

Promoting High-Quality Learning: Perspectives from the ETL Project

Paper presented at the Norwegian Network in Higher Education 14th Conference on University and College Pedagogy, Fredrikstad, Norway, 22nd and 23rd October 2003.

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Abstract

This presentation will consider the implications of findings from a UK-wide research project, for understanding how high-quality learning may be encouraged in higher education. The aim of the Enhancing Teaching-Learning Environments (ETL) project is to develop conceptual frameworks and analytic tools to guide the development of teaching-learning environments. Some of these outputs will be tailored to specific subject areas, whereas other will have broader applicability. The project is funded by the Economic and Social Research Council as part of the UK-wide Teaching and Learning Research Programme (TLRP). The programme as a whole is intended to strengthen the research base informing the quality of teaching and learning in the UK.

The ETL project began in January 2001 and is due to finish in March 2005. The ETL team are working collaboratively with 13 partner departments in four contrasting subject areas: biosciences, economics, electronic engineering and history¹. The departments have been chosen to provide good coverage of academic disciplines and professional areas and a variety of traditional and innovative teaching-learning environments. The ETL researchers have been helping course teams to enhance their understanding of their students' perceptions of one or two course units, or modules, in each partner department (giving a total of 27 course units). On the basis of initial findings in each setting, as well as existing conceptual frameworks, the ETL team and their partners have been identifying ways in which high-quality learning might be further encouraged in a given course unit. The project also involves evaluation of the impact of any changes agreed.

Considerable progress has already been made in our work with departmental partners and in developing and refining relevant conceptual frameworks. The qualitative data which we have collected, via interviews with staff and students, has allowed rich insights into the contexts under study. Two questionnaires have also been developed; these are available on our web site at: <http://www.ed.ac.uk/etl/>. Our analyses to date suggest that the questionnaires also provide useful perspectives on students' learning and on their perceptions of their teaching-learning environments, particularly when used in conjunction with the qualitative data. In addition to the emerging frameworks and tools, the experience of working with such a wide range of departments has provided valuable insights into the complexities of promoting high-quality learning in pressured and evolving Higher education contexts.

¹ At the outset a fifth subject area, media and communications, was involved but our work in this area had to be curtailed due to staffing changes.

Introduction

This paper provides an overview of some findings to date from the Enhancing Teaching-Learning Environments in Undergraduate Courses (ETL) project. It focuses particularly on what can be learned from the ongoing work of the project to inform efforts to encourage high-quality learning in higher education. The project, which started in January 2001, is seeking to develop subject-specific and generic conceptual frameworks to guide the development of teaching-learning environments in higher education. As the project is not due to finish until March 2005, it is only possible at this stage to present initial insights and developing themes from our analyses. Nonetheless, some of these emerging findings have the potential to usefully illuminate the complexities of teaching-learning environments in higher education and their impact on students' learning.

The ETL project is based on a partnership model, whereby members of the project team work collaboratively with the course teams on individual course units² in four subject areas: biosciences, economics, electronic engineering and history. In the first year of our work with a particular setting, our efforts are focused on understanding the course unit as teaching-learning environment and the ways in which the students on the unit both form part of that environment and are influenced by it. In the subsequent year, we work with the course team to negotiate a 'collaborative initiative'. That is some, possibly modest, change to the unit which is intended to further enhance the students' learning and which is rooted in the data collected and informed by our developing conceptual frameworks. The impact of this change is then evaluated. To describe the ongoing work of the project it is therefore important to present our emerging conceptual frameworks in relation to high-quality learning and teaching-learning environments. A brief overview of the literature currently informing these conceptual frameworks is presented here.

High-Quality Learning, Ways of Thinking and Practising, Threshold Concepts

One of the central aims of the ETL project is to further develop the conceptual frameworks available in the literature to describe high-quality learning in higher education. This is not to suggest that it would be possible to provide any single conceptualisation which would fully capture the rich diversity of students' learning and their learning outcomes. The intention is rather to provide a range of frameworks, findings and perspectives which will be useful to researchers and practitioners in their efforts to understand and enhance teaching-learning environments. While the work of the project will contribute to existing generic conceptualisations of high-quality learning, it is particularly focused on providing subject-specific frameworks. This latter task is one that has been less often addressed in the literature.

An important starting point for our perspectives on high-quality learning has been the literature on approaches to learning and studying, which was introduced in Pettersen's earlier keynote address at this conference. The conceptualisation of approaches to learning and studying currently in use within the ETL project is summarised in Table 1. It draws on an extensive body of both quantitative and qualitative research focused on understanding learning from the perspective of the student (Biggs, 1987, 2003; Entwistle, 1997, 1998, 2000; Entwistle and McCune, under review; Entwistle and Ramsden, 1983; Marton and Säljö, 1976, 1997; Prosser and Trigwell, 1999; Tait, Entwistle and McCune, 1998). The approaches describe qualitatively different ways of learning and studying adopted by students, partly in response to their perceptions of the teaching-learning environments in which they are immersed (Biggs, 2003; Entwistle, 2000; Prosser and Trigwell, 1999; Ramsden, 1997). The deep approach, enacted in an organised, effortful and reflective manner provides one possible proxy for high-quality learning in higher education.

In addition to the impact of the teaching-learning environment, which is discussed later in this paper, the literature suggests a number of other influences on students' approaches to learning and studying. The approaches, as described in Table 1, encompass some aspects of students' efforts to monitor and to regulate their own learning. There is a wider literature which considers this metacognitive, or self-regulatory, activity in more detail and which indicates how it can impact on students' approaches to learning (Boekaerts, Pintrich and Zeidner, 2000; McKeachie, 1990; Pintrich and Garcia, 1991, 1993; Vermunt, 1996, 1998).

² Within the ETL project we have used the term 'course unit' to refer to the individual modules or courses which make up a degree programme. These course units typically run for 10 to 15 weeks and a student usually takes several units at the same time.

Table 1 Aspects of approaches to learning and studying*(Based partly on Entwistle, 1997 p 19)*

Deep approach The intention to understand ideas for yourself Making links between topics Relating what is learned to the wider world Looking for patterns and underlying principles Checking evidence and relating it to conclusions Examining logic and argument cautiously and critically Becoming actively interested in the course content	Monitoring studying Keeping your studies well focused Monitoring understanding and addressing any problems Monitoring and developing generic skills Monitoring and enhancing the quality of work produced
Surface approach The intention to cope minimally with course requirements Studying without reflecting on purpose or strategy Treating the course as unrelated bits of knowledge Memorising without understanding Accepting ideas without questioning them	Organisation and effort in studying Organising your studies Managing time and effort effectively Maintaining concentration

The ways in which students reflect on and regulate their own learning are likely to be influenced in turn by their beliefs, both about learning in general and about the nature of the academic tasks in which they are engaged. The literature indicates the diversity of students' conceptions of learning and of specific tasks – such as essay writing – and suggests that these conceptions may influence both students' approaches to learning and their perceptions of the teaching-learning environment (Campbell, Smith and Brooker, 1998; Hounsell, 1987, 1988, 1997; Norton, 1990; Marton, Dall'Alba and Beaty, 1993; Perry, 1970, 1988; Prosser and Webb, 1994; van Rossum and Schenck, 1984; Säljö, 1982). There is also evidence of relationships between students' broad aims and goals and their approaches to learning, which may come about partly through students' efforts to regulate their own learning to meet their goals (Beaty, Gibbs and Morgan, 1997; Morgan, 1993; Taylor, Gibbs and Morgan, 1980; Vermunt, 1996, 1998).

The literature described thus far begins to give a sense of the complex reciprocal web of influences that may impact on students' learning. These aspects of students' learning all seem to relate directly or indirectly to learning outcomes in higher education (Campbell, Smith and Brooker, 1998; Entwistle and Tait, 1990; Marton and Säljö, 1997; Pintrich et al., 1991, 1993; Prosser and Webb, 1994; Tait, Entwistle and McCune, 1998; Trigwell and Prosser, 1991; van Rossum and Schenck, 1984; Vermunt, 1996, 1998). This literature does tend, however, to depend on clear analytic categories which, while useful, cannot fully represent the rich idiosyncratic diversity of individual students' experiences of learning (Entwistle, McCune and Walker, 2001; McCune, 2000). The literature on the interplay between students' identities and their learning perhaps does more justice to the experiences of individual learners. This research signals the importance of students' sense of who they are – and of their sense of belonging, or not, to particular academic communities – in shaping their learning in higher education (Archer and Leathwood, 2003; Bamber and Tett, 2000; Baxter-Magolda, 1999; Ivanic, 1998; Snyder, 1971; Tett, 2000). This literature also places more emphasis on the importance of emotion in learning.

The academic communities with which students are engaging will each to some extent possess their own norms, values, discourses and practices (Anderson, 1997; Ballard and Clanchy, 1988; Becher, 1994; Hounsell, 1988; Lave and Wenger, 1999; Ramsden, 1997). This literature about disciplinary differences suggested the need to expand our conceptualisation of high-quality learning in a way that would more easily accommodate what students' might learn through their studies within particular subject areas. Our initial analyses of interviews with staff in the earlier stages of the project (see for example, Hounsell and McCune, 2002) also suggested the need for a broader perspective. The team therefore adopted the phrase *ways of thinking and practising in a subject area (WTP)* to describe the richness, depth and breadth of what students might learn through engagement with a given subject area in a specific context. This might include anything that was explicitly taught to, or tacitly absorbed by, students as they approached graduate-level mastery of a subject area. It could encompass aspects of approaches to learning and studying. For example,

an understanding of what would be required to take a deep approach to a particular topic in a given setting might be seen as part of *WTP*.

To give a full account of the *WTP* in a given subject area would, of course, be beyond the scope of any single research project. Our use of *WTP* within the ETL project is considerably more narrow. We are building on this emerging conceptualisation simply as one way of describing high-quality learning as understood by staff and students in relation to particular course settings. Towards the end of the project we will be better placed to carry out some more general analyses of common themes within and between subject areas.

In some of our research settings, a closer focus on very specific aspects of *WTP* has been taken in order to provide a different perspective on high-quality learning. Members of the team have been making use of the idea of *threshold concepts*, introduced to the project by Meyer. *Threshold concepts* are key learning outcomes which, when understood, result in students 'seeing things in a new way' (Meyer and Land, 2002, 2003). Whichever level of analysis is chosen, one important purpose of this focus on high-quality learning is to provide points of reference for our analyses of teaching-learning environments. The next section of this paper provides an overview of some of the literature which informs our understanding of these environments.

Teaching-Learning Environments and Constructive Alignment

There is now a fairly extensive literature which considers the impact of students' perceptions of the teaching-learning environment on the ways in which they learn (Biggs, 2003; Entwistle, 1998; Prosser and Trigwell, 1999; Richardson, 2000). In the ETL project, our analysis is focused on particular course units or modules. Figure 1 presents an overview model of the aspects of the teaching-learning environment of a course unit which may be relevant to understanding its impact on students' learning (Entwistle, McCune and Hounsell, 2002; Entwistle, 2003a). One key theme in this literature is the importance of assessment and feedback practices as drivers of student learning (Entwistle, 1998; Entwistle and Ramsden, 1983; Hounsell, 1987, 1988, 1997; McCune, in press; Scouller, 1998; Thomas and Bain, 1984; Wilson, Lizzio and Ramsden, 1997). Hounsell (in press) documents current concerns that the provision of feedback on assessed work may be in decline in the UK context, just as increasing evidence is emerging of the value of constructive feedback for learning across all levels of education.

