

Enhancing  
Teaching-Learning Environments  
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# Approaches to Studying and Perceptions of University Teaching-Learning Environments: Concepts, Measures and Preliminary Findings

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*Noel Entwistle, Velda McCune and Jenny Hounsell*

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Enhancing Teaching-Learning Environments in Undergraduate Courses Project  
Higher and Community Education  
School of Education  
University of Edinburgh  
Paterson's Land  
Holyrood Road  
Edinburgh EH8 8AQ.

Tel: +44 (0)131 651 6669

email: [etl@ed.ac.uk](mailto:etl@ed.ac.uk)

URL: <http://www.ed.ac.uk/etl>

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# Approaches to Studying and Perceptions of University Teaching Learning Environments: Concepts, Measures and Preliminary Findings

## ABSTRACT

This paper introduces work on a major ongoing research project being carried out collaboratively between Edinburgh, Durham and Coventry Universities in Britain. The main concepts and conceptual frameworks being used in the project are introduced, along with a brief summary of a literature review used to define the most salient aspects of teaching-learning environments in higher education. The remainder of the paper describes the development and initial analyses of two questionnaires completed by students. The first of these – the *Learning and Studying Questionnaire* – given towards the beginning of a course unit, covers students' learning orientations and their reasons for studying that unit, and also contains an inventory assessing typical approaches to learning and studying. The second questionnaire, the *Experiences of Teaching and Learning Questionnaire*, completed towards the end of the unit, contains a short version of the inventory but focused specifically on the unit being studied. The main section of this questionnaire concerns students' perceptions of the teaching-learning environment. It also asks about the demands made by the unit, and what students believe they have learned from it. Finally, students are asked to rate their academic progress; assessment grades are being subsequently collected from the institutions involved. Analyses of the initial data sets obtained have identified the main factors within the items concerned with students' perceptions of teaching-learning environments and indicate the relationships that exist between these and their reported approaches to studying.

## 1 BACKGROUND TO THE PROJECT

In 1999, the Economic and Social Research Council (ESRC) for the United Kingdom established a Teaching and Learning Research Programme (TLRP). Within Phase 2 of that programme, nine large-scale projects were established in 2000, one of which focused on teaching and learning in higher education. (Phase 3 of the programme will be concentrating on the post-compulsory stages of education.) The Programme Committee had produced guidelines for applicants, including the need to strengthen 'research-based' teaching through establishing partnerships with practising teachers. That was thus one of the aims of the higher education project on "Enhancing teaching-learning environments in undergraduate courses" (the ETL project – see <http://www.ed.ac.uk/etl>) that provides the main focus of this paper.

The ETL project is now nearing the end of the second of its four years' duration and involves two forms of collaboration. The research team is drawn from three universities – Edinburgh (which is the lead institution), Coventry and Durham. The other collaboration is with colleagues in up to 20 departments, drawn from five subject areas – electronic engineering, cell and molecular biology, economics, history, and media and communication studies – chosen to ensure contrasts in subject matter and approaches to teaching and learning. The departments have been chosen to represent all the main institutional types found in Britain – ancient, civic, 1960s, and 1990s, together with a further education college carrying out degree-level work.

The project is working with departmental partners to investigate ways of encouraging greater engagement of students in their studying and promoting higher quality learning. Although the initial focus is on understanding the influence of teaching-learning environments, the project is committed also to developing materials to help departments monitor the teaching-learning environments they are currently providing with a view to enhancing them. Specifically, the project is expected to provide:

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- conceptual frameworks to describe teaching and learning, tailored to the five subject areas;
  - descriptions of teaching-learning environments and their effects on student engagement and learning;
  - tools, including questionnaires, to allow course organisers to monitor the effects of teaching-learning environments in their departments; and
  - case studies to illustrate how departments in the five subject areas developed their teaching through involvement in the project.

The main part of the project involves collaboration with departmental partners. Questionnaires have been developed to indicate students' overall approaches to studying and their perceptions of the teaching-learning environments, and related aspects of students' attitudes and experience. These data are being supplemented by focus groups of students and interviews with staff to enable us to describe our target course units and departmental contexts more fully. By the end of the first year of involvement with the departments, we shall then be able to negotiate 'collaborative initiatives' in two contrasting course units (mostly chosen from the first and final years), based on the information collected during that first year. This initiative will involve adapting the teaching-learning environment so as to improve the experience and quality of student learning and, where possible, to foster deep approaches to learning. Researchers will work with departmental partners to interpret the data collected, using our emerging conceptual frameworks to consider the specific disciplinary and institutional context. During the second year with the departments, the project team will monitor the effects of these initiatives on students' approaches to studying and their perceptions of the teaching-learning environment, as well as exploring with staff what has been achieved. A final strand will be considering the experience of encouraging colleagues to introduce pedagogic change, and the constraints on that process within differing institutional contexts.

## 2 CONCEPTUAL FRAMEWORKS FOR TEACHING AND LEARNING

Although we intend to develop conceptual frameworks describing teaching and learning within the five different subject areas, the starting point has to be generic, based on the existing literature. The intention is to provide relatively simple frameworks, drawing as far as possible on concepts couched in everyday language, to avoid off-putting social science jargon. The conceptualisation we have developed so far draws mainly on the literature of what has come to be called *student learning research* (Biggs, 1999). It includes the following outline frameworks and broad concepts, all of which are currently being developed further through ongoing research.

- Curriculum frameworks - constructive alignment, teaching for understanding, and influences on learning;
- Approaches to learning and studying, and student engagement with the course unit;
- The overall teaching-learning environment, and students' perceptions of it;
- Learning outcomes, as expressions of the appropriate academic discourse, seen more broadly as the accepted ways of thinking and practising in the subject.

### 2.1 Curriculum frameworks

The international consultants to the project, John Biggs and David Perkins, have each introduced a curriculum framework intended to guide teachers towards teaching which supports conceptual understanding and deep learning, as well as being much involved in the more general conceptualisation of teaching and learning.

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Working with schoolteachers, Perkins and his colleagues on Project Zero at Harvard University developed a *Teaching for Understanding* framework that is based on a distinctive view of the nature of understanding (Perkins, 1998).

