prior academic ability) was a significant predictor of GPA, it was a relatively weak influence when compared to the composite environmental factor of perceived good teaching. Clearly, teaching perceived as 'involving' can, and does, contribute 'added value' to both students' achievement, and learning beyond their prior academic ability. This may be particularly reassuring to university teachers who are wondering if they are 'making a difference'.

Learning approaches. What is the effect of students' learning approaches on academic outcomes? While both approaches were associated with higher grades, this relationship was clearly stronger for surface strategies. The specific relationship between learning approaches and academic outcomes depends squarely on the nature of the outcome in question. The present findings suggest that, in the present context, course grades are more likely to be based on assessment procedures which are related to the memorisation of declarative or procedural knowledge, and a factual, more than a conceptual, mastery of the curriculum. Subsequent faculty-level analyses will clarify this relationship. The use of either approach is not related to students' overall satisfaction with a course of study, but, not surprisingly, a deep approach is clearly associated with the reported development of generic metacompetencies. As predicted, students, across discipline and year of study, reported adopting a reproducing or surface approach to study in learning environments that they negatively evaluated on all scales of the CEQ. Consistently, students reported that they adopted a meaning or deep approach in positively evaluated environments.

Such a clear pattern of associations across disciplines and years of study appears to support a systematic relationship between students' perceptions of the academic environment and their reported approaches to study. The clarity of this pattern of findings, and its consistency with associations between approaches to study and perceptions of the learning environment previously found at the faculty or departmental level (e.g. Ramsden & Entwistle, 1981; Trigwell & Prosser, 1991a), supports Meyer & Parsons (1989) and Entwistle's (1989) proposals that measurement-related issues with the ASI and CPQ in particular may have confounded earlier research efforts.

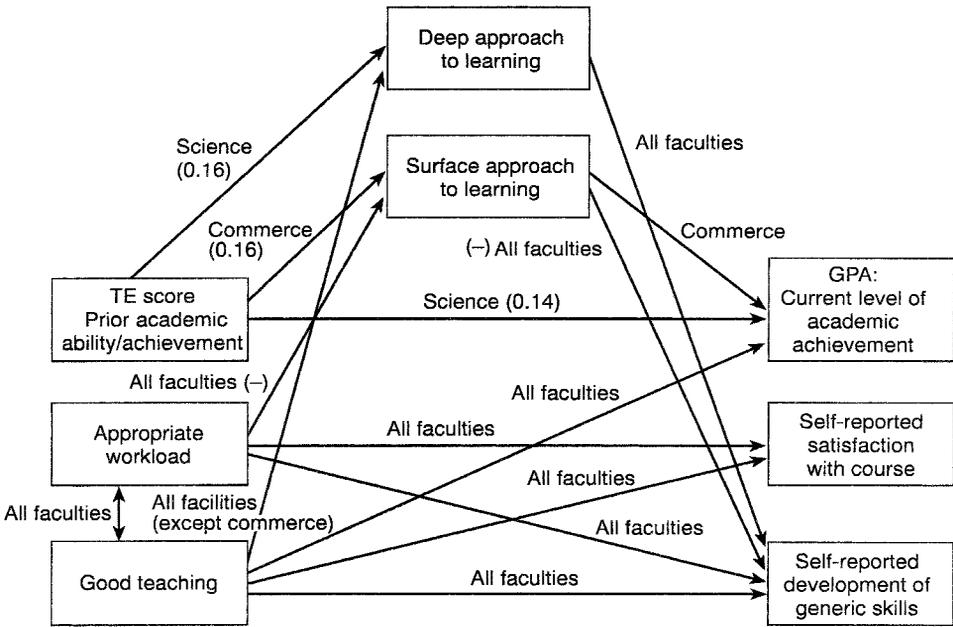


FIG. 2. Patterns of relationships between academic environment, approaches to study, and academic outcomes for commerce, science, and humanities faculties.