The ways in which students are taught, the guidance they are given about learning, and the quality of the relationships between staff and students, are all important concerns when it comes to understanding students' learning in a particular setting (Anderson, 1997; Entwistle, 1998; Ramsden, 1997; Trigwell, Prosser and Waterhouse, 1999; Wilson, Lizzio and Ramsden, 1997). For example, there is evidence that enthusiastic and empathic teaching, with good explanations, can have a beneficial effect on students' approaches to learning and studying. The literature also suggests that, when appropriate guidance about learning and studying is given in relation to a students' work in a discipline, this can have a positive effect on the quality of their learning (McCrindle and Christensen, 1995; Vermunt, 1995; Volet, McGill and Pears, 1995; Weinstein, Husman and Dierking, 2000). Giving students some freedom to choose what they learn and how they go about their learning has been related to students adopting a deep approach (Entwistle, 1998; Ramsden, 1997; Wilson, Lizzio and Ramsden, 1997) but students' ability to cope with this freedom is likely to depend on how adept they are at organising their own learning (Vermunt, 1996). Appropriate workload also seems important in encouraging students to take a deep approach (Entwistle and Ramsden, 1983; Wilson, Lizzio and Ramsden, 1997).

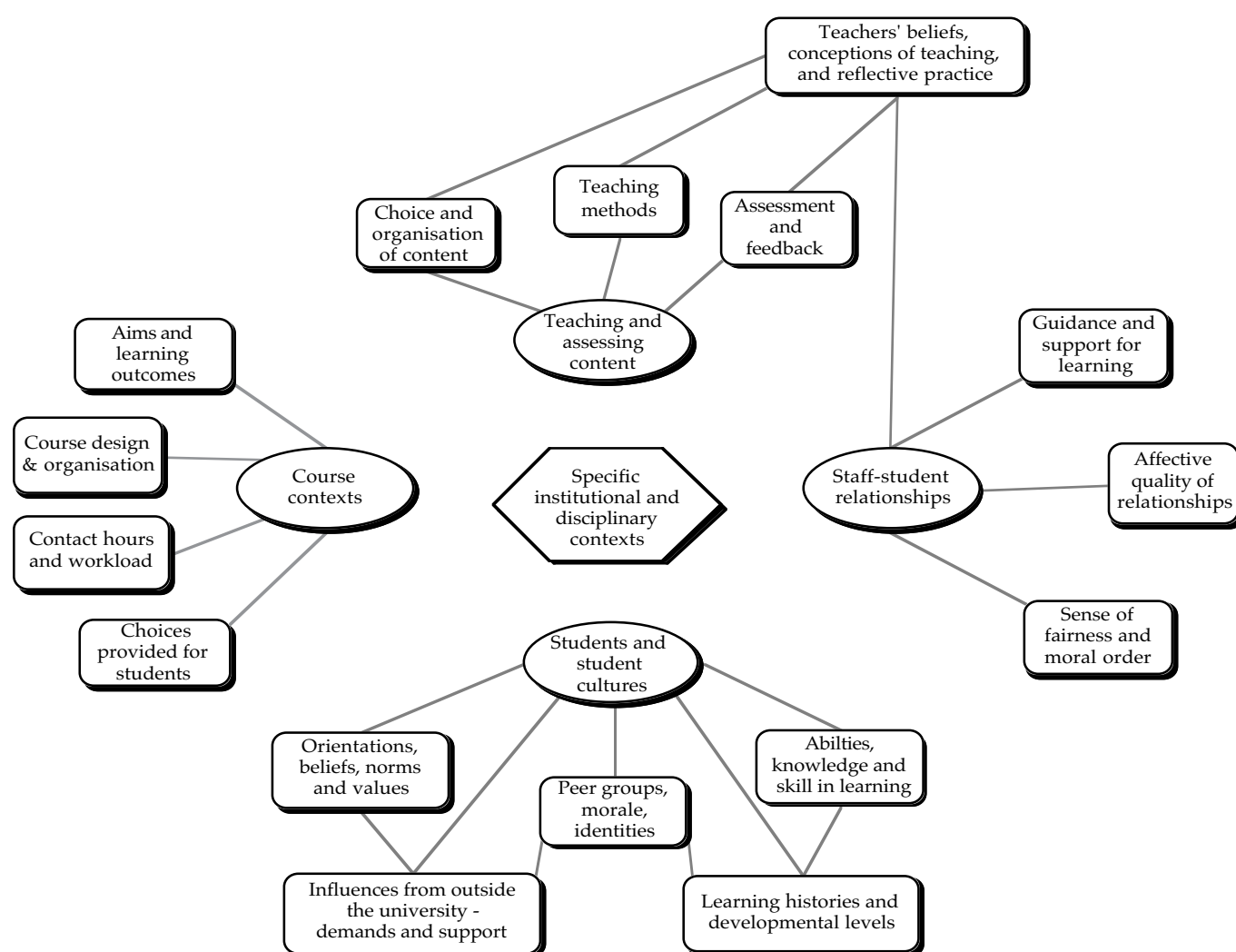
It is important to bear in mind, in considering the model presented in Figure 1, that the influence of the teaching-learning environment on students' learning is mediated through each individual student's perspective on that environment. Further, the students themselves form an important part of the environment of a course unit (Day and Anderson, 2003). For example, students who differ in their beliefs about learning and knowledge, their preferred approaches to learning, or their background knowledge of the subject area, may perceive the same context in quite different ways (Crawford *et al.*, 1998; Entwistle and Tait, 1990; Perry, 1970, 1988; Säljö, 1982). Students' identities, and the communities to which they belong outside of higher education, may also fundamentally affect their perceptions of Higher education contexts (Archer and Leathwood, 2003; Bamber and Tett, 2000; Tett, 2000; Baxter-Magolda, 1999).

The model presented in Figure 1, while simplified, nonetheless gives a sense of the diverse range of influences which may impact on students' learning in a particular context. In thinking about the interplay between

these different influences, we have been making use of Biggs (1996) notion of *constructive alignment*. Biggs has drawn together the literature on instructional design with constructivist perspectives on learning to suggest that:

Learning is constructed as a result of the learner's activities. Activities that are appropriate to achieving the curriculum objectives result in a deep approach to learning. Good teaching supports those appropriate activities, thereby encouraging students to adopt a deep approach. Poor teaching and assessment result in a surface approach, where students use inappropriate and low-order learning activities. A good teaching system aligns teaching method and assessment to the learning activities stated in the objectives, so that all aspects of this system act in accord to support appropriate learning. This system is called constructive alignment, based as it is on the twin principles of constructivism in learning and alignment in teaching. Biggs (2003) p. 11

Figure 1 Overview model of the teaching-learning environment of a course unit



For the purposes of the ETL project, *constructive alignment* has been interpreted rather more broadly than is indicated by the short extract given above, both in terms of the range of aspects of the teaching-learning environment which have been considered and in relation to our emerging conceptualisations of high-quality learning, which extend beyond the deep approach. The general principle has been to investigate the extent to which all of the different aspects of the environment of a course unit work in harmony to encourage the forms of high-quality learning sought by staff and students. It has been important to be aware that there is likely to be a range of different ways in which a high degree of *constructive alignment* might be achieved in a given setting.

Another key point is that certain aspects of the environment will be outside the control of the staff running a particular unit. So what has been of interest is to explore what might be achieved within a particular set of constraints. Each course unit is embedded within a wider context, which cannot be ignored when considering the extent to which the environment is aligned. Our research settings have been chosen from a range of different kinds of institutions and the constraints and affordances of these institutional contexts must be taken into account. These institutions also sit within the particular cultural and political context of higher education in the United Kingdom, which again influences what might be possible within a particular setting.

Of particular concern in the ETL project, are the disciplinary contexts of our course settings. Much of the literature discussed in this introduction is concerned with the impact of teaching-learning environments on students' general approaches to learning and studying. Given our aim of generating discipline specific frameworks and findings, it has been important to investigate how students' perceptions of their course contexts might affect the development of their *ways of thinking and practising* in particular subject areas. Here the literature suggests attention to the ways in which students may learn much about disciplinary cultures in a tacit manner, alongside more explicit teaching (Anderson, 1997; Becher and Trowler, 2001; Hounsell, 1988; Lave and Wenger, 1999; Sambell and McDowell, 1998). The research findings relating to students' diverse conceptions of academic tasks, mentioned earlier, signal the difficulties that students may experience in coming to understand the tacit expectations of particular communities (Campbell, Smith and Brooker, 1998; Crawford et. al., 1998; Hounsell, 1987, 1988, 1997; Norton, 1990; Prosser and Webb, 1994).

Against this background, the next section of this paper provides an overview of the research design, methodology and analyses which are being employed within the ETL project. This is followed by an account of some initial results and emerging themes from the data collection and analysis to date. Findings are presented at three levels. Firstly, some broad overview analyses of inventory data relating to students' perceptions of their course units and approaches to learning and studying are presented. This is followed by an outline of some initial themes beginning to emerge from the qualitative data being collected. The third section of the findings comprises brief case studies from three final-year course units in the biosciences, which combine qualitative and quantitative approaches. The final section of the paper considers possible implications arising from the continuing work of the project.

Research Design, Methodology and Analysis

Figure 2 presents an overview of the research design for the ETL project. The project has been divided into three Phases. Phase I involved pilot studies, literature reviews and consultation intended to support the main data collection for the project, which would occur in Phase II. Phase II began in January 2002 and data collection is scheduled to continue until June 2004. The third Phase of the project is focused particularly on dissemination and the wider impact of the findings from the project, this Phase is yet to begin. Each Phase is discussed in more detail below.

Figure 2 Overview of the research design

PHASE I				
Conceptual Development Development and refinement of frameworks for conceptualising teaching-learning environments and the enhancement of high-quality learning.	Literature Reviews Review of the research literature on high-quality learning and teaching-learning environments, including subject-specific literature.	TQA Analysis Analysis of a sample of quality reports on departments awarded high ratings.	Instrument Development Development of data collection instruments including interview schedules and two questionnaires: • <i>LSQ</i> • <i>ETLQ</i>	External Inputs Advice and support from: <ul style="list-style-type: none">• two international consultants• subject advisers from each subject area• departmental partners• user partners
		Follow-up Interviews Telephone interviews with staff in a sample of the departments in the TQA analysis.		
	PHASE II			
Data Collection and Analysis <i>A.baseline data</i> Data gathering in course units in each subject area: biology, economics, engineering, history [and initially in media and communications]. Analysis of data and reports to course teams.				
Data Collection and Analysis <i>B.collaborative initiative</i> Agreement and development of collaborative initiatives to enhance the teaching-learning environment in some course units. Analysis of data and reports to course teams.				
PHASE III				
Outputs and Dissemination Adapting frameworks, findings and tools for use by staff across higher education. Integrated dissemination strategy.				

Phase I

Phase I of the project comprised several inter-related strands of pilot work carried out in order to inform the later stages of the research. An important aim of this Phase was to build up a greater understanding of teaching and learning in the five subject areas under study, to supplement insights derived from the student learning literature more generally. The work began with an analysis of reports on departments produced by assessors as part of quality assessment processes in the UK. The reports from thirty-seven departments, which had received high quality ratings, were analysed to identify salient themes. In selecting reports to include in the analysis, care was taken to create a sample which was broadly representative of the range of institutions currently offering undergraduate courses in the subject areas in focus in the project.

Telephone interviews were then carried out with members of staff from twenty of the departments for which the quality reports had been analysed. These interviews were analysed to identify themes which might be particularly relevant to understanding teaching-learning environments in the five subject areas. In addition to our two international consultants for the project, Professors John Biggs and David Perkins, an advisor was appointed for each of the subject areas under study. These subject advisors are senior academic staff with considerable experience and expertise as regards teaching and learning in their subject area. Our discussions with these advisors and reviews of subject-specific literatures on teaching and learning contributed to the picture emerging from Phase I. More details of some aspects of the Phase I findings are available on the ETL web site.

