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Learning approaches, study time and academic performance

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Abstract. This study investigated the relationship between learning approach, time spent studying and grades awarded. A class of mechanical engineering students (N=34; male) were asked to keep an hour-by-hour study diary for one week. The Biggs' Study Process Questionnaire (SPQ) provided measures of these students' approach to study tasks. Use of a surface approach to learning was found to be positively correlated with both high attendance in class and greater hours of independent study time. The former is explained by the surface learner's need for the lecturer to define the course; the latter by the inefficiency of a surface approach. Poor grades in spite of long study hours mirror an inefficient surface approach. This finding suggests the need for individual study counselling. Case studies show that the use of a deep approach does not result in good grades unless accompanied by sufficient work. The diary method in conjunction with the SPQ appears to be a promising method for researching workload, study times and other related variables.

Introduction

In the last few years, there has been conjecture and some evidence that engineering courses are 'over full' and that students have difficulty in coping with the ensuing workload. Sparkes (1989) and Ellison (1990) have produced reports for the UK Engineering Professor's Conference which investigate these and other aspects of engineering courses. One general conclusion was that action needed to be taken to ensure that the content became more manageable, more relevant and less demanding so that engineering students are encouraged to adopt deep learning approaches.

Concern for the extent of the curriculum is not confined to engineering. All disciplines face a constant increase in their knowledge base, which in some areas amounts to an information explosion. This creates pressure to include the new material so as to remain relevant and up-to-date. However, it is often not obvious, or admitted, that any of the existing course content has become redundant, so curriculum loads almost inevitably creep upwards.

Despite concern about the extent of curricula, there has been little recent research on the experience of the actual workload of students, especially those in engineering. Studies which have attempted to relate workload to learning approaches have relied upon student perceptions of workload. Dahlgren (1984) identified fundamental misconceptions of basic economic concepts in first year

university students and attributed them to surface approaches to study induced by heavy workloads. His conclusion was drawn from interviews with students. Ramsden and Entwistle (1981) asked students to complete the Approaches to Studying Inventory and the Course Perceptions questionnaire. In their factor analysis, the (heavy) workload scale appeared in the same factor as scales corresponding to reproductive approaches to studying. Items soliciting student perceptions of workload have subsequently been included in many of the numerous questionnaires for gathering student feedback on teaching. Entwistle and Tait (1990) studied the relationship between learning approaches, academic environments and responses to typical items, including workload, commonly incorporated in such evaluation questionnaires.

There also appear to have been few studies which have examined the relationship between approaches to learning and time spent on study. Svensson (1977) used interviews to examine 30 students' approaches to reading selected academic articles. The distinction he found was similar to that described by Marton and Säljö (1984) as 'deep' and 'surface', although his terminology differed. Interview questions were also used to extend the study by inquiring about approaches to study in the courses they were taking and the time spent studying. A higher proportion of students classified as employing a 'holist' approach claimed to have worked for more than three hours per day. Svensson, however, did not interpret these findings as a direct statistical relationship. Instead, the inter-relationship with motivation is noted (1977, p. 242).

> It was clear from the interviews that adopting an atomistic approach created problems for students. The type of learning demanded in higher education becomes exceedingly difficult to tackle in an atomistic manner. Memorisation of the many books, articles and lecture notes is an impossible, as well as unnecessary, task. Some students adopting an atomistic approach are sufficiently motivated to accept the long hours of tedious work necessary to learn this way. For others this approach makes the learning boring and irrelevant, and hence the pattern of declining effort and increased incidence of examination failure is understandable.

Parer and Benson (1989) used diaries incorporating Study Process Questionnaire items to gain insights into the work of 39 students taking a Psychology course by distance education. Their results suggest that those who were intrinsically interested and used a deep approach studied for somewhat longer periods. Parer and Benson were careful, however, to point out that the small sample and the methods employed ruled out any claims that their data established any statistically significant relationship between time spent studying and an approach to learning.