‘Understanding’ is being able to carry out a variety of actions or ‘performances’ that show one’s grasp of a topic and at the same time advance it... Our ‘performance perspective’ ... says that understanding is a matter of being able to do a variety of thought-demanding things with a topic - like explaining, finding evidence and examples, generalising, analogising, and representing the topic in a new way:... being able to take knowledge and use it in new ways. (p.13)

The framework invites teachers to formulate *overarching goals* for the course which will subsequently be used as *throughlines*; students are regularly reminded of these, as a way of keeping clear the main focus of the course. From these goals, *generative topics* are established; these are “issues, themes, concepts, ideas, and so on, that provide enough depth, significance, connections, and variety of perspective to support students’ development of powerful understandings” (Wiske, 1998, p. 18). Then, *understanding aims* are produced to guide the selection of the series of tasks designed to encourage and demonstrate *understanding performances*. Finally, the framework sees assessment as *ongoing* or formative, providing students with feedback about their work and also allowing both teacher and students to assess progress towards understanding. Although these ideas were developed in collaboration with schoolteachers, they can easily be adapted to the university context.

Biggs (1999) introduced the term *constructive alignment* into the literature. It invites university teachers to think critically about the alignment in their courses between aims (designed for a particular group of students), the teaching, learning materials and peer support provided, and the assessment procedures used. The principle of aligning aims closely to both teaching and assessment has already been widely recognised in course designs and quality assurance procedures, and yet the actual teaching provision for students may still create mismatches not anticipated by the staff. The term ‘constructive’ has been added to suggest the importance of aims that focus explicitly on high quality learning and a deep level of understanding, and implies a constructivist approach to teaching along the lines developed by the Project Zero research team.

## 2.2 Mapping the influences on student learning

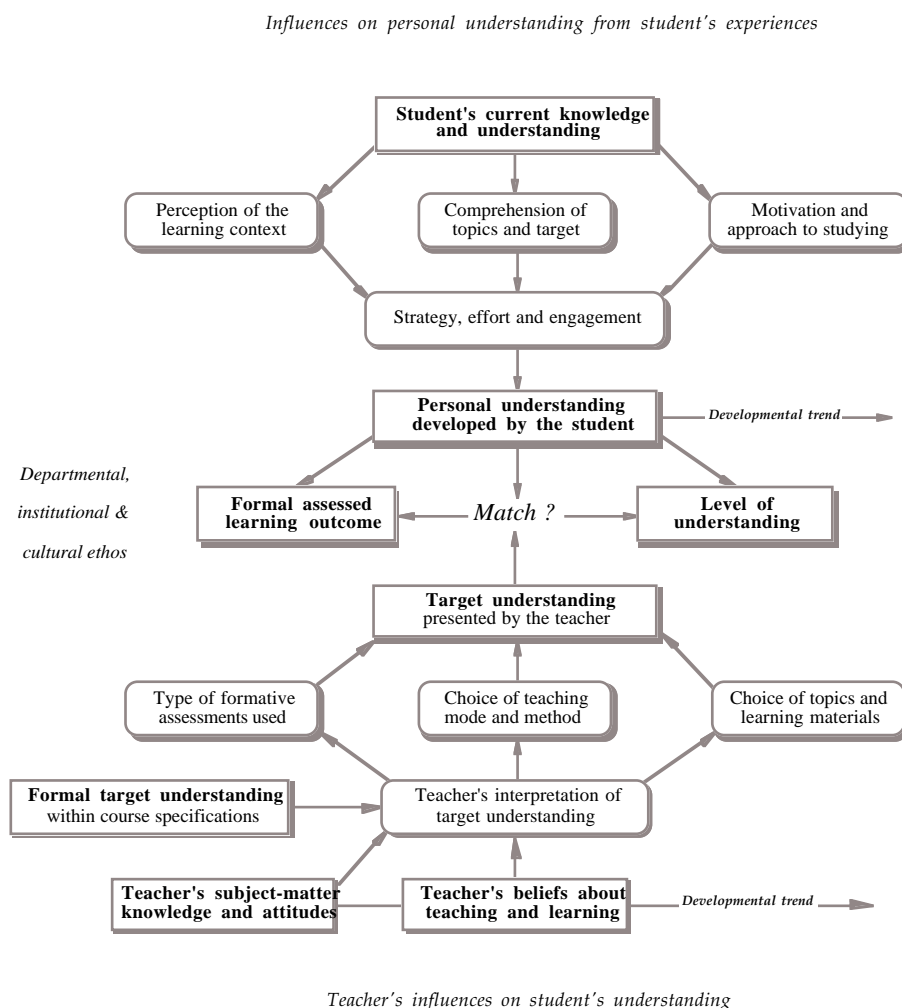
In a recent paper, Entwistle and Smith (2002) have brought together a variety of recent studies from both secondary and tertiary levels to present a conceptual map of the more immediate influences on student learning. The central notion within this map is the distinction between *target understanding* and *personal understanding*. Target understanding describes the understanding that syllabus constructors, teachers and examiners have in mind in setting out the curriculum to be studied, while personal understanding includes the range of understandings actually reached by individual students.

Where the teacher does not decide it, the syllabus will often not just outline the topics to be covered, but also describe the level of understanding to reach a pass mark, and will possibly indicate the defining features of the levels of understanding required for each grade. When provided with such a syllabus, teachers have to decide how to interpret it, drawing on their own conception of the subject and understanding of the topics. The process of setting up a target understanding for the students continues as the individual teacher decides the relative emphasis to put on specific topics, how to teach them, and what assignments and formative assessments to use. The methods of teaching and the assignments given contain explicit and implicit messages to the students about the target understanding that is required. In higher education, however, the target can be quite difficult for the students to discern. Although intended learning outcomes may be specified, staff will be viewing them, and judging the

students' work, in terms of ways of thinking and practising in the subject developed over many years of specialist study and writing. Much of the academic discourse remains implicit within the early years of undergraduate study, and so students can be left confused about what exactly is being required of them to earn good grades.

University students bring to any course unit knowledge and understanding, and experiences of previous education, all of which influence how they make sense both of the subject matter presented and of how they are supposed to go about studying. Students often enter university with firmly established study habits, some of which are inappropriate for higher education. They then try to interpret the situation in terms of their previous experience, in which teachers may have provided knowledge and also strong guidance about what work to do and when it is required – external regulation – whereas university education depends increasingly on self-regulation in learning and studying (Vermunt, 1998). There are wide differences in students' prior knowledge and experience that lead to markedly different approaches to studying and also contrasting perceptions of the teaching-learning environments they experience (Entwistle & Ramsden, 1983). Recent research, summarised for example by Prosser and Trigwell (1999), has made it clear that *approaches to studying* and *perceptions of teaching* are two of the most direct influences on the quality of student learning, and so figure prominently in our current research. Figure 1 provides a conceptual map of some of the main influences on understanding in general (Entwistle & Smith, 2002), while Figure 2, presented later, suggests relationships between the concepts on which our project focuses, within higher education specifically.