This first Phase of the project also involved the development of two inventories which were required for Phase II – the *Learning and Studying Questionnaire (LSQ)* and the *Experiences of Teaching and Learning Questionnaire (ETLQ)*. Both questionnaires and their scoring keys can be downloaded from the ETL web site. The first section of the *LSQ* is designed to investigate students' broad aims and goals for higher education, using a set of items based on research into students' learning orientations, carried out by Beaty and her colleagues (see, for example, Beaty, Gibbs and Morgan, 1997). This is followed by a section containing items which focus more specifically on students' reasons for taking a particular course unit. The third section of the *LSQ* asks students to respond to items which assess their typical approaches to learning and studying in their subject area across five subscales – *deep approach*, *surface approach*, *monitoring studying*, *organised studying* and *effort management*. This section of the *LSQ* is the most recent version of a series of inventories which include the *Approaches to Studying Inventory (ASI)* (Entwistle and Ramsden, 1983) and the *Approaches and Study Strategies Inventory for Students (ASSIST)* (Tait, Entwistle and McCune, 1998). The final item of the *LSQ* asks students to rate their progress to date in the subject area in focus.

Some of the sections of the *ETLQ* echo sections of the *LSQ*, but throughout the *ETLQ* the students are asked to respond in relation to a particular course unit, rather than for their studies more generally. So the students are asked to describe both their approaches to learning and studying for a particular course unit and to rate their own progress on that unit. The *ETLQ* also contains subscales which ask students about their perceptions of the demands made on them by the course unit in question, which are paralleled by subscales relating to what the students feel they have learned from that unit. The main body of the *ETLQ* is a set of subscales designed to assess students' perceptions of aspects of the teaching-learning environment of a course unit which the literature suggests would be likely to influence their approaches to learning and which are potentially amenable to investigation via inventory methodology. These subscales are set out later in this paper when the preliminary findings from Phase II are discussed. Further details of the development of the *ETLQ* are given by Entwistle, McCune and Hounsell (2002, 2003).

Phase II

The second phase of the project, which is currently in progress, involves working in partnership with course teams to first investigate and then attempt to enhance the teaching-learning environment of particular course units. The course units chosen for involvement in Phase II are for the most part different from those studied in Phase I. An overview of the course units involved in Phase II is given in Table 2. The typical pattern, within each of the four subject areas, has been to aim to work across a range of types of institution and within each institution to work with at least one course unit in the early years of the undergraduate degree programme and at least one course unit in the later years¹. In selecting the course units, attempts were also made to include a variety of different types of teaching-learning environment and to identify course teams who were willing to engage actively with the process of research and development.

In the first academic year in which the ETL team work with a particular course unit, the focus is on building up a rich picture of the different aspects of high-quality learning sought in that setting and of the extent to which the teaching-learning environment of the unit supports the desired learning. Qualitative and quantitative data are brought together in building up this initial analysis. Typically the *LSQ* is given to the students near the beginning of the course unit, to provide baseline data about the students' aims and goals and their habitual approaches to learning in that subject area. The *ETLQ* is then given near the end of the course unit, to provide data about the ways in which students claim to have approached their learning for that particular unit as well as their reported perceptions of the unit as a teaching-learning environment. The

¹ In the UK an undergraduate degree generally takes three or four years to complete.

qualitative data generally comprises focus group interviews with a proportion of the students as well as individual interviews with members of staff. Other methods of data collection - such as individual interviews with students and field notes - are employed if this seems appropriate in a given setting. Course documentation and teaching materials are also collected to supplement the analysis.

Table 2 Overview of course units involved in Phase II

Subject Area	N of Institutions	N Course Units 1 st and 2 nd yr of degree prog.	N Course Units 3 rd and 4 th yr of degree prog.	Total N Course Units
Biosciences	3	3	3	6
Economics	3	4	3	7
Elec. Engineering	4	4	4	8
History	3	3	3	6
				27

Once this initial round of data collection with a course unit is complete, an interim report of the findings is provided to the course team. The course team then have an opportunity to comment on the accuracy of the report and to provide additional information. In some of the settings the ETL team and the course team then proceed to negotiate a 'collaborative initiative'. The collaborative initiative is some, possibly modest, change to the course unit which is intended to further improve the extent to which high-quality learning is achieved by the students. The design of the initiatives typically draws on both the data collected and on conceptual frameworks from the literature, such as *constructive alignment*. Where an initiative has been negotiated, there is another round of data collection in the subsequent academic year, to evaluate the success of the changes. This data collection is similar to that done in the previous year, but is tailored to focus more closely on the aspects of the course unit which have been revised. At present collaborative initiatives have been begun or completed in some settings, whereas in other course units they are yet to be negotiated.

Phase III

The third and final Phase of the ETL project will focus, firstly, on adapting and reporting the tools, findings and conceptual frameworks developed during the project in ways which will make them accessible for independent use by a wider range of staff across higher education. This Phase will also be concerned with taking forward an integrated dissemination strategy which will take into consideration possible barriers to change in different institutional contexts.

Preliminary Findings

This section of the paper presents preliminary findings and emerging themes from the project, drawing mainly on research carried out in the first half of Phase II. These findings are presented at three levels. Firstly, a report of large sample analyses of data collected using the *LSQ* and *ETLQ*. This is intended to provide initial insights into the perspectives that this quantitative data can provide on students' perceptions of the teaching-learning environments of their course units and how this might relate to their approaches to learning and studying. This is followed by a brief outline of some of the provisional themes which appear to be emerging from the qualitative data collected across the different settings, and from the experiences of the ETL team members working in these settings. Finally, brief case studies are presented from three final year course units in the biosciences, to provide examples of how the quantitative and qualitative findings can be brought together to provide perspectives on individual course units.

Questionnaire Analyses Across Samples

As most of the collaborative initiatives are either in progress, or yet to begin, it is still too early to use the findings from the *LSQ* and *ETLQ* questionnaires to look for evidence of change in students' perceptions or approaches to learning, which might have been supported by the initiatives. What is possible, however, is to use the large samples of data now available to look in more detail at the underlying structure of the *ETLQ*. This is of interest, partly because the *ETLQ* is a newly developed questionnaire, and partly because the items and subscales relating to students' perceptions of the teaching-learning environment provide one possible proxy for the elements of effective, or well aligned, environments. It is also possible to report some preliminary analyses which look at the inter-relationships between students' reported aims and goals, perceptions of the teaching-learning environments on their modules, approaches to studying and their ratings of their own academic progress.

Tables 3 and 4 present the results of a maximum likelihood factor analysis of all of the *ETLQ* items relating to students' perceptions of the teaching-learning environment. This analysis is based on a sample of 1828 students from the earlier and later years of degree programmes in the five subject areas involved in the project. A five factor solution was chosen, partly on the basis of the scree plot, and partly because it provided the most interpretable pattern matrix. This is very much an interim finding and future analyses will be required to explore, for example, whether this factor pattern will remain stable across different subject areas or year groups. There is considerable correspondence between this analysis and earlier findings with a smaller sample reported by Entwistle, McCune and Hounsell (2003).

Factor I loaded, firstly, on items which seem to relate to *teaching for understanding*. These were items which asked whether students had been encouraged to reflect on their learning and understanding. The items relating to students having some *choice* in relation to the content, or method, of learning also loaded on this first factor. Two further groups of items loaded on Factor I - those relating to *assessment for understanding* and *guidance and feedback on assessment*. Factor II represents different aspects of *support from other students*. The items relating to *interest, enjoyment and relevance* loaded on Factor III and to some extent on Factor IV. Factor IV also brought together items referring to *clear aims and organisation* and to *alignment and integration* of teaching, course materials and assessments. Finally, Factor V relates to *staff enthusiasm* about the subject and *supportiveness* toward students.

The item analysis reported in Table 3 was then used as the basis for the 6 subscales relating to perceptions of the teaching-learning environment of a course unit, which are included in the subscale factor analysis reported in Table 5. The Cronbach alpha scores for each of these subscales are also reported in the Table. Further subscales from both the *LSQ* and the *ETLQ* were included in the analysis to provide some initial insights into possible inter-relationships between different aspects of the students' learning. The sample is slightly smaller (1225 students across the five subject areas) as it represents only those students who filled in both questionnaires. Factor I brings together intrinsic learning orientations and intrinsic reasons for choosing the course unit with the deep approach, positive perceptions of the teaching-learning environment and perceived gains in skills, knowledge and understanding. Factor II brings together low scores on - negative learning orientation, extrinsic reasons for choosing the course unit and a surface approach - with high scores on self-rating of attainment prior to taking the unit and for the unit itself. The third Factor is mainly represented by perceptions of light demands made by the course unit and of gains across a range of skills, coupled with high self-rating of attainment on the unit.

Table 3 Factor analysis of ETLQ items relating to perceptions of the teaching-learning environment

Maximum likelihood analysis with oblique rotation. N = 1828. The 5 factors explained 39% of the variance.

Loadings below .3 omitted except for those few items which do not load above .3 on any factor.

	FACTOR				
	I	II	III	IV	V
Clear aims and organisation					
1. It was clear to me what I was supposed to learn in this course unit.				.64	
2. The topics seemed to follow each other in a way that made sense to me.				.58	
4. The course unit was well organised and ran smoothly.				.47	
31. It was clear to me what was expected in the assessed work for this course unit.				.48	
Alignment and integration					
6. What we were taught seemed to match what we were supposed to learn.				.71	
9. The handouts and other materials we were given helped me to understand the unit.				.45	
14. The different types of teaching (lectures, tutorials, labs, etc.) supported each other well.				.35	
15. Plenty of examples and illustrations were given to help us to grasp things better				.41	
18. How this unit was taught fitted in well with what we were supposed to learn.				.61	
20. The web pages provided by staff helped me to understand the topics better.				(.24)	
33. I could see how the set work fitted in with what we were supposed to learn.				.52	
Teaching for understanding					
7. We were encouraged to look for links between this unit and others.	.32				
10. On this unit I was prompted to think about how well I was learning and how I might improve.	.34				
13. The teaching encouraged me to rethink my understanding of some aspects of the subject.	.35				
17. The teaching in this unit helped me to think about the evidence underpinning different views.	.35				
30. This course unit provided plenty of opportunities for me to discuss important ideas.	.38				
Choice					
3. We were given a good deal of choice over how we went about learning.	(.27)				
5. We were allowed some choice over what aspects of the subject to concentrate on.	.45				
Interest, enjoyment and relevance					
8. I can imagine myself working in the subject area covered by this unit.			-.55		
11. I could see the relevance of most of what we were taught in this unit.			-.32	.38	
12. We weren't just given information; staff explained how knowledge is developed in this subject.				.33	
16. This unit has given me a sense of what goes on 'behind the scenes' in this subject area.			(-.24)		
19. This unit encouraged me to relate what I learned to issues in the wider world.			-.33		
22. I found most of what I learned in this course unit really interesting.			-.77		
26. I enjoyed being involved in this course unit.			-.72		
Staff enthusiasm and support					
23. Staff tried to share their enthusiasm about the subject with us.					-.48
25. Staff were patient in explaining things which seemed difficult to grasp.					-.58
27. Students' views were valued in this course unit					-.39
28. Staff helped us to see how you are supposed to think and reach conclusions in this subject.					-.37
Support from other students					
21. Students supported each other and tried to give help when it was needed.		.83			
24. Talking with other students helped me to develop my understanding.		.69			
29. I found I could generally work comfortably with the other students on this unit.		.58			
Assessment for understanding					
34. You had to really understand the subject to get good marks in this course unit.	(.22)				
36. Doing the set work helped me to think about how evidence is used in this subject.	.64				
38. To do well in this course unit, you had to think critically about the topics.	.49				
39. The set work helped me to make connections to my existing knowledge or experience.	.41				
Guidance and feedback on assessment					
32. I was encouraged to think about how best to tackle the set work.	.48				
35. The feedback given on my work helped me to improve my ways of learning and studying.	.73				
37. Staff gave me the support I needed to help me complete the set work for this course unit.	.43				
40. The feedback given on my set work helped to clarify things I hadn't fully understood.	.69				