A study by Lee (1991) replicated the procedures of Parer and Benson with distance learning students in Hong Kong. She found that those using a deep approach were better able to handle a heavy workload without feeling stressed. Because of their interest and involvement with the subject matter they viewed the academic tasks as a positive challenge.

The project described in this paper set out to investigate the work and study patterns and learning strategies of a group of first year students on the Higher Diploma (HD) course in Mechanical Engineering at the Hong Kong Polytechnic.

This course was chosen primarily because a revalidation had recently been undertaken and the course team had paid particular attention to workload aspects of the course in devising the curriculum.

The HD course is a two year full-time programme which aims to provide an appropriate balance of academic and vocational training to prepare students for careers as Incorporated Engineers (formerly Technician Engineers) in the general mechanical engineering field. Over a two year period, the course broadly covers the content of the first year of the Bachelor of Engineering course in Mechanical Engineering. The first year of the HD curriculum has three parts; two academic and one practical. The first academic block, lasting ten weeks, has seven subject areas, and student progress is monitored entirely by continuous assessment. This is followed by a four week practical training block in a simulated industrial environment, and then by a conventional fifteen week academic block, with assessment including examinations in most of the subject areas.

Method

When investigating the amount and pattern of student work, a system must be defined for student data logging. Two major methods have been used in analyses that incorporate study time factors. One gathers data on time allocation by asking how many hours were spent on a certain task (e.g. Wade, 1991; Parer and Benson, 1989; McKay, 1978). The other asks students to keep a daily diary, recording work hours after each study session (e.g. Lee 1991; LaPalio, 1981, Blacklock (1978) as quoted in Chambers 1992). Entwistle and Entwistle (1970) used an intermediate method in which a daily grid, divided into morning, afternoon and evening periods, was meant to help students remember their study time for the previous week.

There are weaknesses with either of the common approaches. The first method depends on student memory and perception of workload, a perception which, as Chambers (1992) has pointed out, is affected by both the extent of interest in a topic or task and by how difficult the work is found to be. Even family problems, an illness or any anxiety a student may experience could affect student impression of study workload. Further, it could contain exaggeration since students may feel compelled to describe a level of activity that they may not have actually carried out. As a result of these variables, data collected by this method are primarily used for comparative studies.

The logbook method is less circumscribed by student impression. However, as an added activity it demands a higher level of cooperation. Students do not as a rule keep records of their daily activities.

Within this range of choice, we felt that an hourly recording approach would be most appropriate for detailed study of the work required from students and their learning strategies. This method would not only assist students' recollection of their daily activity but also leave relatively smaller room for impressionistic reactions toward their workload. The logbook, in which each hour of the days was marked, required students to fill in all their activities, including free time, hour by hour,

from 8:30 in the morning until the time they went to bed. Students were also requested to describe the topic nature of their academic activity by entries in their log. A space for each hour allowed for any comments that occurred to them. Students participating in the study would thus be involved in an appreciably lengthy exercise in data recording. Thus, it was decided that to ask students to keep a diary for a one week period was the most realistic approach.

In addition, for each of the week-days, open-ended questions were used to investigate a specific learning activity. In turn, during the week, the activities highlighted were: laboratory work; lectures; library activities; tutorials; and reading and revision. For each activity four or five open-ended questions requested more detailed information about how the selected activity had been approached on the day in question. Some questions sought information on general approaches to the task. Other questions were designed to draw more detailed information on the nature of students' activities and the approaches they applied to tackle academic tasks.

One of the three classes in the first year HD programme in Mechanical Engineering was chosen to participate in this study. The class consisted of 34 students, all male, from two main academic backgrounds. One group was recruited from the 'Advanced Level' (Form 7) matriculant pool, whereas the other group was recruited from the Technical Institutes in Hong Kong, where the students had already undertaken a 2 year full-time Diploma course in Mechanical Engineering.