**Figure 1: A concept map of some influences on understanding**





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In both diagrams, it is acknowledged that the focus is restricted to the immediate course context. The learning taking place is, of course, also affected by a set of influences relating to the departmental, institutional and cultural milieus within which specific teaching-learning environments are embedded.

### 3 CONCEPTS DERIVED FROM RESEARCH INTO UNIVERSITY LEARNING AND TEACHING

Since the mid-1970s, there has been a large number of studies deriving from the work of Marton and his co-workers (Marton & Säljö, 1976, 1997). The key concept emerging from the initial work was the *approach to learning* with its categories of *deep* and *surface*, to which was subsequently added an *approach to studying* described variously as *strategic* (Entwistle & Ramsden, 1983) or *achieving* (Biggs, 1987). The strength of this conceptualisation has been to focus attention not only on differences in the ways in which students go about their academic work, but also on how differing types of teaching and assessment affect those approaches.

There is now a set of concepts used to suggest a framework of influences on the quality of learning, some of which stem from the student's own experience, while others describe aspects of the teaching-learning environment being provided by staff. While there would not be general agreement about which concepts to include, several probably would attract broad support. Students' prior educational experiences are reflected in their *conceptions of learning* (Säljö, 1979; Marton & Säljö, 1997) or *epistemological beliefs* (Perry, 1970; Hofer & Pintrich, 1997), and also in their reasons for studying and *learning orientations* (Beatty, Gibbs & Morgan, 1997). Early work on the influences of the contexts within which learning takes place showed that a deep approach was related to what students perceive as 'good teaching' and 'freedom in learning' (choice in what and how to learn), while a heavy work load was linked to a surface approach. It has subsequently been established that multiple-choice questions and short-answer tests tend to induce surface approaches (Scouller, 1998), and it has been suggested that some more open forms of assessment (certain types of essay, authentic problems and project reports) encourage deep approaches, although systematic investigation of these effects is still lacking. But it is students' perceptions of the teaching and assessment procedures, rather than the methods themselves, that affect student learning most directly (Ramsden, 1997; Entwistle, 1998 a, b).

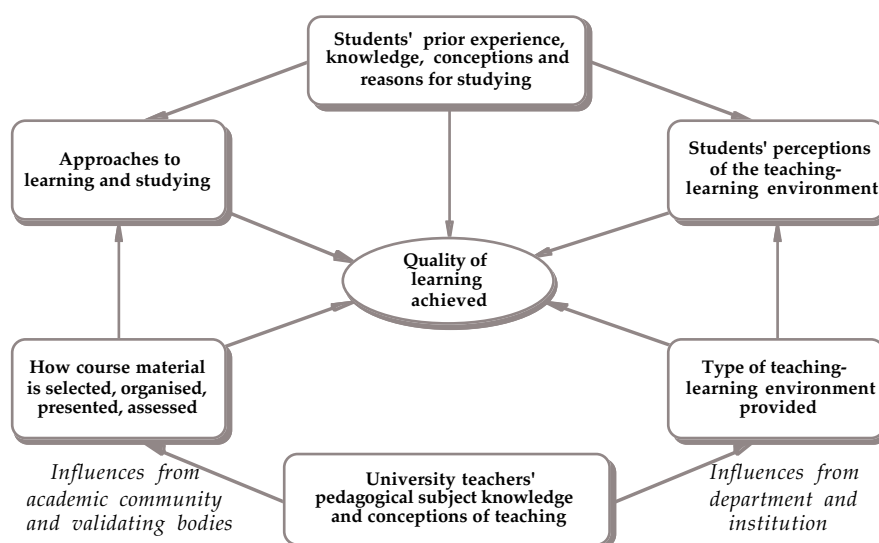
The effects of different forms of teaching and assessment led researchers to investigate differences in the ways in which university teachers describe their teaching and carry it out. From interview research came a set of concepts paralleling the work on student learning. Staff apparently differ in both their *conceptions of teaching* and their *approaches to teaching*, based on a series of overlapping categories that distinguish a *teacher-focus* linked to *information transmission* from a *student-focus* with an emphasis on *conceptual change* (Prosser & Trigwell, 1999). University teachers' conceptions of teaching have their origins in their prior experience and beliefs, and these conceptions affect their current decisions about how to design courses and how to teach and assess within them. The approaches to teaching adopted, and in particular the ways in which students perceive them, affect the approaches to studying that students adopt. And those approaches then influence the quality of learning achieved (Prosser & Trigwell, 1999).

This body of research offers a clear and relatively straightforward conceptual framework for thinking about ways of improving teaching and learning in higher education. But how complete is it and how firm is its evidential basis? Many of the interview studies are based on small samples in specific subject areas, while inventory studies assume that students can accurately, and will honestly, describe how they study. In striving for simplicity and parsimony, the conceptual bases of the most popular inventories have left out some important aspects of

studying (Entwistle & McCune, in press). Not only does more emphasis need to be put on concepts such as self-regulation (Schunk & Zimmerman, 1998) and emotion (Volet, 2001), but also on ideas coming from social psychology and sociology stressing learner identity (Mentowski, 2000), collaboration in learning, and 'communities of practice' (Wenger, 1998).

The very popularity of the student learning conceptualisations has been criticised as creating a hegemony that effectively excludes alternative theoretical approaches to teaching and learning (Webb, 1997); but their strength lies in the description of a recognisable reality in accessible and parsimonious terms. It is not clear which alternative frameworks could compete by providing a better, yet simple, conceptual framework to support colleagues' teaching, and so these concepts formed a starting point for our current project, and are shown in Figure 2

**Figure 2: Concepts related to the quality of learning at university**



#### 4 DEVELOPMENT OF A *LEARNING AND STUDYING QUESTIONNAIRE (LSQ)*

Two questionnaires are being developed for the ETL project. The first (LSQ) has been designed to indicate students' general learning orientations and approaches to studying as they embark on the target module, while the second (ETLQ) focuses on the ways students have actually studied that module and on their perceptions of the teaching-learning environment they experienced. In this way, it should be possible to detect any differences in approach (general to specific) and relate these to aspects of the environment. However, the much stronger test will be to see whether any detectable changes are found during the second year, in relation to the specific changes in teaching and learning that are introduced through the collaborative initiatives we are soon to begin.