Table 4 Factor correlation matrix for ETLQ item analysis

	Factor 1	Factor 2	Factor 3	Factor 4	Factor 5
Factor 1	1.00				
Factor 2	.35	1.00			
Factor 3	-.38	-.30	1.00		
Factor 4	.52	.29	-.48	1.00	
Factor 5	-.35	-.28	.24	-.37	1.00

Table 5 Factor analysis of selected LSQ and ETLQ subscales

Maximum likelihood analysis with oblique rotation. N = 1225. The three factors explained 38% of the variance. Loadings less than .2 have been omitted

Scales	I	II	III
LSQ – Learning orientations/reasons for taking unit			
Intrinsic orientation	.23		
Negative orientation – lack of purpose		-.33	
Intrinsic reasons for choosing course unit	.29		
Extrinsic reasons for choosing course unit		-.24	
ETLQ – Approaches to studying specific to the unit			
Deep approach	.45	.26	
Surface approach	-.21	-.59	
Perceptions of the teaching-learning environment			
Clear aims, organisation, alignment and integration (alpha = .84)	.67		
Teaching for understanding and choice (alpha = .75)	.81		
Interest, enjoyment and relevance (alpha = .78)	.75		
Staff enthusiasm and support (alpha = .77)	.77		
Support from other students (alpha = .73)	.25		.27
Assessment for understanding, guidance and feedback (alpha = .81)	.73		
Light knowledge and understanding demands perceived		.21	.42
Light demands for skills perceived			.79
Perceived gains in knowledge and understanding	.49		.21
Perceived gains across a range of skills	.26		.53
Self-ratings of attainment			
Self-rating of attainment prior to taking the unit (LSQ)		.49	
Self-rating of attainment on the unit (ETLQ)		.42	.33
Inter-correlations between factors			
I	1.0		
II	.30	1.0	
III	.46	.14	1.0

Emerging Themes Across the Project

At this stage, it is only possible to tentatively indicate a few emerging themes which seem to stand out from the early analyses of the qualitative data and from the experiences of the project team working in the different settings. Entwistle (2003b) notes that a picture is beginning to develop of differences in how teaching is approached across the five subject areas. For example, while staff in all of the subject areas seemed to be encouraging students to engage with distinctive *ways of thinking and practising*, this is perhaps made more explicit in our sites in biology, history and media and communications than in those from economics and electrical engineering. Reimann (2003) comments on the relative uniformity of teaching-learning environments in economics, as compared with some other subject areas.

The challenges presented for students in adjusting to changes in their teaching-learning environments also seem to be a recurring theme (Entwistle, 2003a; Hounsell and McCune 2002; Reimann, 2003). This can be either adjustment to the first year of university study, or adapting to changes which occur later in the degree programme, as discussed in the case studies reported below. This suggests the importance of *alignment to*

students as part of *constructive alignment* (Hounsell and McCune 2002; Reimann, 2003). In other words, it may not be sufficient that all of the different aspects of a teaching-learning environment emphasise the desired forms of learning, if the challenges presented to individual students by the environment are too great, or insufficient. This echoes Vermunt and Verloop's (1999) argument for the importance of *constructive friction*, where a teaching-learning environment makes sufficient, but not excessive, demands on students to encourage their development.

The importance of the student within *constructive alignment* is also suggested by emerging data which suggests that students may react negatively to teaching-learning activities which seem, on initial inspection, to contribute to *constructive alignment*, because they do not understand the purpose of the activity. In one of the case studies reported below, students responded with some consternation to course work assignments which rewarded lateral thinking, apparently because they did not realise that this was an aspect of their learning that the course team wished to encourage. Similarly, it seemed that students in one of our first-year settings in the biosciences had a fairly hostile response to a poster assignment, as they were not aware that creating posters is often part of the work of a practising bioscientist. More generally, concerns relating to the provision of adequate guidance and feedback on assessments have been raised in a number of settings.

It is becoming increasingly clear from our interactions with academic staff, and with students, that both groups often struggle considerably to juggle multiple demands on their time. A related issue is that we have often found that the course units under study are shifting and changing, due to pressures outwith the control of the course teams, such as institution wide changes to programme structures. All of this has implications for our work with staff to develop collaborative initiatives, in that they have a limited amount of time to engage with conceptual frameworks or research findings and are sometimes more ready respond to specific suggestions as to how they might develop their course units. Even with enthusiastic and supportive course teams, any changes suggested generally need to be ones that can be implemented without a marked increase in demand on staff time. The pressures on staff and students mean that the ETL team have also had to make considerable efforts to collect adequate data. We have found that it has often been necessary to repeatedly visit sites in person in order to build up a rapport with students and staff and to carry out practical tasks such as distributing and collecting questionnaires. We have also found that it has been necessary to take a small amount of time in classes to have the questionnaires completed, as response rates are otherwise unacceptably low.

Phase II Case Studies – Three Final Year Settings in the Biosciences

In order to allow the reader a deeper insight into Phase II of the ETL project, this section of the paper concentrates more narrowly on emerging findings from three course units in the final year of undergraduate study in the biosciences. One year of data collection has been completed with these three units and the collaborative initiatives are currently being negotiated for the 2003–2004 academic year. An overview of the three settings is provided in Table 6. All of the course units were broadly in the area of molecular and cellular biology, with one focused on genomes, one on cancer and one on enzymology. In each of these three final year settings, one of the central aims was to help students engage critically with research findings and with the primary literature. The reports of the three settings presented here focus on the parts of the analysis which relate most clearly to this particular aim. A more wide ranging analysis and more extensive interview extracts are presented by McCune, Hounsell and Nisbet (2003). An overview of the design of the course units is given in Table 6, and discussed in more detail below.

Table 6 Summary of final year course unit settings, biosciences

(From McCune, Hounsell and Nisbet, 2003)

	B1L	B2L	B3L
<i>Unit theme</i>	Genomes	Cancer	Enzymology
<i>Unit scheduling & duration</i>	First semester module 2-3 hrs p.w. over 12 wks	Second-semester option 6 hrs p.w. for 5 weeks	First-semester option 2 hrs p.w. over 1+10 wks
<i>Student enrolment</i>	46 (of which 20 postgraduates)	25	14
<i>Teaching staff</i>	2	1, plus guest lecturers	2
<i>Teaching-learning activities</i>	Lectures + tutorials + private study	Guest lecture + problem-focused group discussion of data provided by guest lecturer + private study	Paired student presentations + discussion, from choice of 10 topics + private study
<i>Assessment</i>	<ul style="list-style-type: none"> Examination, 3 hrs (60%) Two essays (each 20%) 	Essay examination, 3 hrs (100%)	<ul style="list-style-type: none"> Presentations (50%) Two essays (each 25%)
<i>Guidance/learning support</i>	Course handbook, www materials, and tutorials, where students are encouraged to raise issues arising, including assessment queries	Extensive guidance in course handbook and web site; individual requests/ enquiries	Pre-presentation class briefing; individual requests/enquiries
<i>Other</i>	Research projects/placements in second semester	Some of the students had completed professional placements in research environments	Students had spent their third year on professional placements in research environments

Methodology and Analysis

The data collection in the three course units followed the broad pattern for Phase II presented earlier in this paper. Table 7 summarises the data collected from the course units. The interview schedule used for the

semi-structured group interviews conducted with the students is presented in Appendix 1. All of these interviews were transcribed in full and at least two members of the project team worked to identify key issues and themes from each transcript. The analysis focused particularly on *ways of thinking and practising* in the biosciences and on students' perceptions of the teaching-learning environments of the course units. A second, more detailed, analysis was then carried out on the interview data in order to check and clarify the initial findings. The inventory data was used both to provide a broad overview of the students' perceptions of the course units and to further substantiate the themes emerging from the student interviews. The interviews with the staff teaching the course units were not included in this initial analysis of the data.

Table 7 Take-up rates for questionnaires and interviews in final-year biology

Course unit	B1L	B2L	B3L
LSQ collected	28	–	13
ETLQ collected	24	20	14
LSQ & ETLQ collected	19	–	13
No. of staff interviewed	2	1	2
No. of student focus groups	5	4	3
No. of students interviewed	13	12	13

Ways of Thinking and Practising - Engaging with the Primary Literature and Experimental Data

Before considering the students' perceptions of the teaching-learning environments of the course units, it is important to further elaborate the kinds of high-quality learning sought and achieved in these three settings. One of the strongest themes emerging from the student interviews centred around the students' engagement with the primary literature and experimental data. Only this theme is considered here, more details of other aspects of the analysis relating to *ways of thinking and practising* can be found in McCune, Hounsell and Nisbet (2003).

When the students were asked to comment on what they had learned from their courses, about what they needed to do to succeed in their assignments, or about what might be involved in thinking, or communicating, like a bioscientist, they focused to a large extent on the importance of engaging critically with research findings. Part of what the students were being required to learn was skill in locating sources of information within the up-to-date primary literature and in selecting among them. In some cases they were being asked to do this in relation to an area of the literature about which they had not directly been taught.

Perhaps the most interesting part of the data on the students' engagement with research findings relates to the students' struggles to come to terms with how knowledge was generated in their subject areas and with how they might develop their own views and interpretations. Although the students sometimes seemed to find it difficult to understand the accounts in the literature of how particular findings had been derived and interpreted, some of them at least seemed to be attempting to engage with the literature in depth. They also indicated that they saw at least some aspects of the literature as being open to their own interpretations:

B2LP V02¹

S1: All our references, or most of them, are articles, scientific articles. So, when we are reading them we don't have to say, 'Oh yeah, okay, these are the conclusions, yeah cool.' But we have to say, 'Why did they do these experiments, why not others? Okay, why is this working this way, why these conclusions?' So we always have to ask why things are happening [...]

B1LP D01

I: What's actually necessary to do well on a course like this? Are there certain things that get you relatively high marks?

¹ The coding given before each interview extract indicates the site (B1LP; B2LP; B3LP) and the interview from which the extract is taken (e.g. V01, D01, J01, JN01).

S1: I think being able to give your own opinion and find evidence and base your opinions on evidence and give reasons for your opinions, that seems to be the main thing this year is giving your own opinions, correctly evaluating the stuff you're getting as opposed to just, this is good because it says so. [...]

S2: Yeah, you have to find various papers and understand them by reading them and then you have to summarise what they're saying, obviously whether you agreed with that or not. And studying [this area] there's lot of disagreement, you know they're not all saying the same thing or coming from the same line of thought. So they have different opinions. [S1: yeah]

Other aspects of the students' talk did, however, seem to indicate that they might not necessarily feel able to develop their own views or to challenge established sources:

B1LP V01

S1: It's difficult to question things that you read in journals sometimes I think because, I mean, we're just undergraduates [...] I mean, this will only be a three-week piece of a module, you know, and these people have composed these journal articles. They've spent months, years maybe, doing ... I often find it difficult to try and question some of these things.

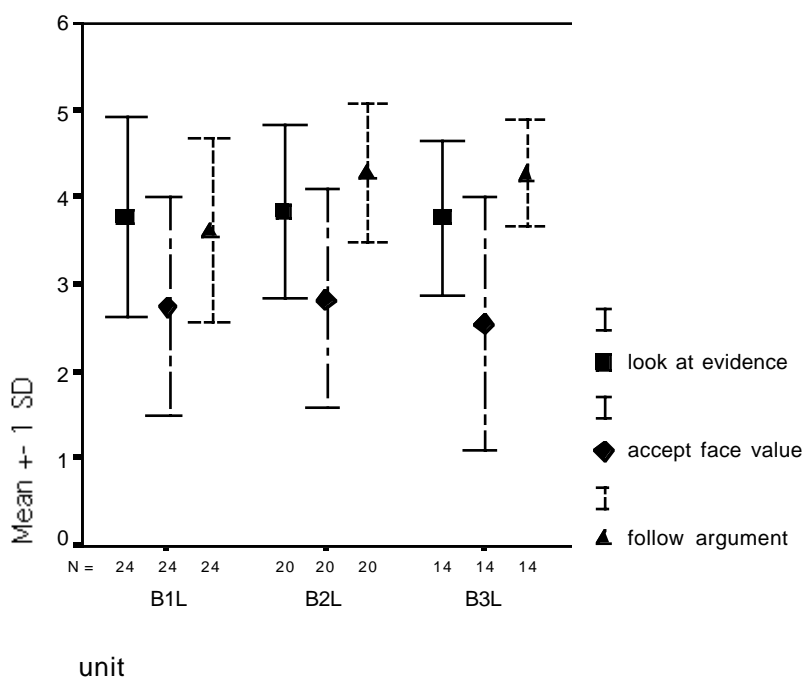
B3LP D01

S: If you find a reference that's applicable to what you're trying to do, it's a modern reference then, you know, you don't really need to be critical. You can just assume it's right 'cos otherwise it wouldn't have been published. They generally are right and they make sense.