The diary/questionnaire was administered during the 7th week of the first term when there were no pending examinations that might increase student workload above normal levels. During a session to distribute the logbook, students were informed that findings from the study would be used in the improvement of the Higher Diploma and other courses. Hence their contribution in compiling a reasonably accurate record of their learning activities would be highly regarded. Then they were asked to read through the entire logbook and any part of the contents not clear to them was explained in their mother tongue.

Completion rates were highly satisfactory in that all thirty-four students returned a diary with an entry for each hour of the week. Cross-checks indicated that certain events that occurred accidentally during the week, such as a computer break-down or a lecturer showing up late, were recorded accurately and at the same times in different logs. The lecture, tutorial and laboratory hours students noted matched perfectly with their departmental time table. The class contents described in their logbook are consistent with one another as well as with teaching staff feedback obtained through a short questionnaire described below. Some students showed striking honesty and frankness, a measure of a good level of cooperation. One student, for example, acknowledged that he skipped classes on two occasions in order to be with his girl friend.

Jumped the Mechanical Technology class, owing to illness of my girlfriend (Student 17)

We are, therefore, confident that the diaries are an accurate and honest record of the students' work during the week.

Measure of learning approaches

Data were also drawn from two other instruments. At the same time as the diaries were distributed the same class of students were asked to complete the Biggs' (1987) Study Process Questionnaire (SPQ), using a version with items in both Chinese and English. Their study approach scores would be compared with the comments found in the logbooks and correlated with their study time data.

The SPQ consists of three scales for surface, deep and achieving approaches. Each scale is divided into a sub-scale for a motive and strategy element. The meanings of the sub-scales are given in Table 1.

Table 1. The meaning of the sub-scales in the SPQ instrument

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

(adapted from Biggs, 1987, p.11)

Lecturer's questionnaire

A third questionnaire with nine questions concerning class, tutorial, laboratory and assignment content of the week, and the time expected to be spent on these tasks was distributed to the teaching staff of the class just before the week in which the students completed the diaries. All the lecturers completed and returned the questionnaire.

Analysis

Student logbooks provided us with activity accounts totalling approximately 3,400 hours out of the ($34 \times 168 =$) 5712 possible hours equalling 60% of the students' time. The unrecorded time was mainly sleep. After repeated refining during the coding procedure, a category protocol with two divisions, subject and task, was established. The subject division included 7 subjects the students took during the

week, plus physical education, extracurricular activities and other activities. The task division consisted of lecture, tutorial, laboratory, assignment, general revision, test revision, unspecified study, leisure, reading in library, job, computing practice, language practice, engineering drawing, remedial class, sleep (during day time) and other activities. Each hour's activity was coded according to, first, the subject it concerned, then the nature of the activity. Since details of students' extracurricular life were not a concern of this study, activities such as having dinner or socialising with friends were categorised as free time without any subdivision. The coded data were checked twice to ensure both coding accuracy and consistency in categorisation. When the data file was subsequently aggregated and computed, it resulted in a new data list consisting of the time spent on each task for each subject by each student. The study approach scores obtained from the Biggs' questionnaire was matched with this new data list.

The open-ended questions were studied carefully and the comments which showed insights into students' study were recorded. After comparing the SPQ scores with the findings of open-ended questions, the pattern of different learning styles of mechanical engineering students starts to emerge.

Results

Statistical results indicate that students spent 20.2 hours (90% of expected time) on average in the classroom for the week in question, including lectures, laboratory experiments and tutorials. The average hours spent on independent study are 23.6 hours (77% of expected time) (Table 2). Subjects are labelled A to G as lecturers had been told that evaluation data on individual subjects would be kept confidential.