Faculty Level Analysis

In order to test the generalisability of this pattern of relationships to specific educational contexts at the faculty level, a further series of three structural equation analyses, testing relationships between the same set of academic presage, process and outcome variables, was conducted on students' perceptions in the faculties of science, humanities and commerce. Results at the level of individual faculties approximated that of the whole university in terms of goodness of fit, but fell a little short of the recommended CFI level of 0.95 for a good fit of model and data: humanities (CFI = 0.89 based on 8 degrees of freedom; SRMR = 0.02); commerce (CFI = 0.88 based on 9 degrees of freedom; SRMR = 0.03); and science (CFI = 0.87 based on 7 degrees of freedom; SRMR = 0.02). Smaller sample sizes, and, in particular, ratios of subjects to variables, may have contributed to the level of achieved model fit at the faculty level. However, given the relative consistency of patterns of findings across analyses, the faculty-level models were considered an adequate basis for an indicative discussion.

For economy of presentation, the results of these three analyses are summarised in Fig. 2. For the most part, the relationships identified at the level of the whole university or individual students are in evidence at the faculty level. In particular, the direct associations between good teaching and appropriate workload, and positive academic outcomes, and the indirect path of good teaching contributing to deeper processing, which, in turn, contributes to generic skills development, were both confirmed in a range of specific academic contexts.

Two specific variations were evident between the general map and faculty-specific maps in the relationship of school achievement (TE) and university achievement (GPA) and approaches to study. While science students were the only group to show a positive association (0.16) between their TE score and deep approach to study at university,

TABLE I. Summary results of multiple regression analyses with CEQ scales as predictors of deep and surface approaches to learning

CEQ scale	Deep approach			Surface approach		
	B	Beta	<i>t</i>	B	Beta	<i>t</i>
Good Teaching	0.10	0.17	5.14‡			ns
Clear Goals	0.05	0.06	2.17*			ns
Assessment	0.08	0.11	3.80†	-0.30	-0.34	-13.97‡
Workload			ns	-0.38	-0.36	-17.16‡
Independence	0.05	0.06	2.18*			ns

* $p < 0.05$; † $p < 0.01$; ‡ $p < 0.001$.

commerce students, in contrast, were the only group to show a positive association (0.16) between TE and surface processing. That is, the better a science and commerce students' school results, the more likely they are to report deep and surface approaches to study respectively. Consistently, commerce students showed a clear positive relationship (0.35) between a reported surface approach and a higher GPA. This dynamic can be understood in terms of the defining characteristics of many commerce/business courses: the job-specific and instrumental motivations of students, the more narrow vocational focus of courses, the inherently factual and procedural knowledge base of some commerce curricula (Lucas, 1998), and the relatedly reproducing methods of assessment often employed. Thus, it may be that not only do the 'better students' who enter some commerce programmes report a greater use of surface approaches, but also, given the nature of the curriculum and assessment methods, this may be a logical and strategic choice for all commerce students to pursue, in the present context, if they wish to 'do well'. It may well be that the influence of school achievement on learning approaches and outcomes at university may show a degree of variability across disciplinary contexts. While humanities students in the present study reflected Trigwell & Prosser's (1991b) finding of no relationship between these three factors, science and commerce students showed contrasting relationships.

Elaboration of Path Models

While the path analysis has identified a number of general associations between characteristics of the academic environment as summarised by the two-factor higher order structure of the CEQ, and learning processes and outcomes, a more precise understanding is afforded by analyses of the relative contribution of individual component scales measuring more specific aspects of the environment. Thus, two series of multiple regression analyses were conducted to elaborate the relationship of aspects of the academic environment to, firstly, students' study approaches, and secondly, academic outcomes.

Academic environment and approaches. Two standard multiple regression analyses were conducted using the individual scales of the CEQ as predictors to the criterion variables of students' reported global deep and surface approach scores. The results are presented in Table I. Four of the five aspects of the university learning environment (good teaching, appropriate assessment, emphasis on independence, and clear goals and standards) were significant positive predictors of deep approach to learning ($F [5, 1886] = 28.98, p < 0.0001$).