S: Everything's peer review anyway so.. [S: Yeah]. If they really didn't catch the fact that it's complete rubbish then all the undergraduates aren't gonna.

Figure 3 gives the students' scores on three items from the *ETLQ* which provide some triangulation in relation to the interview data discussed here. Across all of the three settings the students' scores were clearly higher on the items 'I've looked at evidence carefully to reach my own conclusions about what I'm studying' and 'It has been important for me to follow the argument, or to see the reason behind things' than on the item 'I've tended to take what we've been taught at face value without questioning it much.' There is, however, considerable variability within the students' responses to each item.

Figure 3 Students' scores on items about evidence
(mean and 1 standard deviation; 5 = agree, 1 = disagree)



The students' perceptions of the teaching-learning environments of the course units

The broad aim of encouraging students to engage with the primary literature and data was tackled quite differently in each of the three course settings. In B1L, twice-weekly lectures were combined with tutorial sessions in which students were able to raise questions and voice concerns. Supplementary learning materials were also provided on the web. The assessment was based on a three hour examination and two coursework assignments. In the first half of each teaching session at B2L guest lecturers – who were also active researchers – gave a talk on an area of research in which they were involved. In the second half of each session the students worked in groups to discuss data originating from the guest lecturer's research. The only assessment for this course unit was a three hour examination. In B3L, each seminar was presented by a pair of students, who spoke for around forty-five minutes in total, on one of ten topics chosen by the two members of staff. The presentations were followed by questions and discussion. The assessment was based on students' presentations, their contributions to the seminar discussions and two coursework essays. All of the assessments set across the different settings did, however, require students to engage with research findings and often with the primary literature.

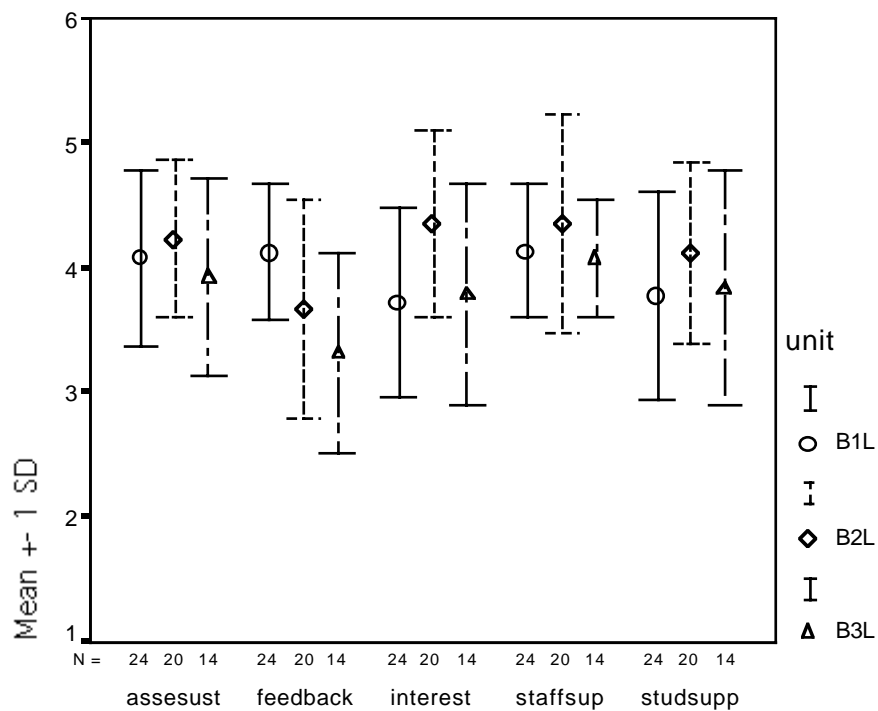
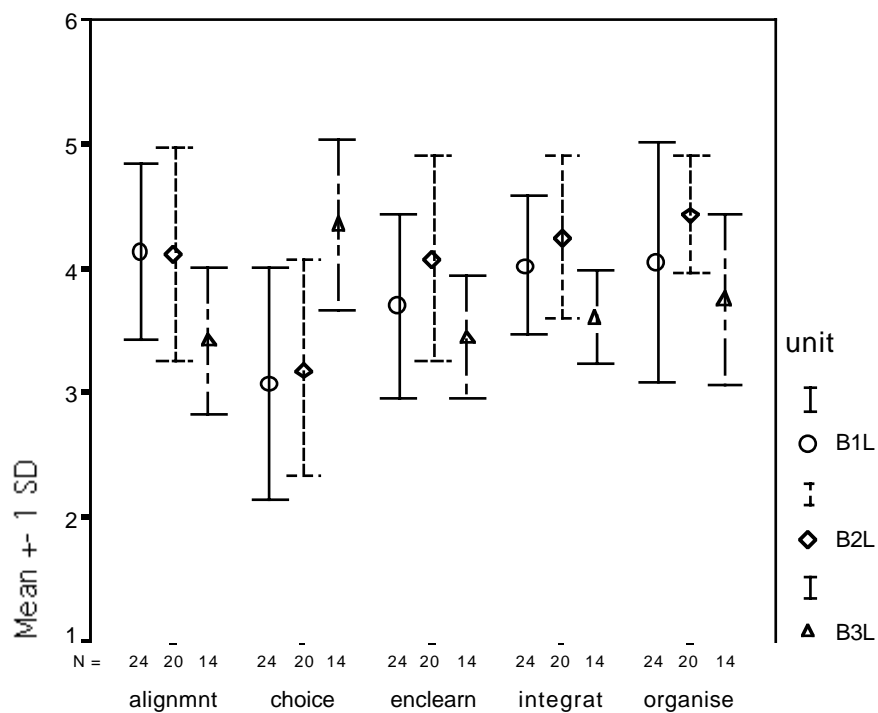
Despite the differences between the settings, the data from the *ETLQ* suggested some commonality between the students' perceptions of the course units. Table 8 and Figure 4 give a breakdown of the scores for each setting on each of the subscales relating to perceptions of the teaching-learning environment. The mean scores are uniformly above the mid-point, suggesting that the students had generally positive perceptions of the three settings. For example, students across the three sites reported favourable perceptions of the supportiveness and enthusiasm of the teaching staff. The broadly positive picture presented by the *ETLQ* findings was supported by the student interview data across the three sites. It should be borne in mind that neither the quantitative nor the qualitative findings can be used to make direct comparisons between the three settings as the students' perceptions will depend, to some extent, on influences which were not measured, such as their background knowledge, or their experiences of other course units with which they might compare the course unit in question.

Table 8 Scores on *ETLQ* subscales for perceptions of the teaching-learning environment

SUB-SCALE	COURSE UNIT		B1L (n=24)		B2L (n=20)		B3L (n=14)	
			mean	SD	mean	SD	mean	SD
clear aims and organisation (organise)			4.06	.97	4.43	.47	3.76	.68
alignment (alignmt)			4.14	.69	4.12	.85	3.43	.59
integration (integrat)			4.10	.62	4.42	.53	3.74	.40
choice (choice)			3.08	.93	3.20	.86	4.36	.69
encouraging high quality learning ¹ (enlearn)			3.67	.78	4.14	.88	3.51	.57
guidance/fbk on assessments (feedback)			4.12	.54	3.68	.88	3.31	.80
assessment for understanding (assesust)			4.08	.71	4.24	.63	3.93	.79
staff enthusiasm & support (staffsup)			4.14	.52	4.35	.88	4.07	.47
support from other students (studsup)			3.83	.86	4.17	.75	3.81	.98
interest, enjoyment & relevance (interest)			3.73	.75	4.35	.76	3.79	.89

¹ Certain of the subscales used in this analysis differ from those presented in Table 3 as they are based on earlier analyses.

Figure 4 Scores on *ETLQ* subscales for perceptions of the teaching-learning environment
(mean and 1 standard deviation; 5 = agree, 1 = disagree)



Looking more closely at the interview data, it became apparent that to understand the students' experiences of these course units it was important to consider the units in the context of the students' overall degree programmes. In each of the settings, the students spoke about the transition from the earlier to the later years of their programmes and the demands this had made on them. They also spoke of the increasing pressure that they felt to manage their own learning and to cope with competing deadlines for course work. This was perhaps partly related to the shift - between the first and second and the third and final years of study - towards greater reliance on, and engagement with, the primary literature and towards assignments based on essays rather than, for example, multiple-choice questions:

B2LP V02

S: [In] first and second year, you just need to memorise little points to get the multiple choice answers right. You don't need to learn how it all links together to write an essay on it. [It's a] different way of learning within the first two years compared to the next two.

B3LP J01

S1: I thought the biggest jump was second to third [year].

I: What's the big jump between second and third?

S3: Well it's a different style, like in the second year it was more textbook learning, whereas in the third year it was all kind of going to get references, trawling through loads of information [...]

In two of the settings, B2L and B3L, the students were also having to adjust to an unfamiliar approach to teaching and this seemed to have an important impact on their experiences:

B2LP V01

S1: Yeah, I found I started talking a lot towards the end [of the course unit] but not because I think I'm more right with my answers, but just because I feel more comfortable in the class.

I: So what's led to that? It sounds like the atmosphere has maybe got easier as you've gone on. Is that usually what happens?

S2: Ehmm, I think its just a matter of maybe getting used to this sort of style of teaching and everything, because.. I mean, all through almost pretty much of first, second and third year it has always been a set of.. the lecturer comes up, either writes notes on the board or maybe gives you one or two handouts, but he is still like constantly talking not a chance to like answer questions, but you also - in like first, second and third year - you were in really big classes as well which doesn't help much.

B3LP J01

S: We haven't actually had anything taught to us by the lecturers, it's all been taught by the students. It's all been around research which we've never had before, until the final year.

Guidance and feedback to students about what is expected of them, and about how well they are progressing, is an important part of any teaching-learning environment. This is perhaps particularly the case at times when students are making a transition to new ways of working, as in these three course units. At first sight, it might seem that the students in B1L and B3L were better placed in this regard, given the opportunities for feedback provided by their assignments, whereas in B2L there was only the final examination. Closer consideration of the data revealed, however, that the way in which B2L was taught provided many opportunities for informal feedback to students through their participation in the problem-solving sessions. Clear guidance about examinations was also provided on the course web site for B2L, including past examination questions and model answers. The students therefore seemed to feel that they were well prepared for what was expected of them:

B2LP JN01

S: The problem solving sessions we have at the end of this module , [...] they're something you don't get in all the modules and it's [...] really helpful especially for one of the papers in the exam, the problem solving bit.

B2LP V01

S2: Yeah [the web site has] all the past exam questions from something like 98 onwards [...] I went to the web site and just seen this whole, like structure of stuff [the module coordinator]'s got all set up and everything for the module, which I thought was really good.

S1: Yeah, lots of links to other cancer-related web sites.

S2: And even to the, sort of, recommended reading. [The module coordinator]'s got links to the journals and stuff, they're all up on the web site, which I thought was really good.