The first questionnaire consisted of four sections. The first section contained ten items covering learning orientations, defined as "all those attitudes and aims which express the student's individual relationship with a course of study and the university" (Beaty, Gibbs & Morgan, 1997, p. 76). The categories, derived from interviews with students, reflect four main functions of higher education – academic, vocational, personal and social - and two distinctive kinds of interest in the courses being taken – extrinsic and intrinsic. Two additional items cover 'independence' – the idea that higher education will develop self-confidence and the self as a



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person (France & Beaty, 1998) and 'lack of purpose', which represents a negation of the defined orientations. Factor analyses of this group of items for different sub-samples suggested a clear single factor covering all four aspects of intrinsic interest to which 'independence' was also related, but the extrinsic items and 'lack of purpose', although showing some commonality, did not hold together consistently.

The second section contained nine items covering the reasons for taking a particular course unit. These items had been selected to parallel the more general intrinsic and extrinsic learning orientations, and factor analyses confirmed the existence of two groupings, described as extrinsic and intrinsic reasons. The final section was a single item asking students to rate on a nine-point scale how well they had been doing on the course so far, and based where possible on their actual grades obtained.

The third, and longest, section of the questionnaire was a 36-item *Approaches to Learning and Studying Inventory (ALSI)* developed from earlier inventories – the *Approaches to Studying Inventory (ASI)* (Entwistle & Ramsden, 1983), and the *Revised Approaches to Studying Inventory (RASI)* (Tait, Entwistle & McCune, 1998). The continued development of the inventory has already been reported (Entwistle & McCune, in press), culminating in the version designed for the current project. As before, the wording of each item was carefully chosen to make it colloquial, and pilot studies were used to reduce the length of the new inventory to 36 items and to establish the scale structure. (A report of these analyses can be found on the project web site at <http://www.ed.ac.uk/etl>.) The resulting *Approaches to Learning and Studying Inventory (ALSI)* contains five scales. *Deep approach* is defined explicitly by a combination of intention and process, with items covering 'intention to understand', together with the associated thinking processes of 'relating ideas' and 'use of evidence' that parallel Pask's holist and serialist strategies (Pask, 1976). Additional items have been included to cover aspects of constructivist thinking (Phillips, 2000), and these link closely with the earlier items describing 'relating ideas'.

An additional scale – *monitoring studying* – was created by combining items describing 'monitoring understanding', 'monitoring generic skills' and 'monitoring studying'. This scale is empirically related to deep approach, but is conceptually distinct, describing metacognitive aspects of learning and studying. The *surface approach* covers four aspects - 'unreflective studying', 'unthinking acceptance', 'memorising without understanding' (Meyer, 2000), and 'fragmented knowledge' (Meyer, 1991). The third main factor in the *RASI* was described as a 'strategic approach' (Tait, Entwistle & McCune, 1998). Since then successive changes have gradually lost the more obvious strategic elements in this domain and it is now more concerned with organised study and directed effort. The original factor is now covered by two scales, one indicating *organised studying* (including time management), and the other *effort management* (including concentration).

## 5 DESCRIPTIONS OF THE TEACHING-LEARNING ENVIRONMENT

### 5.1 Conceptual basis

The term *teaching-learning environment* was used in the project title to cover a broad range of potential influences on students' learning, both within and beyond particular course units. Our discussions identified an extensive and varied set of concepts that had been used to describe this overarching notion. The resulting concept map is too large to present here, but at the broadest level it described the social, cultural and political contexts within which higher education operates. It then covered institutional and departmental contexts, as well as disciplinary and professional contexts. Narrowing down even further, it indicated aspects of course design and organisation, teaching and assessing course content, staff-student relationships, and of the student cohort on a particular course.

**Figure 3: Conceptual map of the ‘inner’ teaching-learning environment**

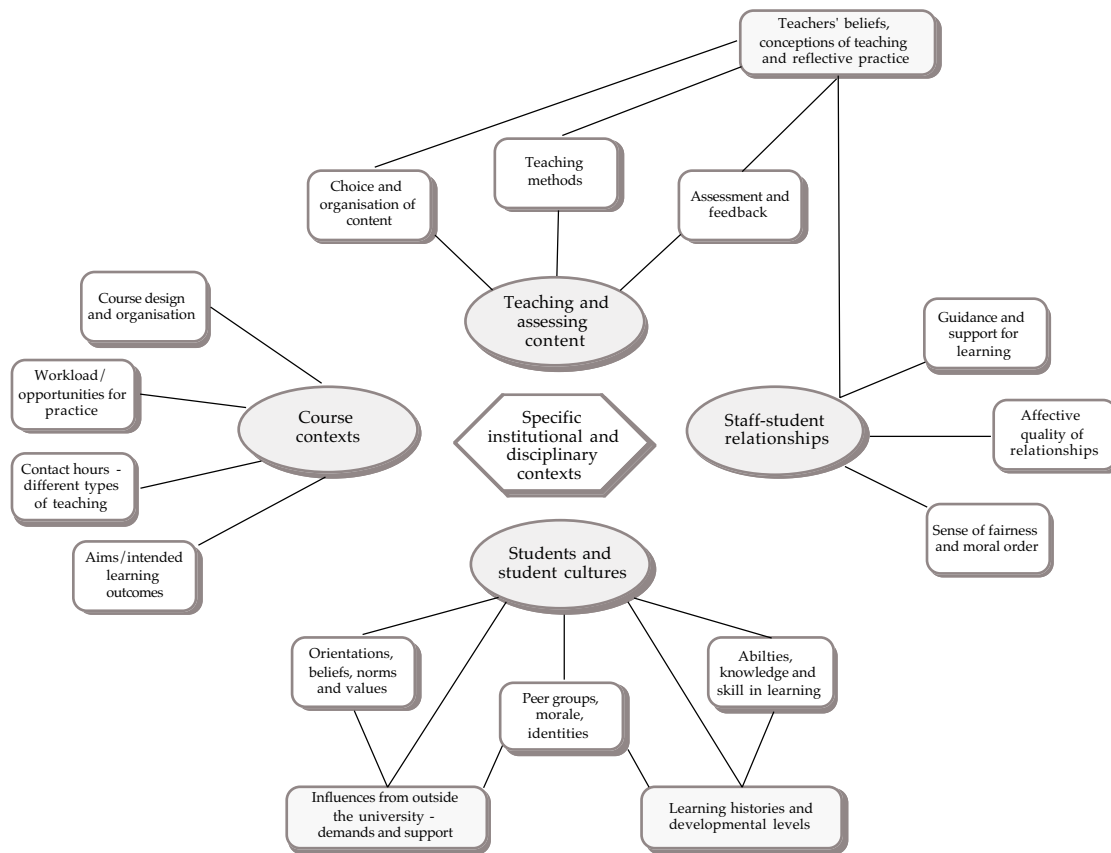


Figure 3 summarises this ‘inner’ set of concepts that are most directly related to the experiences of students, and so are likely to have the most immediate impact on their studying and learning, with the effects of the specific institutional and disciplinary contexts indicated at the centre of the diagram.