The strongest predictor of a deep approach was the good teaching scale, which essen-

tially describes the ‘involving quality’ of the basic learning transactions between staff and students. Students appear to be saying that the learning environments that will most strongly influence them towards deeper processing are those which are characterised by reciprocal transactions, involving both the giving (clear and useful explanations, helpful feedback) and seeking (interest in students’ opinions and difficulties) of information, within an intrinsically motivating context (work to make subjects interesting and motivate students to do their best work). This is fundamentally a process of active engagement, and parallels what Laurillard (1993) has characterised as the essentially conversational character of the teaching–learning process. This particularly identifies aspects of a learning culture that need to be safeguarded and highlighted as design principles with the increasing use of media and technology in higher education.

Only two of the aspects of the university learning environment (appropriate workload and assessment) were significant negative predictors of a surface approach to learning ($F [5, 1892] = 190.13, p < 0.0001$), with the direction of findings indicating that a heavy workload and inappropriate assessment strongly contribute to a surface study approach. This is consistent with the pattern of associations reported by Crawford *et al.* (1998). Interestingly, the use of the higher order structure of the CEQ in the path analysis masked the relationship between assessment and surface processing. This perhaps serves as a caution to attempts to analyse learning environments at too great a level of aggregation.

Finally, clear goals and standards were not a significant predictor of a surface approach. The argument that students tend to adopt a surface approach to studying as a ‘default option’, when they are uncertain what an academic environment requires of them (Gibbs, 1992), was not supported by the findings. That clear goals and standards were also the strongest predictor of academic achievement, and only a relatively weak predictor of deep processing, suggests that this aspect of the learning environment may impact more strongly on ‘how well students are able to achieve’, rather than on ‘what approach they use’. Accordingly, while there is some evidence for the intuitively appealing notion that a well-structured knowledge base (Gibbs, 1992) can foster a deep approach, the association is not particularly strong.

Academic environment and outcomes. Three standard multiple regression analyses were conducted using the scales of the CEQ as predictors to the academic outcomes of students’ reported satisfaction and generic skills development, and their level of academic achievement as measured by GPA. The results are presented in Table II.

Students’ evaluations of all aspects of the academic environment were significant predictors of their reported levels of generic skill development ($F [5, 1984] = 125.42, p < 0.0001$), and accounted for 25% of the variance in their reported levels of learning. While these results appear to indicate that the development of higher order or metacompetencies is a complex and interrelated process, which is affected by all aspects of the learning environment, the two strongest predictors were a good teaching environment and opportunities for independence and choice in learning content or process. This pattern of findings strongly supports the argument that independent learning processes (enhancing student perceptions of relevance and ownership), in combination with a positive motivational context deriving from the relational environment (enhancing intrinsic motivation), are the dual elements central to the facilitation of effective higher order learning outcomes Trigwell & Prosser, 1991a; Gibbs, 1992; Ramsden, 1992). This finding is certainly consistent with, and explanatory of, the clear path between good teaching, deep approaches, and generic skill development in the previous analyses.

Present findings provide a measure of empirical support for the recommendations of a

TABLE II. Summary results of multiple regression analyses with CEQ scales as predictors of academic outcomes: generic skills, course satisfaction, and academic achievement

Academic environment CEQ scale (predictors)	Academic outcomes									
	Generic skills			Course satisfaction			Academic achievement			<i>t</i>
	B	Beta	<i>t</i>	B	Beta	<i>t</i>	B	Beta	<i>t</i>	
Good Teaching	0.19	0.27	8.98†	0.05	0.29	11.51‡	0.03	0.25	8.26‡	
Clear Goals	0.06	0.05	2.11*	0.05	0.19	9.53‡	0.04	0.26	10.14‡	
Assessment	0.07	0.08	3.21‡	0.01	0.05	2.21*	0.01	0.08	3.15†	
Workload	0.06	0.06	2.66†	0.02	0.06	3.08†	—	—	ns	
Independence	0.22	0.21	8.12‡	0.04	0.15	7.04‡	—	—	ns	

* $p < 0.05$; † $p < 0.01$; ‡ $p < 0.001$.