S2: So when it comes to studying I don't think we'll have a problem accessing any information at all, I think it will be there and we'll have examples on how to answer the exam questions, and we'll know what [the module coordinator]'s looking for in answers, so . . . Even though we've had no assessments, I think this is probably gonna be one of the easiest exams to study for . . . *(laughter)*

The B1L and B3L students also had opportunities for some informal feedback during their classes, but the provision of guidance and feedback in relation to their assignments proved to be more problematic. The B1L students were able to seek guidance about their coursework in their tutorials, but any feedback on that work would come after their examination. This was of particular concern to the postgraduate students taking the course, as they had no past feedback from the department to guide their efforts:

B1LP JN 03 60-66

S1: Well, usually, if you're handing things in this late, we don't usually get them back, really. By the time they've taken them away over the Christmas break and they get back, sometimes some lecturers are really bad for marking and it takes them weeks, so sometimes you don't even get feedback and it's just waiting for your overall grade for the module...to see how well you've done, which is quite bad, actually.

S2*: Yeah, it is, because you need some sort of gauge, before you go into your exams, of how well you're doing, you know, because if you know you're doing really badly, then you've still got time to get help.

S1: Yeah.

S2*: And, if you're doing well, then you know what you're doing's right, you know you're on the right track.
(denotes a postgraduate student)*

At B3L there were a number of related concerns about guidance and feedback. Firstly, some of the students were quite unsure as to what was expected for their coursework essays. Part of the difficulty seemed to be a lack of experience of writing essays and insufficient feedback on the essays that had been written for earlier course units. At the time the students were interviewed they had not yet submitted their essays for the B3L unit, but they would have received some feedback at a later date. Some difficulty also seemed to have been caused by the essay topics chosen. The course team had deliberately set questions which required lateral thinking and to which the answers could not easily be found in any textbook or article. It later transpired (in discussion with the course team) that the purpose of these essays had not clearly been explained to the students. This led to some confusion:

B3LP V01

I: What would it take to do a really good essay for this course? What would be important?

S1: I've no idea, well, the essays are ridiculous questions. I mean it's one of the questions is em why is —

S2: — An enzyme a protein?

S1: Yeah, why is an enzyme a protein?

S2: I don't know what to write.

S1: What sort of question's that? It's ridiculous! [..]

I: So you're not very clear how to deal with it?

S1: Yeah, [...] I don't know, [...] I wouldn't call it a normal style scientific question of problem solving [...] I'm not too sure of the purpose or, I mean, you know, what it's supposed to be testing 'cos it's not testing our scientific knowledge, it's more your ability to rationalise, I think.

Given the concerns the students had about their essays, it might have been expected that they would seek advice from the course unit staff, particularly given that the course team were perceived by the students as being supportive and approachable. Some of the students seemed uncertain, however, about the 'ground-rules' for seeking advice:

B3LP V01

I: And have you been given any guidance for the essays – about how you might go about [them]?

S1: I think you can ask, maybe I will go and ask him what he would expect because I don't know what to write at all.

S2: Yeah, I'm sure most of these lecturers are quite approachable if you actually do go and get in contact with them but then there's a fine line — I don't really like doing that because there's a fine line between sort of pestering, annoying them or how much information you can actually get or whether because you got information from them they'll sort of down-mark you. I mean..

S1: Yes?

S2: No, I don't think that happens but, I mean —

S1: Okay! *[laughs]*.

S2: It's a point though. I mean, you know I mean, everyone should have the same amount of help to make it fair otherwise what's the point?

S1: Yes, that's true.

S2: And if you've got people they do have people that they, you know, prefer more and will give more help to or if you go and ask them they'll be like really keen. So I, I'm not keen on asking the lecturers for help 'cos I don't really see that it's something that's particularly fair.

S1: Yes, but maybe you were to ask something [?]. Maybe we can ask then and everybody can get the information.

While the students at B3L had been given advice about how to tackle their oral presentations, they did not seem to have a complete understanding of how the presentations would be assessed. Nor did they receive feedback on the presentations, beyond a sense that their efforts had been positively received:

B3LP D01 149-156

I: [How are the presentations assessed]

S1: I don't know. I've noticed that they keep writing notes down as we're talking so I guess it's got something to do with that! We don't know.

S2: I'm not sure either.

B3LP J01 199-109

I: Do you get much feedback on [the presentations] from the lecturers? [..]

S1: They were encouraging. We were the first up and they did say, Well done, that was a good start.

S2: They don't hold you back after, though, do they, and tell you where you went wrong? [...] So you've no idea how well —

S3: — Yes, but because you're not doing two, you don't, there's no ... I suppose it would be good for them to say that just so you improve presentations generally.

S: And also so you have an idea of like where you are.

These issues surrounding feedback seemed to reflect wider assessment practices in the department, rather than being specific to oral presentations, or to the B3L course unit.

The students' experiences of work placements

In building up a picture of the teaching-learning environments of the three settings and their impact on the students' engagement with research evidence, it is important to consider the students' experiences of work placements, even though these were not directly connected to the three course units in question. In two of the settings, B2L and B3L, some of the students had spent extended periods of time working for research institutes or companies before embarking on the final year of their degree programme. Their experiences seemed in some cases to have had a marked impact on their engagement with their studies and on their understanding of how research evidence might be derived, interpreted and reported:

B2LP V01

S1: I think it was the work placement [...] - it has made me more interested in it [...] 'Cos basically you're studying something that hardly anyone knows as much about it as you do, so.. It gave me more confidence in science more than anything else, which made me more committed. [...]

S1: [Placement] is the best thing I could have done for my degree. If had stayed on and rushed on just on fourth year, I wouldn't have known anything really about the whole background of science. I'd be like, "Oh, here are the facts that we've been given", but I wouldn't have a clue about how people went around doing it [...] You know, you're being taught the science but you don't know the bigger picture, and when you do your work placement you get to find out everything about it, and how it all works and how everyone can

just phone up other scientists that they know are on the same field and just ask them for help and stuff. [...]
The knowledge is in the people's heads rather than in books [...]

S2: Yeah, is all the experience as well that helps enormously, especially for, like, data interpretation and everything.. hemm.. I find myself, even just from my knowledge from the work placement, just sort of interpreting some of my results in the lab that I found [...]

S1: You've gone up a level [because of the placement], you're not a student anymore.

B3LP D01 346 - 354

S: Yeah. It's much more real [on placement]. It's a different world completely, yeah.

S: Much more interesting I'd say.

S: Yeah, much more interesting.

I: Why.. how's it different? Why's it more interesting?

S: Real science isn't really about learning it's about, it's about finding, it's about trial and error, discovery sort of thing. Whereas being at university is about learning, it's not really about trial and error.

S: Yeah, it's back to this whole instead of just learning stuff for the sake of learning it and just memorising it, you've got to think of how it works, you've got to understand how it works. And then you've got to start thinking about how you can change that or play with it or develop it.

Discussion

The literature relating to students' perceptions of the teaching-learning environment, discussed in the introduction to this paper, illustrates the rich complex interplay of influences which may impact on the quality of students' learning in higher education. No single research project could hope to fully capture this complexity, but a central aim of the ETL project is to provide conceptual frameworks, tools and findings which contribute to our understanding of how high-quality learning can be understood and supported, particularly in relation to the subject areas in focus. Our emerging conceptual frameworks include both the overview map of the teaching-learning environment of a course unit, presented in the introduction, and our developing interpretations of Biggs' notion of *constructive alignment*. Conceptually we have also been making use of the literature on approaches to learning and studying as well as the broader perspective represented by *ways of thinking and practising* in a subject area. The tools under development in the project include the LSQ and the ETLQ and these questionnaires are also the source of some of the initial findings reported in this paper.

In addition to the perspectives presented on students' perceptions of the teaching-learning environment by the questionnaires, it has been possible here to report initial themes arising from the qualitative data collected across the project and to bring qualitative and quantitative data together in reporting the three case studies. This final section of the paper will consider some of the possible implications arising from these initial findings in relation to the conceptual frameworks presented in the introduction. It is important to bear in mind that the project is still in progress and that there is much more yet to do in terms of data collection, analysis and development of the frameworks and tools. This paper also tends to concentrate more heavily on those aspects of the frameworks and findings which are most in focus for the author, the publications on the ETL web site provide access to important perspectives and findings which have not been discussed in detail here.

In reporting the case studies of the three final year courses in the biosciences, one particular aspect of *ways of thinking and practising* in the subject area was brought into focus – students' engagement with data and with the primary literature. Students in the biosciences in the UK are expected to be able to engage critically with research findings and to realise 'that much of what they are taught is contested and provisional, particularly in the light of continuing scientific advances.' (QAA 2002, p. 4). Our interim findings suggest that the students in our three settings were beginning to engage with this important challenge but they sometimes expressed concerns about their readiness to be critical of established sources. To some extent, what is being considered here is the ability of students to enact one particular aspect of a deep approach to learning – use of evidence – within a particular disciplinary context. The broader perspective allowed by the notion of *ways of thinking and practising* is, however, useful as it allows us to more easily integrate into our conceptual frameworks the different related aspects of the task of engaging with research findings. For example, *ways of thinking and practising* can encompass the students' developing understanding of how research findings were generated in the 'real world' contexts of their work placements:

S1: [Placement] is the best thing I could have done for my degree. If had stayed on and rushed on just on fourth year, I wouldn't have known anything really about the whole background of science. I'd be like, "Oh, here are the facts that we've been given", but I wouldn't have a clue about how people went around doing it [...] You know, you're being taught the science but you don't know the bigger picture, and *when you do your work placement you get to find out everything about it, and how it all works and how everyone can just phone up other scientists that they know are on the same field and just ask them for help and stuff. [...] The knowledge is in the people's heads rather than in books, so you know to go and ask someone about something. [...]*

Drawing on the literature, as well as the initial findings reported in this paper, *ways of thinking and practising* in a subject area might encompass a wide range of aspects. This could include particular forms of knowledge and understanding, a range of subject-specific skills and strategies, as well as an understanding of the norms, values and uses of language involved in engaging with a discipline at graduate or near-graduate level (Becher and Trowler, 2001; Hounsell and McCune, 2002; Lave and Wenger, 1999; McCune and Reimann, 2002; McCune, Hounsell and Nisbet, 2003). While the breadth of *WTP* as a concept has the advantage that it can more easily encompass many different aspects of high-quality learning, one of the challenges for the later stages of the ETL project will be to define and describe *WTP* in particular contexts in such a way that the very breadth of the concept does not render it meaningless. The boundaries of *WTP* may often be hard to define for a number of reasons. Firstly, it can be difficult to fully describe the boundaries

of the setting to which a particular account of *WTP* applies, as seen, for example, in the need to consider students' placement experiences in relation to the course units in the case studies discussed in this paper. Secondly, *WTP* refers to subject areas which are in themselves not clearly defined, given the number of sub-disciplines and inter-disciplinary areas of study which exist. Thirdly, the boundary between subject-specific and generic aspects of learning may be unclear. This can be illustrated by considering students' ability to regulate their own learning. To some extent this might be considered a generic, or transferable, skill but its successful application rests on an understanding of the expectations of the subject area under study.

Returning to the overview model of the teaching-learning environment - presented in Figure 1 in the introduction - the findings reported in this paper do not so much suggest changes to this overall model but rather illustrate the limitations of abstract models for fully describing particular settings. Our emerging findings suggest that sometimes one small problem within a setting can have marked effects on what otherwise appears to be a well-aligned environment. Those instances where students' have reacted negatively to a seemingly well-aligned assignment because they did not fully understand its purpose, or relevance, would be one example.