These concepts help to fix the meaning of the term ‘teaching-learning environment’ as we are using it, but our project is attempting to find ways of ‘enhancing’ the environments currently provided to students, in ways which encourage greater engagement with the subject matter and higher quality learning. We have thus had to identify not just descriptive concepts, but also the particular aspects of teaching-learning environments that seem most likely to affect student engagement with studying and the quality of learning achieved.

Greater engagement will be indicated, in part, through evidence of a deep, strategic approach to studying being adopted, and so we are interested in establishing from the literature what aspects of a teaching-learning environment at university are most likely to encourage that approach. In the student learning literature, links have been established, for example, between students’ learning orientations and conceptions of learning, and their approaches to studying, and between approaches to studying and grades. Specifically, intrinsic orientations are related to a deep approach, and deep strategic approaches are related to grades, at least where assessment requires the demonstration of conceptual understanding (Entwistle, 2000). As we have seen already, university teachers’ conceptions of teaching are related to their ways of teaching, and those, in turn, are associated with students’ approaches to studying (Trigwell, Prosser and Waterhouse, 1999). Narrowing this down further, we see that a sophisticated,

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integrated conception of teaching with a focus on the conceptual development of the student, leads to teaching and assessment methods that emphasise and support the students' understanding, and so encourage a deep approach to studying (Entwistle & Walker, 2002).

The curriculum frameworks already described provide valuable guidance on course design and implementation. Constructive alignment, for example, indicates the importance of ensuring that all components of the teaching-learning environment work together as a system designed to encourage a deep approach to learning (Biggs, 1999). *Teaching for Understanding* suggests how to develop a curriculum systematically so as help students focus their efforts on developing their understanding (Wiske, 1998). Ideas drawn from cognitive apprenticeship (Collins, Brown and Newman, 1989) suggest additional ways in which teachers can use the environment to foster high quality thinking. And De Corte (1995, 2000) has used this model to develop specially designed learning materials that teachers use in carefully controlled ways to create 'powerful learning environments'. These typically involve:

- provision of authentic, open problems and learning materials presented in a variety of formats and designed to make connections with students previous knowledge and interests;
- teaching methods which arouse interest, activate prior knowledge, clarify meanings, and model appropriate learning strategies and reflective processes;
- specific learning strategies specified in detail, and then removed by degrees to encourage subsequent self-regulation of studying; and
- students monitoring their own strategies and discussing them with other students, to produce a classroom culture that encourages reflection on process.

Although De Corte and his co-workers have worked mainly in school settings, reviews of the literature related to higher education, and derived from several theoretical bases, produced a virtually identical set of suggestions for practice (Vermetten, 1999; Tynjälä, 1997).

Other research has looked at the amount of support that students need, and in particular at the balance between external regulation and self-regulation of studying (Vermunt, 1998). Students coming straight from school expect to be given considerable support by their teachers, but often do not receive it, even in the first year at university. Vermunt and Verloop (1999) suggest that teachers need to create 'constructive friction' by gradually reducing the amount of support they provide, challenging students to develop their own ways of learning for themselves. However, 'destructive friction' may occur if too little support is provided, leaving the students unable to bridge the gap to the type of learning required at university.

Studies by Perry (1970) and Taylor (1986) have also suggested the importance of challenging students' existing ideas or beliefs as a way of provoking development. And Säljö (1982) found that the conceptions of learning of some of the students in his research were changed by their realisation that the learning that was now required of them differed from what they had used previously. Snyder (1971) noted that students' sense of their progress in relation to tasks in higher education can have a powerful effect on their sense of their worth as students, suggesting that challenges must be made sensitively, particularly with inexperienced students.

Gaining access to the discourse of a discipline seems to be a gradual and difficult process. Hounsell (1987) argues that it often requires profound changes in students' thinking and thus cannot just be 'made' to happen. He suggests this process will be best facilitated through dialogue that takes the students' perspective into account in exploring and developing these ideas, arguing that simple information-giving is unlikely to be sufficient. Anderson (1997) found that students only gradually gain access to the practices of a discipline over the course of years of tutorials in which tutors gradually challenge and shape their students' understanding within a supportive climate permeated by a sense of fairness and moral order. The extent to

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which this process could be facilitated by more explicit discussions about the assumptions underlying assessments is not yet clear, but some such process is needed to overcome the difficulties that students have in understanding the feedback they are given.

## 5.2 Development of the *Experiences of Teaching and Learning Questionnaire (ETLQ)*

This review of the literature provided an emerging description of the aspects of a teaching-learning environment most likely to encourage engagement with the subject matter, a deep approach, and high quality learning within the discipline or professional area. The ETL project has since developed a questionnaire to capture, for a specific course unit, students' approaches to studying and their perceptions of the teaching-learning environment. The inventory within this questionnaire was based, in part, on the literature review, but also on an analysis of existing inventories measuring students' perceptions of teaching and of learning environments. The *Experiences of Teaching and Learning Questionnaire (ETLQ)* has five sections. The first contains a short form of the *Approaches to Learning and Studying Inventory* in which the students are asked to describe how they actually had been studying within the target course unit (in contrast with the first questionnaire which asked about their more general approaches to studying). The second section covers the students' perceptions of the teaching and learning they had experienced on the course unit – to be described shortly. The third section asks about the demands that students felt the course unit made in terms of knowledge requirements and learning processes, while the fourth section paralleled those aspects in relation to what they felt they had actually gained from the unit. The final section was again a single item asking students how well they had felt they had done in the course unit they had just been taking.

Table 1 indicates the broad domains within which the items were presented to the students, with the sub-groups of items indicating the conceptual basis of the item selection. Maximum likelihood factor analysis was carried out with rotation to simple structure; five factors presented the clearest pattern matrix and explained 41% of the variance. This analysis largely confirmed the anticipated structure, with some interesting variations, however.

In Table 1, factor loadings above 0.3 are shown, with only one item (20 – web pages) failing to have any sizeable loading. The first factor picked up the items describing the *organisation and structure* of the course, although 'choice' was found to load on the second factor. Factor I also loaded quite strongly on two of the 'teaching' items, those relating to 'handouts' and 'examples', with the conceptual links with course organisation being clear. Factor II describes *encouraging learning* with an emphasis on 'ways of thinking' in the discipline; the link with 'choice' being offered to the students is again understandable.