Table 2. Actual class and independent study hours per week compared with teacher expected hours

	Class hours		Independent study hours		Total	
Subjects	Actual	Timetabled	Actual	Expected	Actual	Expected
	Mean SD		Mean SD			
A	2.03 (0.63)	3	1.82 (2.37)	2.5	3.85	5.5
B	3.44 (1.28)	2.9	3.82 (3.92)	4	7.26	6.9
C	3.35 (0.81)	3.6	5.03 (4.46)	5	8.38	8.6
D	2.91 (0.29)	3	2.82 (2.42)	1.5	5.73	4.5
E	2.35 (0.95)	3	4.29 (3.86)	5.5	6.64	8.5
F	2.03 (0.17)	3	4.09 (3.45)	6	6.12	9
G	4.12 (0.69)	4	1.71 (2.75)	6	5.83	10
Total	20.23	22.5	23.58	30.5	43.81	53
Percentages	90% (actual or expected)		77%		26%	31% (of 7 × 24hr available)

The figures for hours of study can be compared to timetabled hours for formal classes. When the course was designed, the lecturers were also asked to estimate the number of hours of independent study which would be needed for their subject, to support the learning process. The actual hours of independent study can be compared with these suggested hours. Table 2 shows that class attendance is generally close to the full timetabled hours. In two subjects attendance was actually greater than timetabled hours as some students remained in class to complete assignments, mainly for laboratory classes. Overall the amount of independent study was lower than lecturers expected but there were marked variations between subjects.

Table 3 shows correlations between class and independent study hours from the diaries, self-rated English proficiency scores and GPA, and scores on the SPQ. It shows that surface motive correlates positively with both class time and independent study time, and surface and achieving strategies correlate with independent study time only. Deep and achieving strategies, at least in this student population, have a positive correlation with English ability.

Individual case studies

The correlation data in Table 3 help to reveal overall patterns of relationships between the variables. Further insights come from the rich individual data contained in the diaries. To examine the diary data in a coherent way, students were classified according to their SPQ scores. Biggs (1992) has produced Hong Kong norms for SPQ scores based on over 5000 students in five institutions. There are norm tables for clusters of courses of which the "first year Polytechnic general" was most appropriate for this group of students. The mean scores for surface and achieving approaches for the HD class did not differ significantly from the norm means. The class mean for deep approach was a little below the norm mean.

Biggs (1992) suggests a procedure for classifying students against Hong Kong norms for the SPQ, which are available in tables by decile. It is suggested that, for each sub-scale, scores below the thirtieth percentile be rated below average and

Table 3. Correlation coefficients between approaches to studying and other variables (N=34)

	SURFACE		DEEP		ACHIEVING	
	SM	SS	DM	DS	AM	AS
	motive	strategy	motive	strategy	motive	strategy
Independent study time	.35*	.42*	.12	−.16	.13	.35*
Class hours	.45**	.28	−.15	−.21	.22	.09
Self-rated English proficiency	−.07	.00	.13	.46**	−.16	.39*
GPA	.29	.11	.20	.25	.17	.19

*p <.05, **p <.01 (2-tailed)

those above the seventieth percentile above average. Remaining scores are counted as average. The result is a usable shorthand profile for each student which served as a descriptor of students' learning approaches. These classifications helped with the interpretation of material in the diaries which were treated as case studies illustrating the inter-relationships between learning approaches and study time. This information is used in the discussion section to illustrate and substantiate the conclusions drawn from the quantitative data.

Discussion of results

The average study hours per week of the HD students is comparable to the findings of other studies. A study by McKay (1978) and his review of available data suggested that undergraduates in the UK spent about forty hours per week in class and independent study.

Learning approach and study time

Time spent on independent study has significant positive correlations with surface strategy and motive, and with achieving strategy. The positive correlation between time spent on private study and achieving strategy is not unexpected given the definition of the strategy, which encompasses organising study time and behaving as a model student (Biggs, 1987, p. 11, and Table 1). It is surprising that the correlation between independent study time and achieving motive was not significant.

Students with high surface approach scores spend greater amounts of time on private study. The explanation for this finding appears to be the inefficiency of a surface approach. If students fail to distinguish important underlying principles from examples, illustrations and interesting asides, then they are left with memorising as much of the material as they can manage. A student who employs a deep approach can save time by concentrating on the main principles of a lecture, piece of reading, problem or laboratory experiment. This explanation was graphically illustrated by the case studies of individual students.