The broad perspective represented by *constructive alignment* - that all of the elements of a teaching-learning environment need to work together to support the kinds of high-quality learning sought - is not challenged by the findings presented here. Having said that, the full implications of *constructive alignment* are not easily identified. While it may be possible - by drawing on the existing literature and future analyses from the project - to provide some insights into which aspects of teaching-learning environments should generally be included when considering the alignment of a given setting, it seems likely that this will always depend on the particular context in question and the *WTP* which are sought. There is no reason to suspect that all of the aspects of a teaching-learning environment will be equally important to alignment in a particular instance. Further, it will always be important to consider the *extent* to which alignment can be achieved within a given set of contextual constraints, rather than judging environments as aligned or not, or evaluating them without reference to wider influences such as resourcing and institutional policy. Thus, while *constructive alignment* may represent a useful perspective on teaching-learning environments, its application in practice is not likely to be straightforward.

Our findings to date suggest that one important addition to our initial perspectives on *constructive alignment* is the idea of *alignment to students* (Hounsell and McCune, 2002; McCune, Hounsell and Nisbet, 2003; Reimann, 2003). While a teaching-environment may seem well aligned in terms, for example, of the correspondence between the forms of learning encouraged by the different aspects of the teaching and assessment, this does not mean that this environment will be equally suitable for all of the students involved. Differences in students' aims and goals, preferred approaches, background knowledge and beliefs about learning may have a considerable impact on their perceptions of a particular context (Beaty, Gibbs and Morgan, 1997; Crawford et al, 1998; Entwistle and Tait, 1990; Säljö, 1982). A further layer of complexity is introduced in research by Meyer and colleagues, which suggests that certain groups of students, often those who are weak academically, may show uninterpretable inter-relationships between their approaches to studying, perceptions of the learning environment, and preferences for contrasting environments (Meyer, Parsons and Dunne, 1990; Entwistle, Meyer and Tait, 1991; Entwistle, Tait and McCune, 2000). Such findings have sometimes been explained in terms of students wishing to take a deep approach but not knowing how to achieve this. Another possibility is a mismatch between a student's preferred approach and their perceptions of the learning environment (Entwistle, Tait and McCune, 2000; Meyer, 2000).

Given the complexities of high-quality learning and *ways of thinking and practising* on the one hand and of teaching-learning environments on the other, it is clear that questionnaires such as the *LSQ* and *ETLQ* have certain limitations in terms of fully describing the extent of alignment in a given setting. Nonetheless, they also have the potential to provide valuable insights. When used across large samples, as illustrated in Tables 3 and 5, they can be used to help identify and describe aspects of the teaching-learning environment which might often be expected to contribute to alignment. In individual settings, such as the three case studies presented here, the questionnaire findings can be used to identify areas which might warrant further investigation and can help to assess the extent to which an issue identified in the qualitative analysis is relevant to a larger sample of students taking the course unit.

Considerable care must be taken, however, in the interpretation of the questionnaire findings. As discussed above, the literature suggests that students may perceive environments quite differently, depending on

their particular learning histories. Available points of comparison is another issue, it seems possible that, where students attend a course unit which stands out in quality from others they are attending, that this may influence their perceptions. Further, it is not possible at present to illustrate that students at different stages in their academic careers, or in different subject areas, interpret the same questionnaire items in the same way. We have also seen from the three case studies, that qualitative data may be needed to better understand the questionnaire findings. For example, the students' questionnaire responses in relation to the guidance and feedback on their assessments alone would not have identified all of the issues raised by the qualitative data. All of these concerns suggest strongly that using the questionnaires alone to evaluate course units, or to make comparisons between course units, would be problematic. Further, there are many alternative ways of obtaining feedback on particular settings, which may sometimes be more appropriate (Day, Grant and Hounsell, 1998; Hounsell, Tait and Day, 1997). At any rate, the questionnaires are only ever likely to form one part of a successful strategy for investigating and developing teaching-learning environments.

As we move into phase III of the ETL project, it will be necessary to focus even more closely on how the frameworks, findings and tools under development may be used independently by staff in higher education. In this regard, it will be important to take into account our experiences of the demands placed on staff and students immersed in evolving and pressured environments. While some staff may wish to engage with conceptual frameworks and detailed research findings, others may be looking for materials with which they can achieve improvements in their courses, without investing large amounts of time engaging with the underpinning findings. Thus one challenge for the ETL team will be to develop materials which can be used effectively under such constraints. The concept of 'action poetry', introduced to the project by David Perkins, is relevant here. "Good action poetry is simply language about what to do that is simple, memorable and to the point" (Perkins & Wilson, 1999: 3). It evokes "mental snapshots that make the idea actionable in real time and stressful situations." (*ibid*). We will need to consider whether concepts such as *ways of thinking and practising*, *threshold concepts* and *constructive alignment* are good action poetry across a range of contexts. Hounsell (2003) has questioned the potential limitations of *constructive alignment* as a metaphor, given that it may evoke connotations of settings organised in a rigid and linear manner and has suggested that *congruence* might be a more helpful term. Further, Reimann has raised the concern that *constructive alignment* might be received negatively in certain settings because it may evoke connotations of managerial control (McCune and Reimann, 2002).

In conclusion, it seems that findings emerging from the ETL project have the potential to provide useful perspectives on how high-quality learning might be understood and promoted across a range of contexts. There is, however, considerable work still to be done in terms of data collection and analysis. In particular, we will need to await the completion of the collaborative initiatives within Phase II before the full impact of the work of the project can begin to be assessed. As the final outputs from the project are developed, it will be necessary to tackle the challenge of providing frameworks and tools, which are realistic and practical for use across higher education, but which are sufficiently nuanced and sensitive to access the complex, multifaceted, pictures presented by teaching-learning environments in higher education.

Acknowledgements

The ideas being developed in the ETL project are a product not only of the whole project team, but also of our subject advisors, international consultants, and colleagues in our collaborating departments. At the time of writing researchers on the project team, besides the author, were Charles Anderson, Adrian Bromage, Kate Day, Noel Entwistle, Dai Hounsell, Jenny Hounsell, Ray Land, Erik Meyer, Jennifer Nisbet and Nicola Reimann. Glynis Cousin, Liz Beaty and Hilary Tait made important contributions earlier in the project.

References

- Anderson, C. (1997). Enabling and shaping understanding through tutorials. In F. Marton, D. J. Hounsell and N. J. Entwistle (Eds.), *The experience of learning* (2nd Edn.). Edinburgh: Scottish Academic Press, pp 184-197.
- Archer, L. and Leathwood, C. (2003). Identities, inequalities and higher education. In L. Archer, M. Hutchings and A. Ross (Eds.), *Higher education and social class: issues of exclusion and inclusion*. London and New York: Routledge Falmer, pp 175-192.
- Ballard, B. and Clanchy, J. (1988). Literacy in the university: an 'anthropological' approach. In Taylor, G., Ballard, B., Beasley, V., Bock, H., Clanchy, J. and Nightingale, P. *Literacy by degrees*. Milton-Keynes: SRHE and OUP, pp 7-23.
- Bamber, J., and Tett, L. (2000). Transforming the learning experiences of non-traditional students: a perspective from higher education. *Studies in Continuing Education* 22(1), 57-75.
- Baxter-Magolda, M. B. (1999). *Creating contexts for learning and self-authorship: constructive developmental pedagogy*. Nashville: Vanderbilt University Press.
- Beaty, L., Gibbs, G. and Morgan, A. (1997). Learning orientations and study contracts. In F. Marton, D. J. Hounsell and N. J. Entwistle (Eds.), *The experience of learning*, (2nd Edn.). Edinburgh: Scottish Academic Press, pp 72-88.
- Becher, T. (1994). The significance of disciplinary differences. *Studies in Higher Education* 19, 151-161.
- Becher, T. and Trowler, P. (2001). *Academic tribes and territories: intellectual enquiry and the cultures of disciplines*. Buckingham: SRHE and Open UP.
- Biggs J. B. (1987). *Students' approaches to learning and studying*. Melbourne: Australian Council for Educational Research.
- Biggs, J. B. (1996). Enhancing teaching through constructive alignment. *Higher Education* 32, 347-364.
- Biggs, J. B. (2003). *Teaching for quality learning at university*. 2nd edn. Buckingham: SRHE and OUP.
- M. Boekaerts, P. Pintrich and M. Zeidner (Eds.) (2000). *Handbook of self-regulation*. London: Academic Press.
- Campbell, J., Smith, D. and Brooker, R. (1998). From conception to performance: how undergraduate students conceptualise and construct essays. *Higher Education* 36, 449-469.
- Crawford, K., Gordon, S., Nicholas, J. and Prosser, M. (1998). Qualitatively different experiences of learning mathematics at university. *Learning and Instruction* 8(5), 455-468.
- Day, K. and Anderson, C. (2003). *Making history: engaging students in the values and practices of a discipline*. Paper presented to the 10th Conference of the European Association for Research on Learning and Instruction (EARLI), Padova, Italy, August 26-30, 2003.
- Day, K., Grant, R. and Hounsell, D. (1998). *Reviewing your teaching*. Edinburgh and Sheffield: Centre for Teaching, Learning and Assessment, University of Edinburgh and Universities' and Colleges' Staff Development Association.
- Entwistle, N. J. (1997). Contrasting perspectives on learning. In F. Marton, D. Hounsell and N. J. Entwistle (Eds.), *The Experience of learning* (2nd Edn.). Edinburgh: Scottish Academic Press, pp. 3-22.
- Entwistle, N. J. (1998). Improving teaching through research in student learning. In J. J. F. Forest (Ed.), *University teaching international perspectives*. New York and London: Garland Publishing, pp 73-112.
- Entwistle N. J. (2000). Approaches to studying and levels of understanding: the influences of teaching and assessment. In J. C. Smart (Ed.), *Higher education: handbook of theory and research*. Vol. XV. New York: Agathon Press.
- Entwistle, N. J. (2003a). *Concepts and conceptual frameworks underpinning the ETL project*. (ETL Occasional Reports, no. 3). Universities of Edinburgh, Durham and Coventry, ETL Project.
- Entwistle, N. J. (2003b). *University teaching-learning environments and their influences on student learning: an introduction to the ETL project*. Paper presented to the 10th Conference of the European Association for Research on Learning and Instruction (EARLI), Padova, Italy, August 26-30, 2003.
- Entwistle, N. J. and McCune, V. (under review). The conceptual bases of study strategy inventories in higher education. *Educational Psychology Review*
- Entwistle, N., McCune, V. and Hounsell, J. (2002). *Approaches to studying and perceptions of university teaching-learning environments: concepts, measures and preliminary findings*. (ETL Occasional Reports, no. 1). Universities of Edinburgh, Durham and Coventry, ETL Project.
- Entwistle, N., McCune, V. and Hounsell, J. (2003). Investigating ways of enhancing university teaching-learning environments: measuring students' approaches to studying and perceptions of teaching. In E. De Corte, L. Verschaffel, N. Entwistle and J. van Merriënboer (Eds.), *Powerful learning environments: unravelling basic components and dimensions*. London: Pergamon, pp 89-108.
- Entwistle, N. J., McCune, V. and Walker, P. (2001). Conceptions, styles and approaches within higher education: analytic abstractions and everyday experience. In R. M. Sternberg and L. -F. Zhang (Eds.), *Perspectives on cognitive, learning and thinking styles*. NJ: Lawrence Erlbaum, pp 103-136.
- Entwistle, N. J., Meyer, J. H. F. and Tait, H. (1991). Student failure: disintegrated patterns of study strategies and perceptions of the learning environment. *Higher Education* 21, 249 - 261.
- Entwistle, N. and Ramsden, P. (1983). *Understanding student learning*. London: Croom Helm.