The third factor picks up most of the items related to *assessment and assignments*, although the strongest loadings in this sample relate to the provision of good feedback on student work. Factor IV brings together all the items relating to staff and students and seems to describe a *supportive climate* within the course unit, although in one sub-group analysis peer support separated out from staff support. The final factor describes *evoking interest*, with weaker loadings relating to a perception of relevance. Altogether, these initial item analyses are very encouraging in suggesting a set of coherent scales describing perceptions of the aspects of the teaching believed to be influential in encouraging a deep approach and high quality learning. The set of items may seem, at first sight, to be similar to those found in the conventional evaluation forms students are asked to fill in. But the crucial difference is that our items focus on particular teaching and learning activities and so suggest strengths and weaknesses in course provision for staff to consider.

**Table 1: Item factor analysis of *Experiences of teaching and learning* ( N = 472)**

	<i>Factor</i>	<i>I</i>	<i>II</i>	<i>III</i>	<i>IV</i>	<i>V</i>
<b>ORGANISATION AND STRUCTURE OF THE COURSE</b>						
<b>Aims and organisation</b>						
1.	It was clear to me what I was supposed to learn in this course unit.	.61				
2.	The topics seemed to follow each other in a way that made sense to me.	.60				
4.	The course unit was well organised and ran smoothly.	.43				
<b>Alignment</b>						
6.	What we were taught seemed to match what we were supposed to learn.	.59				
14.	The different types of teaching (lectures, tutorials, labs, etc.) supported each other well.	.36				
18.	How this unit was taught fitted in well with what we were supposed to learn.	.53				
<b>Choice</b>						
3.	We were given a good deal of choice over how we went about learning.		.32			
5.	We were allowed some choice over what aspects of the subject to concentrate on.		.38			
<b>TEACHING AND LEARNING</b>						
<b>Teaching for understanding</b>						
7.	We were encouraged to look for links between this unit and others.			(.29)		
9.	The handouts and other materials we were given helped me to understand the unit.	.40				
13.	The teaching encouraged me to rethink my understanding of some aspects of the subject.		.42			
15.	Plenty of examples and illustrations were given to help us to grasp things better.	.46				
20.	The web pages provided by staff helped me to understand the topics better.					
<b>Awareness of learning skills and ways of thinking</b>						
10.	On this unit I was prompted to think about how well I was learning and how I might improve.			(.29)		
12.	We weren't just given information; staff explained how knowledge is developed in this subject.	.31	.33			
16.	This unit has given me a sense of what goes on 'behind the scenes' in this subject area.		.51			
17.	The teaching in this unit helped me to think about the evidence underpinning different views.		.67			
28.	Staff helped us to see how you are supposed to think and reach conclusions in this subject.			.33		
<b>Evoking interest and enjoyment</b>						
8.	I can imagine myself working in the subject area covered by this unit.					.61
11.	I could see the relevance of most of what we were taught in this unit.	.33				.35
19.	This unit encouraged me to relate what I learned to issues in the wider world.		.33			.38
22.	I found most of what I learned in this course unit really interesting.					.74
26.	I enjoyed being involved in this course unit.					.75
<b>STUDENTS AND TEACHERS</b>						
<b>Teachers' enthusiasm and responsiveness to students</b>						
23.	Staff tried to share their enthusiasm about the subject with us.				.30	
25.	Staff were patient in explaining things which seemed difficult to grasp.		.30		.35	
27.	Students' views were valued in this course unit		.33		.36	
<b>Climate and relationships</b>						
21.	Students supported each other and tried to give help when it was needed.				.74	
24.	Talking with other students helped me to develop my understanding.				.65	
29.	I found I could generally work comfortably with the other students on this unit.				.61	
30.	This course unit provided plenty of opportunities for me to discuss important ideas.				.37	
<b>ASSESSMENTS AND OTHER SET WORK</b>						
<b>Alignment and clarity</b>						
31.	It was clear to me what was expected in the assessed work for this course unit.	.45		.45		
33.	I could see how the set work fitted in with what we were supposed to learn.	.42		.37		
<b>Focusing on understanding</b>						
34.	You had to really understand the subject to get good marks in this course unit.			(.23)		
36.	Doing the set work helped me to think about how evidence is used in this subject.			.52		
38.	To do well in this course unit, you had to think critically about the topics.			.36		
39.	The set work helped me to make connections to my existing knowledge or experience.			.37		
<b>Supporting learning and awareness of learning skills</b>						
32.	I was encouraged to think about how best to tackle the set work.			.55		
35.	The feedback given on my work helped me to improve my ways of learning and studying.			.67		
37.	Staff gave me the support I needed to help me complete the set work for this course unit.			.58		
40.	The feedback given on my set work helped to clarify things I hadn't fully understood.			.72		



Intercorrelations between factors		I	II	III	IV	V
Factor I	Organisation and structure	-				
Factor II	Encouraging learning	.34	-			
Factor III	Assessments and assignments	.35	.41	-		
Factor IV	Supportive climate	.45	.41	.24	-	
Factor V	Evoking interest	.50	.33	.32	.34	-

## 6 RELATIONSHIPS BETWEEN SCALES

In this early stage of the project, it is only possible to carry out some preliminary analyses to explore relationships between the scales in the two questionnaires, giving only weak indications of any effects of the teaching-learning environments. Complete sets of data from both questionnaires were obtained from 216 students, and Tables 2 and 3 show Spearman correlations obtained from this sample. A set of ten groups of items describing perceptions of the teaching-learning environment were derived from the factor analyses with some additional groupings retained to clarify the relationships obtained.

Table 2 shows correlations between the ten perceptions of environment scales with a sub-set of the other scales. The first two columns refer to the items on learning orientations and reasons for studying the particular course unit and were collected at the beginning of that unit, while the remaining columns were derived from *ETLQ* completed towards the end of the unit. Table 3 compares correlations with approaches to studying which were general (collected through the first question – *LSQ*) and those which were specific to the target unit (from *ETLQ*).