Neither Svensson (1977) nor Parer and Benson (1989) found a significant relationship between surface approach and longer study times. Indeed it is easier to interpret both studies as showing that students with a deep approach spend longer studying. This contrasts with the present study which found a significant correlation between surface approach and independent study time. However, all of the three studies can be seen as congruent if the number of hours spent studying is seen as a function of the inter-relationship between study strategy, motive, and the nature of the study task.

The starting point of the explanation is the inefficiency of a surface approach to study which is clearly established (e.g. Marton and Säljö, 1984, p. 46; Svensson, 1977, p. 242). In our study it has been well illustrated by the comments in the case

studies. If students do not seek to understand the underlying meaning in their reading or lectures, then they are left with remembering the work "from a to z". Surface learners do not search for unifying principles so are left with the daunting task of remembering numerous fragments of information. When they do not seek to understand the principles they are investigating in an experiment, they are left with slavishly following procedures in a handbook. To accomplish a well defined study task should therefore take longer if surface strategies are employed than deep ones.

This conclusion can be illustrated by a student who scores highly on surface and achieving approaches and puts in long hours.

How do you use your lecture notes and text books to revise for tests? The only way is to learn by rote, and also aided with some exercises.

Read from a to z, aided with textbook, dictionary and little reference book, including copied notes, assignments and notes taken down by myself during sessions.

Because the student does not search for or cannot understand the underlying principles, studying becomes extremely inefficient. Everything has to be read and remembered. The course is defined by the lecturer rather than by interest.

When reading a textbook, how do you learn from it?

Read the lecture part, i.e. I seldom do exercises or make notes. If there is any puzzle, either read a dictionary or make use of reference book or read notes issued by the teacher (because these notes are the extracts, while the text book expands upon these notes).

The surface approach is also readily identifiable in this student's laboratory work, the student blindly following instructions without really understanding the point of the experiment.

In spite of working for a total of 65 hours in the week, the student ended up with a very low grade. It is easy to feel sorry for the student, and others, high on both surface and achieving approaches, who have worked long hours but receive poor grades. Unless they can alter their study approach they face a humiliating academic experience.

It is ironic that students can use a surface approach as short cut yet, because of the inefficiency of the approach, the task actually takes longer. If a task is set which perhaps does not seem particularly interesting or relevant students may well adopt a surface approach and not properly engage the task in a corner-cutting exercise. The results of this study clearly suggest that such expediency will be self-defeating.

The total study time will then depend on the level of motivation of the student. In our study a surface approach was commonly found in conjunction with an achieving approach. To set these scores in context, it should be noted that mean achieving approach scores of Hong Kong students have consistently been higher than those for comparable groups of students in Australia or Britain (Kember and Gow, 1990; 1991). A student who is above average for achieving approach compared to Hong Kong norms (Biggs, 1992) should therefore be seen as a very keen student.

The engineering students who combine surface and achieving approaches must keep on working until they complete their set tasks in spite of the inefficiency of their approach and the long hours necessary. In Svensson's study, a number of the students with an 'atomist' approach must presumably have been less highly motivated. The tedium of constant rote-learning without understanding proved too much for those who reported low study times.

The nature of the study tasks also seems to play a part. The engineering course we examined was graded by continuous assessment. The assessment tasks are fairly short and tightly prescribed. The students are therefore provided with clearly defined study goals which tend to be short term. The higher class attendance of the surface learners suggests that they consciously sought external guidance and goal setting.

The work of Svensson (1977) and Parer and Benson (1989) was with education and psychology students respectively. Compared to the engineering students they probably had fewer but longer and less well defined assignments. They would probably have had more discretion in deciding what and how much was necessary. It would therefore be quite understandable if those who lacked intrinsic motivation or who employed tedious strategies did less work.

The motivation of students is important whether they employ a deep or a surface approach. This conclusion was readily apparent when comparing cases of two students with high scores for deep approach, one with a high score for achieving approach and the other a lower score.