- Entwistle, N. J. and Tait, H. (1990). Approaches to learning, evaluations of teaching, and preferences for contrasting academic environments. *Higher Education* 19, 169-194.
- Entwistle, N. J., Tait, H. and McCune, V. (2000). Patterns of response to an approaches to studying inventory across contrasting groups and contexts. *European Journal of the Psychology of Education* XV, 33-48.
- Hounsell, D. (1987). Essay writing and the quality of feedback. In J. T. E. Richardson, M. W. Eysenck, and D. Warren Piper, (Eds.), *Student learning: research into education and cognitive psychology*. Milton Keynes: OUP, pp 109-119.
- Hounsell, D. (1988). Towards an anatomy of academic discourse: meaning and context in the undergraduate essay. In Säljö, R. (Ed.), *The written world: studies in literate thought and action*. Berlin: Springer Verlag, pp 161-177.
- Hounsell, D. (1997). Contrasting conceptions of essay writing. In F. Marton, D. J. Hounsell and N. J. Entwistle (Eds.), *The experience of learning* (2nd Edn.). Edinburgh: Scottish Academic Press, pp 106-125.
- Hounsell, D. (2003). *Enhancing teaching-learning environments*. Presentation at the Symposium on Sharing Excellence and Improving Student Learning, University of Surrey, 10th June, 2003.
- Hounsell, D. (in press). No comment? Feedback, learning and development. In M. Slowey and D. Watson (Eds.) *Higher Education and the Lifecourse*. Buckingham: SRHE and OUP.
- Hounsell, D. and McCune, V. (2002). *Teaching-learning environments in undergraduate biology: initial perspectives and findings*. (ETL Occasional Reports, no. 2). Universities of Edinburgh, Durham and Coventry, ETL Project.
- Hounsell, D., Tait, H. and Day, K. (1997). *Feedback on courses and programmes of study*. Edinburgh: Centre for Teaching, Learning and Assessment, University of Edinburgh.
- Ivanic, R. (1998). *Writing and identity: the discursal construction of identity in academic writing*. Philadelphia: John Benjamins Publishing Company.
- Lave, J. and Wenger, E. (1999). Learning and pedagogy in communities of practice. In J. Leach and B. Moon (Eds.). *Learners and pedagogy*. London: Paul Chapman Publishing in association with OUP.
- McCrindle, A. R., and Christensen, C. A. (1995). The impact of learning journals on metacognitive and cognitive processes and learning performance. *Learning and Instruction* 5, 167-185.
- Marton, F., Dall'Alba, G. and Beaty, E. (1993). Conceptions of learning. *International Journal of Educational Research* 19, 277 - 300.
- Marton, F. and Säljö, R. (1976). On qualitative differences in learning: I - outcome and process. *British Journal of Educational Psychology* 46, 4-11.
- Marton, F. and Säljö, R. (1997). Approaches to learning. In F. Marton, D. J. Hounsell and N. J. Entwistle (Eds.), *The experience of learning* (2nd Edn.). Edinburgh: Scottish Academic Press, pp. 39-58.
- McCune, V. (2000). *The development of first year university students' approaches to studying*. Unpublished Ph.D. Thesis, University of Edinburgh.
- McCune, V. (in press). Development of first-year students' conceptions of essay writing. *Higher Education*
- McCune, V. Hounsell, D. and Nisbet, J. (2003). *Final-year biology courses as teaching-learning environments*. Paper presented to the 10th Conference of the European Association for Research on Learning and Instruction (EARLI), Padova, Italy, August 26-30, 2003.
- McCune, V. and Reimann, N. (2002). *The enhancing teaching-learning environments in undergraduate courses project: some initial reflections and observations*. Paper presented at the 10th Improving Student Learning Symposium - Improving Student Learning: Theory and Practice - 10 years on. Brussels, 4th - 6th September 2002.
- McKeachie, W. J. (1990). Research on college teaching: the historical background. *Journal of Educational Psychology* 82, 189-200.
- Meyer, J. H. F. (2000). The modelling of 'dissonant' study orchestrations in higher education. *European Journal of Psychology of Education* 15, 5-18.
- Meyer, J. H. F. and Land, R. (2002). Threshold concepts and troublesome knowledge: linkages to ways of thinking and practising within the disciplines. In C. Rust (Ed.). *Improving student learning: improving student learning theory and practice – 10 years on*. Oxford: OCSLD, pp 412-424.
- Meyer, J. H. F. and Land, R. (2003). *Threshold concepts and troublesome knowledge (2): epistemological and ontological considerations and a conceptual framework for teaching and learning*. Paper presented to the 10th Conference of the European Association for Research on Learning and Instruction (EARLI), Padova, Italy, August 26-30, 2003.
- Meyer, J. H. F., Parsons, P. G. and Dunne, T. T. (1990). Study orchestration and learning outcome: evidence of association over time among disadvantaged students. *Higher Education* 20, 245-269.
- Morgan, A. (1993). *Improving your students' learning: reflections on the experience of study*. London: Kogan Page.
- Norton, L. S. (1990). Essay-writing: what really counts? *Higher Education* 20, 411-442.
- Perkins, D., and Wilson, D. (1999) Bridging the idea action gap. *Knowledge Directions: The Journal of the Institute of Knowledge Management* 1, 65-77.
- Perry, W. G. (1970). *Forms of intellectual and ethical development in the college years*. New York: Holt, Rinehart and Winston.
- Perry, W. G. (1988). Different worlds in the same classroom. In P. Ramsden (Ed.), *Improving learning: new perspectives*. London: Kogan Page.

- Pintrich, P. R. and Garcia, T. (1991). Student goal orientation and self-regulation in the college classroom. In M. L. Maehr and P. R. Pintrich (Eds.), *Advances in motivation and achievement, Vol. 7, goals and self-regulatory processes*. Greenwich, Conn: JAI Press.
- Pintrich, P. R. and Garcia, T. (1993). Intraindividual differences in students' motivation and self-regulated learning. *German Journal of Educational Psychology* 7, 99-107.
- Pintrich, P. R., Smith, D. A. F., Garcia, T. and McKeachie, W. J. (1991) *A manual for the use of the motivated strategies for learning questionnaire (MSLQ)*. Ann Arbor, Mich: National Centre for Research to Improve Postsecondary Teaching and Learning.
- Pintrich, P. R., Smith, D. A. F., Garcia, T. and McKeachie, W. J. (1993). Reliability and predictive validity of the Motivated Strategies for Learning Questionnaire (MSLQ). *Educational and Psychological Measurement* 53, 801 - 813.
- Prosser, M., and Trigwell, K. (1999). *Understanding learning and teaching: the experience in higher education*. Buckingham: SRHE and OUP.
- Prosser, M. and Webb, C. (1994). Relating the process of undergraduate essay writing to the finished product. *Studies in Higher Education* 19, 125-138.
- Quality Assurance Agency (2002). *Biosciences benchmarking document*. Gloucester: QAA.
- Ramsden, P. (1997). The context of learning in academic departments. In F. Marton, D. J. Hounsell and N. J. Entwistle (Eds.), *The experience of learning* (2nd Edn.). Edinburgh: Scottish Academic Press, pp 198-216.
- Reimann, N. (2003). *First year teaching-learning environments in economics*. Paper presented to the 10th Conference of the European Association for Research on Learning and Instruction (EARLI), Padova, Italy, August 26-30, 2003.
- Richardson, J. T. E. (2000). *Researching student learning: approaches to studying in campus-based and distance education*. Buckingham: SRHE and OUP.
- Säljö, R. (1982). Learning and understanding: a study of differences in constructing meaning from a text. *Acta Universitatis Gothoburgensis, Gothenburg Studies in Educational Sciences*, 41.
- Sambell, K. and McDowell, L. (1998). The construction of the hidden curriculum. *Assessment and Evaluation in Higher Education* 23, 391-402.
- Scouller, K. (1998). The influence of assessment method on students' learning approaches: multiple choice question examination versus assignment essay. *Higher Education* 37, 435-452.
- Snyder, B. R. (1971). *The hidden curriculum*. New York: Knopf.
- Tait, H., Entwistle, N. J. and McCune, V. (1998). ASSIST: a reconceptualisation of the approaches to studying inventory. In C. Rust (Ed.), *Improving student learning: improving students as learners*. Oxford: Oxford Centre for Staff and Learning Development, pp. 262-271.
- Taylor, E., Gibbs, G. and Morgan, A. (1980). The orientations of students studying the social science foundation course. *Study methods group report, No. 7*. Milton Keynes: Institute of Educational Technology, Open University.
- Tett, L. (2000). 'I'm working class and proud of it' - gendered experiences of non-traditional participants in higher education. *Gender and Education* 12(2), 183-194.
- Thomas, P. R. and Bain, J. D. (1984). Contextual dependence of learning approaches: the effects of assessments. *Human Learning* 3, 227-240.
- Trigwell, K. and Prosser, M. (1991). Improving the quality of student learning: the influence of learning context and student approaches to learning on learning outcomes. *Higher Education* 22, 251-266.
- Trigwell, K., Prosser, M. and Waterhouse, F. (1999). Relations between teachers' approaches to teaching and student learning. *Higher Education* 37, 57-70.
- Van Rossum, E. J. and Schenk, S. (1984). The relationship between learning conception, study strategy and learning outcome. *British Journal of Educational Psychology* 54, 73-83.
- Vermunt, J. D. (1995). Process-oriented instruction in learning and thinking strategies. *European Journal of Psychology of Education* 10, 325-349.
- Vermunt, J. D. (1996). Metacognitive, cognitive and affective aspects of learning styles and strategies: a phenomenographic analysis. *Higher Education* 31, 25-50.
- Vermunt, J. D. (1998). The regulation of constructive learning processes. *British Journal of Educational Psychology* 68, 149-171.
- Vermunt, J. D. and Verloop, N. (1999). Congruence and friction between learning and teaching. *Learning and Instruction* 9, 257-280.
- Volet, S., McGill, T. and Pears, H. (1995). Implementing process-based instruction in regular university teaching: conceptual, methodological and practical issues. *European Journal of Psychology of Education* X, 385-400.
- Weinstein, C. E., Husman, J. and Dierking, D. R. (2000). Self-regulation interventions with a focus on learning strategies. In M. Boekaerts and P. R. Pintrich and M. Zeidner (Eds.), *Handbook of self-regulation*. London: Academic Press, pp 727-747.
- Wilson, K., Lizzio, A. and Ramsden, P. (1997). The development, validation and application of the Course Experience Questionnaire. *Studies in Higher Education* 22, 33-53.

Appendix 1 Focus Group Interview Schedule for Final Year Bioscience Students

EXPERIENCES	
Reasons for choice	What led you to take this module?
Teaching-learning	Which aspects of the teaching have you found <i>most</i> helpful, in getting to grips with the key subject-matter? ... And which <i>least</i> helpful, do you think?
Support for learning	What sort of help/support has been available when/if you've encountered difficulties in learning and studying? (Could be from staff or from other students.) [Are there particular areas or concepts that are difficult? What makes them difficult?]
Sense of belonging	To what extent do you feel a 'sense of belonging' in this department/School? [e.g. relationships with other students/with staff?]
Assessment / feedback	Looking at the assessments for this module, how well do they relate to what you are expected to learn? [To what extent have they helped, or hindered, your learning?] What sorts of guidance and feedback are you expecting on your essay assignment?
Module organisation and management	Looking at all the various elements that make up the course (the course design, teaching and learning, the assessments, and so on), how well have they come together, as far as you are concerned?
Engagement	Overall, has this module made you more or less enthusiastic about biology -- and why, do you think?

DOING WELL	
Doing well in the module	What's necessary to do well in this module? (And what influences how well you do?)
Doing well in biology	What's necessary to do well in biology generally, as a subject? (And what influences how well you do?)
Ways of thinking in biology	To what extent do you feel you have learnt to 'think like a biologist'? [... Could you illustrate that with an example?]
Techniques and procedures in biology	To what extent do you feel you have learnt the techniques and procedures of a biologist?
Communicating in biology	To what extent do you feel you have learnt to speak and write like a biologist?
Using your degree	How do you think you're going to make use of what you've learnt from this degree?

ANY OTHER COMMENTS	Is there anything else you would like to say about studying biology, or about your experiences more generally as students in this university?
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