TABLE III. Summary results of multiple regression analyses with generic skills scale items as predictors of course satisfaction

Generic skills items (predictors)	Course satisfaction		
	B	Beta	<i>t</i>
Problem-solving	0.17	0.17	11.31‡
Analytic	0.17	0.16	11.31‡
Team member	0.03	0.04	2.86†
Confidence tackling unfamiliar problems	0.13	0.13	8.90‡
Written communication	0.07	0.07	5.48‡
Planning own work	0.13	0.13	10.17‡

* $p < 0.05$; † $p < 0.01$; ‡ $p < 0.001$.

number of writers suggesting practical means by which the curriculum may be adapted to enhance the development of generic academic and work-based skills (Sadler, 1989; Candy & Crebert, 1991; Marginson, 1993). Students' experiences appear to support the proposition that course designs that are student centred will better develop adaptive and self-regulating learners (planning their own work) who are better equipped to manage more informal and realistic learning situations (using problem-solving to tackle unfamiliar situations). The distinction between didactic (content-oriented) and facilitative (learning-oriented) approaches to teaching (Kember, 1997) seems particularly salient in this regard. Students' perceptions appear to reinforce the argument that capability derives from congruent processes—*independent thinking comes from engaging in independent learning processes—the medium is the message* (Stephenson & Weil, 1992).

A standard multiple regression analysis, using the six items of the generic skills scale as predictors to the outcome of students' reported level of course satisfaction, was conducted to further clarify students' perceptions of the processes of generic skill development. The results are presented in Table III. While students related the development of all skills to their course satisfaction, there were differences in this regard. The strongest predictors of satisfaction (analysis and problem-solving) related to the development of higher order cognitive capabilities. A second, slightly less related, set of predictors (planning own work and confidence in tackling unfamiliar problems) reflected the meta-theme of enhanced self-regulation, in terms of both the confidence and competence to function autonomously. The weakest predictor of student satisfaction was the development of team work skills.

This latter finding is particularly noteworthy in light of the pre-eminence given by employer organisations to the 'ability to work with others' (Marginson, 1993). Several explanations appear relevant. Firstly, it may be that students socialised into patterns of individual learning (Candy & Crebert, 1991) may not value apparently 'softer' collaborative skills as highly as 'harder' skills related to strengthening independent and critical judgement. Secondly, it may simply be that students have had fewer opportunities to develop collaborative capacities, given the continued prevalence of traditional classroom-based conceptions of teaching and learning. Finally, it may well be the case, as is regularly noted by staff implementing cooperative learning methods (Thorley & Gregory, 1994), that they are difficult to 'do well' and can often produce 'mixed outcomes'.

While it is probably an overinterpretation of the present findings to argue for a 'valuing hierarchy' in students' perceptions of generic skills, given that some universities propose hierarchical taxonomies of generic abilities (Barrie & Jones, 1998), it is a question for future research as to the match between students' and staff perceptions of their relative importance.

Students' evaluations of all aspects of the academic environment were significant predictors of their reported levels of overall satisfaction ($F [5, 1882] = 335.15, p < 0.0001$) and accounted for 49% of the variance in their levels of satisfaction with their courses. The strongest predictors of satisfaction were a learning environment which was perceived as involving (good teaching) with clear expectations (clear goals), and allowing of a degree of choice to pursue individual interests (independence).

Students' evaluations of only three aspects of the academic environment (clear goals, good teaching, and appropriate assessment) were significant predictors of their level of academic achievement ($F [5, 1847] = 141.85, p < 0.0001$), and accounted for 28% of the variance in their GPA. That students 'do better' (i.e., achieve higher grades) in courses where they feel more involved, and are clearer about expected standards of work, should not be particularly surprising.

Summary

In summary, the findings from the present study provide empirical support for, or confirmation of, a number of related theoretical propositions.