Looking at the columns in Table 2, the most consistent set of substantial correlations relate all but one (peer support) of the perceptions sub-scales to students' ratings on the knowledge the students believed they had achieved, and most of these sub-scales also relate to their ratings of gains in their processes of learning. Otherwise, the strongest patterns show links between deep and surface approaches and the perceptions, with the highest values showing deep approach associated with 'encouraging learning' and 'assessing understanding', and '(lack of) interest evoked' being linked with the surface approach. Monitoring studying is most closely associated with the four environmental scales running from 'encouraging learning' to 'staff support', and

**Table 2: Correlations between perceptions of environment and other variables**

Perceptions of t-l environment	Intrins orient	Intrins reason	Deep apprch	Monitr study	Organ study	Effort manage	Surface apprch	Kn dm light	Prc dm light	Knowl gained	Process gained	Estimat outcom
Organised course	.12	.30	.22	.16	.17	.10	-.31	.28	.12	.38	.23	.18
Alignment	.05	.18	.26	.18	.11	.18	-.38	.33	.08	.35	.24	.19
Teaching integrated	.11	.22	.30	.23	.16	.21	-.35	.30	.16	.41	.32	.22
Choice provided	-.01	.05	.17	.16	.04	.03	-.18	.29	.08	.33	.18	.22
Encouraging learning	.12	.14	.45	.40	.23	.19	-.36	.31	.22	.43	.40	.20
Assessment feedback	.06	.06	.33	.31	.21	.21	-.30	.30	.17	.41	.40	.26
Assess understanding	.19	.17	.45	.33	.24	.25	-.31	.14	.17	.42	.38	.20
Staff support	.15	.06	.34	.36	.23	.19	-.26	.22	.17	.44	.41	.23
Peer support	.14	.08	.22	.27	.12	.17	-.12	.07	.22	.18	.38	.03
Interest evoked	.19	.41	.41	.29	.23	.20	-.42	.31	.17	.48	.33	.30
Self-rating - outcome	.11	.15	.26	.17	.20	.29	-.38	.36	.27	.31	.27	*



a similar, but less strong, pattern is found for organised studying and effort management. Perceptions of the demands of the course being light go with a spread on positive relationships on environmental scales without any being outstanding. There are some consistently statistically significant, although rather low, correlations between both students' estimated learning outcomes and perceived demands of the course unit and most of the perceptions of the environment scales. Intrinsic orientations and reasons for choosing the course show few substantial correlations, although intrinsic 'reasons' do correlate strongly with both 'organised course' and 'interest evoked'. Correlations, at this stage in the project, will tend to be reduced because we are having to combine samples from different subject areas to obtain adequate numbers of students for the analyses. And yet the whole thrust of the study is based on the expectation that there will be rather different relationships across those areas.

Looking at the correlations across the rows, the strongest sets of correlations come from 'integrated teaching', 'encouraging learning', 'assessment feedback', 'assessing understanding' and 'evoking interest', while there is a noticeable lack of substantial correlations relating to 'peer support'. Of course, these correlations tell us nothing about the direction of causality, so we cannot suggest that the levels of deep approach, for example, are attributable to specific aspects of the teaching-learning environment as perceived by the students. They are simply associations.

Table 3 takes advantage of the fact that approaches to studying were measured both generally and specifically, to explore possible differences between the correlations relating to approaches assessed on the two occasions. Looking at differences in correlations of more than 0.05, certain patterns become clear. The students' perceptions of a particular course unit correlate more highly with their scores on the deep (positive) and surface approaches (negative) for the course unit specifically, as compared with their scores on approaches to the subject area in general. Similarly, students' perceptions of the course unit relate more strongly to their self-ratings of attainment for that unit, than to their earlier self ratings of attainment for the subject area in general. This may indicate an effect attributable to the experience of taking the course unit, but that is confounded by the fact that the more highly correlated scales came from a questionnaire completed at the same time. On the other hand, a quite different pattern is seen with 'monitoring studying' where, with the exception of 'staff support', the relationships are closer with the earlier general approach, so the other pattern may indicate a pedagogical effect.

To explore these relationships in another way, change scores were created (by subtracting one approach score from the other) and then correlating these with the perceptions scales. Change

**Table 3: Correlations between perceptions of environment and general and specific approaches to studying**

Perceptions of t-l environment	Deep general	Deep specific	Monitr general	Monitr specific	Organis general	Organis specific	Effort general	Effort specific	Surface general	Surface specific	Outcom general	Outcom specific
Organised course	.13	.22	.21	.16	.11	.17	.15	.10	-.18	-.31	.15	.18
Alignment	.20	.26	.23	.18	.09	.11	.13	.18	-.25	-.38	.21	.19
Teaching integrated	-.24	.30	.31	.23	.16	.16	-.14	.21	-.18	-.35	.20	.22
Choice provided	.15	.17	.20	.16	.01	.04	.02	.03	-.18	-.18	.10	.22
Encouraging learning	.37	.45	.41	.40	.19	.23	.18	.19	-.18	-.36	.08	.20
Assessment feedback	.26	.33	.32	.31	.23	.21	.20	.21	-.25	-.30	.20	.26
Assess understanding	.33	.45	.40	.33	.28	.24	.23	.25	-.25	-.31	.16	.20
Staff support	.22	.34	.30	.36	.22	.23	.25	.19	-.24	-.26	.14	.23
Peer support	.15	.22	.24	.27	.11	.12	.16	.17	-.02	-.12	.05	.03
Interest evoked	.32	.41	.32	.29	.21	.23	.20	.20	-.26	-.42	.13	.30

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scores conflate the unreliability in the individual raw scores, and thus tend to lower correlations; it was not surprising therefore that rather few statistically significant relationships were obtained. The main exception was that decreases in the surface approach are associated with positive ratings on the perceptions of environment scales, with the exception of staff and peer support. There are also significant associations between increases in deep approach and assessment requiring understanding, staff support and evoked interest.

The final analysis with this initial set of combined data from the two questionnaires was a factor analysis of a selected set of the scales with most loadings below 0.25 omitted (the two retained describe relationships with self-ratings on attainment). As the scales covering perceptions of the environment all showed substantial positive inter-correlations, they inevitably produce a strong single factor which swamps other, weaker connections with other scales. We therefore reduced the ten scales used in the previous analysis to six by combining course organisation with alignment and integration, feedback with assessment of understanding, and encouraging learning with student choice. The other three scales were retained in their original form to produce six environment measures in all. Table 4 reports the pattern matrix for the three-factor solution of a maximum likelihood analysis rotated to simple structure, being the most readily interpretable solution, although only accounting for 37% of the variance.

Factor I describes a set of positive perceptions of the teaching-learning environment, together with a rating of the unit as having relatively light demands for knowledge, combined with strong perceived gains in both knowledge and learning processes. It is also associated, though weakly, with self-rating of attainment on the unit, and with a deep approach accompanied by monitoring studying and a low level of surface approach. The second factor has its major loadings on the most positive aspects of studying, with weaker positive loadings on intrinsic orientation, knowledge and study process gains, and attainment, together with negative loadings on both surface approach and a lack of purpose. The final factor shows low self-ratings of attainment associated with a perception of heavy knowledge demands by the unit, combined with extrinsic reasons for choosing the unit and a surface approach to studying.