1. Perceptions of heavy workload and inappropriate assessment influence students towards surface approaches to study, but perceptions of workload have no systematic relationship to students' use of deep approaches to studying.
2. Perceptions of a good teaching environment influence students towards deep approaches to studying, and conversely, students' perceptions of a bad teaching environment influence them towards surface approaches to studying. The strongest predictors of students using a deep approach to studying are their perceptions of the quality of the teaching and the appropriateness of the assessment.
3. Perceptions of teaching environments influence learning outcomes both directly (perceptions to outcomes) and indirectly (perceptions to approaches to outcomes). Thus, changes in teaching environments may have an impact on students' learning outcomes without necessarily affecting their learning approaches.
4. Positive perceptions of the teaching environment not only directly influence academic achievement but also, importantly, qualitative learning outcomes. Generic academic and workplace skills are perceived to be best developed in learning environments characterised by good teaching and independence.
5. While a student's school achievement is a positive (but weak) predictor of their university achievement (GPA), how they perceive their current learning environment is a stronger contributor to all types of learning outcomes at university. Thus, perceptions of university learning environments make a clear contribution to academic outcomes above the prior academic success of a student.
6. Prior academic achievement has no significant influence on how students evaluate their learning environment.
7. The above patterns are evident not only at the general level of the individual student, but also in three contrasting disciplinary contexts.

Methodological Limitations

Comment should be made on the positioning of global course satisfaction as an outcome variable in the path model. While 'overall course satisfaction' has been established as a global

or summative outcome measure by 'common practice' (e.g. Ainley & Long, 1994, Ashenden & Milligan, 1999), an argument can be made that affective factors such as perceived interest in course content (Kember *et al.*, 1996) or students' satisfaction with career/programme choice might equally be regarded as presage factors. At the interpersonal level, Robbins & DeNisi (1994), in a study of the influence of affect on cognitive processing in students' performance evaluations of teachers, interpret their findings as indicating that affect impacts the early stages of evaluation, thus 'colouring' later appraisals. Ramsden (1992) also reports interview evidence indicating that a deep approach and course satisfaction demonstrate a reciprocal relationship. Thus, some aspects of student satisfaction may influence students' learning approaches and perceptions of the learning environment, as well as be the consequences of these. Clearly, future research should seek to address this question from a more interactive and systemic perspective.

Comment should also be made regarding the level of generality of the present study. We asked students to reflect on 'their experience of university to date in their current programme of study.' Thus, students were reporting perceptions of learning environments that were a summative aggregate of a range of specific learning experiences (i.e. subjects) in their programmes. Such an inclusive frame of reflection across a number of potentially diverse learning contexts may be problematic, because of the implicit assumption that relations between system elements may be consistent over time (years of study) and different environments.

Finally, the relationship between perceptions and approaches as modelled in the present study using higher order path analysis may not be as coherent and consistent for all groups of students. While these relationships may hold for most students in higher education, there are a small number of atypical students where such clear patterns do not usually emerge. For example, Meyer *et al.* (1990) found, for academically weak or failing students, that relationships between perceptions of learning context and approaches, such as those reported here, may disintegrate. Similarly, Entwistle *et al.* (1991) found the expected coherent patterns for passing students, and disintegrated patterns for unsuccessful students. Meyer *et al.* (1990) term these dissonant study orchestrations, because they represent a violation or exception of conceptual boundaries. That is, they are defined by apparently conceptually incompatible dimensions (e.g. a student scoring high on both deep and surface approaches; Meyer, 2000). Recent research has both confirmed this process of atypical variation (Entwistle *et al.* 2000) and identified presage factors such as a student's prior knowledge of a subject area which may be associated with it (Prosser *et al.* 2000). While we recognise the importance of modelling variations of the 'general model' of student learning, the sampling methods employed in the present study do not readily access the groups of students most likely to display dissonant orchestrations. A broad mail survey across years of study is likely to produce very low response rates from failing students, and this proved to be the case in the present study. There were insufficient numbers of unsuccessful students in the final sample to conduct meaningful or reliable analyses.

Implications for Practice

Firstly, and fundamentally, the results confirm that elements of the learning environment which are under teacher control can, and do, positively influence both the way students approach their study, and the learning outcomes they may achieve. Thus, interventions, if appropriately conceived and implemented, can and will 'make a difference'.

What might be done in specific terms? The model of the academic environment underpinning the CEQ (see Appendix 1) provides an overview of domains for potential reflection and intervention, and the present study has demonstrated how each of these environmental elements relates to students' approaches and outcomes. It is clear that 'teaching quality' (as a composite of good teaching, clear goals and standards, appropriate assessment and emphasis on independence) has the strongest influence, both directly and indirectly, on learning outcomes. At a finer level of analysis, it is the component elements of good teaching (reciprocally interactive and motivating transactions between teacher and student) which are the strongest single influence.

This would appear to suggest that good teaching is the 'place to invest' if one is seeking to make a difference to students' learning outcomes. We would suggest, however, that this may not necessarily be the 'place to start', and that there is an important distinction to be made between the importance and feasibility of developmental goals. We propose that reviews of workload and assessment practices may be more feasible 'points of departure' for university educators who are seeking to improve the design of courses.

The areas of workload and assessment are proposed as areas for initial intervention for three reasons. Firstly, these are the only two aspects of the learning environment which have been consistently shown, both in the present and previous studies, to drive or 'motivate' students toward a surface approach to learning across a wide range of student populations and disciplinary contexts. Secondly, given that the size of this effect is quite substantial (e.g. 40% of the variance related to surface processing in the present study was accounted for by these two variables), appropriate interventions offer potentially great rewards in terms of positive impacts on learning. Thirdly, change in these aspects of the learning environment would appear to offer a greater likelihood of initial success than other areas, by virtue of what is required to make the change. For example, while improvements in students' perceptions of good teaching may involve changes in the skill levels, relationship behaviours, and availability of academic staff, improvements in workloads and assessment processes can be implemented with comparatively fewer training or resource implications. This is not to suggest that we should only address 'what is more easy to do'; far from it. Rather, as a number of organisational development theorists have argued (Beckhard & Harris, 1987; Cummings & Huse, 1989), early attempts at planned change should seek to optimise the chances of success by focusing on proven issues which offer a visible return and which are feasible to implement. Early 'returns on investment' or successful improvements in one domain of the learning environment will then, hopefully, create organisational momentum and staff motivation for continued efforts with increasingly challenging tasks.

In the next section, we outline an interactive process aimed at stimulating discussions between teachers and students about aspects of the learning environment. While we suggest that the content of initial discussions may, for example, be workload or assessment, it is, in fact, the process of these interactions that is equally valuable. Such structured dialogues are relatively safe ways for teachers to start to build the interactive competencies and underlying sense of mutual responsiveness that are the behavioural and attitudinal foundations of the 'good teaching' construct. In this sense, concrete and procedural activities can be used strategically to pursue more abstract and personal developmental goals. The underlying intention of the approach to exploring students' perceptions that we outline in the next section is, because of its deliberate basis in interaction and dialogue, not only the gathering of information, but also the development of teachers' capability to attune, validate, and respond to students' perceptions. In this sense the meta-goal is always the development of 'good teaching', irrespective of the content under discussion.

Analysing Students' Perceptions

It is one thing to suggest such a task, but quite another to undertake this in a meaningful and systematic fashion. In the spirit of translating research findings into practice, we offer the following modest procedure, based on experience, for assessing students' specific perceptions of a subject's workload in relation to its nominated value. It is important to remember here that the focus of investigation is students' perceptions. As Kember & Leung (1998) have clearly demonstrated, actual workload is only weakly related to perceived or experienced workload.

While course evaluation surveys such as the CEQ, and the ubiquitous subject evaluation questionnaires, are able to provide broad brush information on student perceptions, such processes often do not provide a sufficiently clear and specific, and motivating, base for the planning of improvements. A number of academic staff development practitioners have identified the informational and motivational 'value added' of 'direct conversations' between students and staff in the course improvement process. For example, Gibbs *et al.*, (1988) outline a structured interactive feedback process based on small group discussions. Similarly, Landbeck (1993) describes a system of student groups and committees to gather attitudinal information about classroom climate and context. Such interpersonally based processes enable us to not only gain a sense of students' perceptions of subjects but also explore their sense of the underlying causes of problems and suggestions for change.