Although this analysis is based on a relatively small and still somewhat unrepresentative sample, the findings are promising, suggesting that the questionnaires are working effectively. We can thus have some confidence that we shall be able to detect any changes in approaches to studying and attainment attributable to the future collaborative initiatives designed to enhance the teaching-learning environments in our selected course units.

## 7 DISCUSSION AND CONCLUSION

In a continuing programme of research in Leuven, Janssen (1996) has explored ways of describing the different ways of studying adopted by students. A parsimonious and theoretically justifiable framework has been developed to reflect the main components of effective learning and studying by students, and the range of study behaviours it describes overlaps considerably with what is now included within our *LSQ*. As a result of extensive work with lecturers (De Neve, 1991), it was also possible to create an equivalent framework describing teaching behaviours, that are perceived by both students and staff as supporting high quality learning. This work has demonstrated the importance of thinking about teaching in relation to the specific kinds of learning staff wish to encourage, and Janssen's ideas informed our thinking in considering those components of a supportive teaching-learning environment related to teaching.

It proved difficult, however, to bring together ideas within that specific theoretical perspective and relate them directly to the conceptual frameworks used in our own study. Ongoing research by Vermetten, Vermunt and Lodewijks (2002) is closer to our own approach. They

**Table 4: Factor loadings from a factor analysis of selected scales**

Scales	Factor I	Factor II	Factor III
Intrinsic orientation		.29	
Negative orientation – lack of purpose		-.34	
Intrinsic reasons for choosing course unit			
Extrinsic reasons for choosing course unit			.26
Deep approach to studying the specific course unit	.29	.51	
Surface approach to studying that course unit	-.29	-.33	.33
Monitoring studying during that unit	.26	.55	
Organised studying for that unit		.65	
Effort management for that unit		.80	
Unit seen as organised, aligned and integrated	.78		
Unit seen as encouraging learning and providing choice	.83		
Unit assessing understanding with good feedback	.74		
Unit providing good staff support	.70		
Unit encouraging good peer support	.26		
Unit evoking interest	.73		
Unit perceived as having light knowledge demands	.41		-.29
Unit having light demands for learning processes		.25	
Perceived knowledge gains from unit	.60		
Perceived gains in learning process gains from unit	.40	.30	
Self-rating of attainment prior to taking the unit		.31	-.64
Self-rating of attainment on the unit	(.21)	(.22)	-.51

Loadings less than /0.25/ have been omitted except for those relating to attainment)

Inter-correlation between factors		I	II	III
I	Positive perceptions of the unit-	-		
II	Positive aspects of studying	.41	-	
III	Low self-ratings on attainment	-.16	-.05	-

have been investigating the effects of introducing *student-oriented education* in several degree courses in Tilburg University in The Netherlands, comparing the inventory responses of students who had experienced the innovation with students who had not. In their first study, they found rather weak evidence of differences, but it did suggest that authentic materials worked on in groups would be an important element of a 'powerful learning environment'. The effect was, however, detectable only where this approach formed a prominent part of the curriculum. The weak effects otherwise found were attributed to the different ways in which the notion of student-oriented education had been implemented by staff, but also to the possibility, noted in the literature, that there would be marked individual differences in the

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ways in which students responded to any teaching-learning environment. In their second study, such individual differences were indeed found, with students appreciating

aspects of the environment which suited their own way of learning. For example, deep and highly self-regulated learners indicated that they do not need detailed manuals, whereas surface/undirected learners would like to have them more often... (The former group) are inclined to apply their own methods, and find their own answers, and use instructional measures merely as a check... This study makes it clear that direct influence of instructional measures does not take place, which may explain the ... generally ... unsatisfactory impact of educational reforms on the learning processes of students. It seems that students prefer, and act as if there is 'congruence' between the learning environment and their own learning habits. However, (constructive) 'friction' between teaching and learning is often necessary to make students change and to develop their learning strategies (Vermunt & Verloop, 1999). (p. 281).

There has not yet been an opportunity to carry out equivalent analyses of our data, and indeed it will probably be better to wait until later in the project to do so. It is an aspect which will become important as we seek to interpret any possible effects of teaching-learning environments on students' approaches to studying (or lack of such general effects). However, insights derived from our current study and other recent work are already leading us to re-conceptualise our own view of the influences of teaching-learning environments on student learning. Specifically, we are becoming more and more aware of the difficulty, through any single conceptual framework, of adequately representing the complexity and the social dynamics of the inter-relationships that exist in everyday teaching and learning.

We have also become more concerned about the match between research findings and everyday reality in the descriptions in the research literature of both approaches to studying and the teaching-learning environment. In an earlier paper, we reflected on the contrast between ways of describing approaches to studying and attempts at understanding the individual circumstances affecting the likelihood of a student changing a well-established approach (Entwistle, McCune & Walker, 2001). The concepts and categories used to describe general differences in studying provide a valuable analytic framework for considering the ways individuals study, but also tend to disguise the complexity of the everyday situation. In the current study, a similar pattern is beginning to emerge in describing the context within which studying takes place. We have outlined a conceptual framework and indicative research findings that suggest how various aspects of a teaching-learning environment may affect student engagement with the course, a deep approach, and high quality learning outcomes. But the notion of constructive alignment reminds us that any such environment is a complex composite of many interacting influences that need to be aligned towards supporting deep active learning, if there is to be any overall effect.

The conceptual map describing the 'inner' teaching-learning environment enabled us to identify the areas which needed to be covered in the inventory, with the prospect of using feedback of students' responses, together with our interview data, as starting points for developing a collaborative initiative. But at that stage we are being brought face to face with the 'messy reality' from which the analytic frameworks have been abstracted, and fail to capture adequately. Besides all the complexity created by marked differences across subject areas and myriad individual differences among both staff and students which prevent any simple patterns emerging, there are additional crucial differences between the idealised world described by research and the actual world experienced by the participants. University staff are, for example, currently working under considerable pressure from several directions. They are also trying to cope with increasing numbers of students with severe resource constraints created by a continuing diminution in the funds made available for teaching. In these circumstances, many of the approaches to teaching, that the literature suggests as being desirable, may not be achievable in practice. Moreover, all such changes are constrained by the

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general university regulations and procedures, as well as past departmental practice, and these may inhibit any rapid or radical change in approaches to teaching and learning approaches. The process of negotiating the collaborative initiatives will bring all these issues into the foreground of our research and will encourage us to find ways of presenting findings that relate more closely to the reality experienced by colleagues.

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