While previous approaches have primarily utilised an open discussion process for gathering qualitative data on students' perceptions, the outcomes, while practically useful, can often be somewhat unsystematic and difficult to relate to a theory of teaching. For this reason, we have developed questioning protocols which provide more focused outcomes in more specific domains. For example, the process we have used for further explicating students' perceptions of workload at a subject level involves conducting a series of brief (2 hours) group discussions, with a small number of students (typically 6–8 people), using a combination of structured and open discussion methods. We have found that for subjects with enrolments of approximately 150 students, three 2-hour meetings, with groups covering a range of students' achievement levels, provide a relatively clear and convergent picture of perceptions, underlying causes and suggested improvements. The structure and questioning protocol for these discussions is outlined in Appendix 2. We firstly ask students to make comparative judgements about their experience of the workload across subjects in terms of both volume and complexity of work, since these are distinct but interactive factors in students' conceptions of the 'toughness' or 'fairness' of a course (Svensson, 1997). This also allows an informal 'benchmarking' of students' perceptions across subjects. Secondly, we ask students to reflect on their sense of the interaction between what and how much they had to learn, and their approach to the task, in particular focusing on the notion of 'short cuts' or compromises to learning in the subject. Finally, we ask students to identify other factors (either in terms of course structure or culture, or student attitudes or resources) which may be contributing to perceptions of high workload. The data from these conversations are sufficient to make appropriate, and positively received, adjustments to the subject structure and curriculum focus, without compromising learning outcomes. A second protocol, which we use to guide discussions with students regarding their perceptions of course assessment, is presented in Appendix 3.

Two further points deserve consideration. Firstly, this interactive process appears to be greatly enhanced by making its motives transparent for students, and where they have had time to reflect on the stimulus questions beforehand. Not surprisingly, we have had better results where we were able to better prepare students. The underlying values that support

staff–student interaction on this task are consistent with what Gibbs & Lucas (1995) term a collaborative research-oriented approach to development. Secondly, and somewhat paradoxically, the protocol of questions which we have used as the basis for discussions with students also appears to be a useful basis for private reflection or self-study review on workloads and assessment practices by academic staff. It is always a useful exercise to compare our own and students' responses to the same questions.

Students' perceptions are, of course, only one source of information in making decisions. These, of course, have to be considered in the light of disciplinary, professional, and employer group expectations of curriculum content and, where possible, benchmarked against the perceptions of students in similar programmes. However, other considerations notwithstanding, given that students' perceptions of the amount and type of work they have to do appears to impact on the extent to which they 'cope with' rather than learn the material, they should be afforded considerable attention in the subject design process.

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Correspondence: Alf Lizzio, School of Applied Psychology, Griffith University, Mt. Gravatt Campus, Brisbane 4111, Australia.

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Appendix 1. Conceptual Model of an Effective Academic Environment Underpinning the Course Experience Questionnaire

Good Teaching: an academic environment which is involving for students because staff:

- *Empathic responsiveness*
show an interest in students' opinions, and attempt to understand the difficulties students may be having
- *Motivating expectations*
express positive expectations and seek to motivate students to do their 'best work'
- *Understandable explanations*
provide clear and useful explanations of ideas
- *Stimulating learning designs*
work to make subjects interesting
- *Helpful feedback*
provide feedback on progress

Clear Goals: an academic environment where students know what is expected of them because staff:

- *Aims and objectives*
explain 'right from the start' the learning objectives of courses/subjects
- *Direction*
provide progressive markers of 'where we are going'
- *Standards of work*
explain the standard of work expected

Appropriate Assessment: an academic environment which enhances learning by using assessment which:

- *Type*
emphasises understanding, not just the memorisation of facts
 - *Timing*
is progressive and spaced over time
- *Developmental feedback*
involves feedback beyond just grades or marks

Appropriate Workload: an academic environment which effectively manages students' workloads and stress by:

- *Volume of work*
setting a feasible amount of material to be covered
- *Breadth of curriculum*
focusing the range of topic areas covered
- *Time availability*
allowing adequate time frames for work to be completed

Independence in Learning: an academic environment which, within the limits of practicality, offers students a degree of choice in:

- *Curriculum content*
developing areas of academic interest
- *Learning processes*
how they learn material
- *Assessment modes*
the forms or modes of assessment

Generic Skills: an academic environment which provides opportunities for students to develop generic metacompetencies through:

- *Analysis*
using analytical skills
- *Problem-solving*
developing problem-solving capabilities
- *Communication*
developing written communication skills
- *Application*
using problem-solving skills to tackle unfamiliar problems
- *Collaboration*
working as a team member
- *Self-regulation*
planning their own work

Appendix 2. A Protocol to Investigate Students' Perceptions of Subject Workload

Comparative Perceptions

What is your sense of the volume/amount of work in this subject compared to other subjects you have done?
What is your sense of the difficulty of the material in this subject compared to other subjects you have done?

Felt Compromises

What is your sense of any compromises or 'short cuts' to your learning you may have taken in this subject?
Which of these do you explain in terms of the course workload? Which of these do you explain in other terms?

Trade Offs

What is your sense of the balance between the breadth (the range of areas covered) and depth (how thoroughly they are covered) of material in this subject?

Priorities

What, for you, have been the key ideas/areas in this subject? How well do you feel you understand each of these?

If we were to give more time or emphasis to one area, what should that be? Why?

If we were to give less time or emphasis to one area, what should that be? Why?

Contributing Factors

What is your sense of 'other factors' which might contribute to making this subject's workload feel or appear greater than it is? (e.g. poor subject structure, lack of organisation, difficulty accessing resources, novelty or unfamiliarity of learning processes)

Student Characteristics

What are your 'time commitments' outside of university?

What activities compete with university study?

What skills, attitudes, or resources might assist you in better managing the workload in this subject?

Appendix 3. A Protocol to Investigate Students' Perceptions of Assessment

Comparative Perceptions

How does the assessment in this subject compare with assessment you have experienced in other subjects? In what ways is it similar or different? Novel or repetitive?

Relationship to Learning

In what ways, if any, did the assessment in this subject help your learning, hinder your learning, or was not relevant to your learning?

Priorities

If all you knew about this subject was the forms of assessment used, then what conclusions would you reach about it?

What 'messages' do you take from the 'assessment package' about what we value? In discussions with staff about assessment pieces, what impressions did you get about what was 'desirable' or would be 'rewarded'? What is your reaction to this?

Congruence

How consistent are the espoused goals of this subject and the actual goals addressed by the assessment? How congruent are we in your eyes in what we say is important and what we actually assess?

Scope

What is your sense of how well the assessment matched the curriculum? In your opinion, what, if any, were important aspects of the curriculum (e.g. knowledge, behavioural competence, values, etc.) that were not assessed or could be better assessed?

In what ways did the assessment give/not give you an appropriate chance to show what you had learnt?

Timing

What are your perceptions of the relative timing and sequencing of assessment pieces in the subject? For example, was the first piece 'too early' for people to do it justice or 'too late' to provide feedback on progress? Were pieces too close together to allow improvement between efforts?

Equity

What do you think about the 'fairness' of the assessment? Difficulty? Amount? Marking procedures? Justification of grades/marks?

Feedback

What do you think about the feedback you have received on your assessment? What comments, if any, would you like to make about its quality, extent, effect on your motivation, and value in helping improve your performance?

Arousal

How anxiety or stress producing was the assessment in this course? Are arousal levels affecting your learning or enjoyment? How?

Informal Systems

What is your perception of the type or extent of informal assessment or feedback systems in this subject (e.g. peer interaction/feedback, informal ungraded exercises)?

Are there sufficient means, apart from formal graded assessment, for students to get feedback on 'how they are going'?

Involvement

What is your opinion of the level of involvement or participation you have as students in the assessment process? Would you prefer more/less or different involvement or level of choice in the negotiation of the forms or content of assessment?