The former student was a model student whose normal practice was to read through notes after a lecture to "deepen understanding". He consistently prepared in advance of classes. He was rewarded by this combination of hard and diligent work and a constant search for understanding by gaining a high mark in the assessment.

The other student was above average for both deep approach and strategy and average for the remaining SPQ sub-scales. His use of a deep approach was shown by answers to the daily questions, which clearly revealed a search for understanding. However, the search for understanding was concentrated on the subjects he found interesting and little work was directed towards others which did not capture his interest. This student had the joint lowest class attendance record and his independent study hours were also low. He certainly could not be said to be lazy though, as he led a full and varied life. The student ended up with a low GPA in spite of adopting a deep approach. Clearly his problem was not enough work, or too little time studying mechanical engineering and too much time applied to other interests. Students with a deep approach need to have their interest captured if they are to be successful.

Class attendance and learning approach

There was a limited range in the figures for time spent in class, from 16 to 25 hours. Even this narrow range is inflated by optional extra classes in English Language attended for up to 3 hours each by 3 students. Without these optional

classes, the prescribed class contact time amounted to 23 hours for the week. There was individual variation as some laboratory classes are not held every week for each sub-group of the class. It was also difficult, with some diaries, to code the time spent in laboratories. After performing an experiment students could stay on in the laboratory to write their reports, rather than doing them at home. It was sometimes not easy to allocate these time slots between class time and private study.

The participant group of students are clearly conscientious about attending class. Only seven students reported attending less than twenty hours of class time. Within the coding limitations this has to be interpreted as meaning that most students attend all, or nearly all of their timetabled classes.

Despite the limited range in time spent in class, there was a significant positive correlation between time spent in class and surface motive. The reason for this relationship is presumably that the surface learners need the lecturers to define the content of the course for them. Without intrinsic interest, the only guidance as to what to study comes from the lecturer. The students therefore attend all classes so that the boundaries and requirements of the course are defined.

English ability and study time

The students in the class were all first language Cantonese speakers. As about 97% of the population of Hong Kong are Cantonese speakers they have little need to make use of English, their second language, outside the classroom. Examination scores indicate that this class is somewhat weak in English. Indeed, the reason some students enrolled on a Higher Diploma course is that their English examination grades were below the threshold for degree course entry.

Formally, the institution uses English as the medium of instruction, though it is openly acknowledged that Cantonese can be, and is, widely used in class. For this class, the diaries show that textbooks, hand-outs and practical instructions are in English, but that Cantonese, or Cantonese mixed with English technical terms, is used for some class discussion. Given the limitations in their English ability and the requirement for usage, at least partially, for study, it might have been expected that there would be a relationship between English ability and study time. More fluent students might be expected to complete study tasks in less time.

The cover sheet for the SPQ contained self-rating items on English ability in reading, writing and speaking. This information has previously been combined into a single scale to give a measure of English ability (Gow, Kember and Chow, 1991). As the correlation between English ability and independent study time was not significant, the suggested hypothesis was not proven.

Academic outcomes

During the ten week period, involving the seven subject areas, a number of prescribed, formal course work activities are recommended in the course scheme.

Typically, a piece of work is required about every two weeks and includes written assignments (problem solving, information retrieval, case studies, design, essays), laboratory reports, short tests and mini-projects.

The 'Grade Point Average' (GPA) is the weighted arithmetic average percentage mark for the seven subjects taken in the first term of the course. The individual subject weightings are based on the total hours scheduled for each particular subject. The correlations between GPA and the SPQ sub-scale scores are positive but not significant.

The correlation coefficients obtained in our study suggest that the assessment for this course would benefit from careful scrutiny. The correlation coefficients between deep motive and the seven individual subject grades ranged from −0.21 to +0.46 and for deep strategy from −0.12 to +0.57. Some subjects appear to be assessing and rewarding mainly reproductive tasks. It is well established that the nature of assessment has a profound effect on the learning approaches of students (e.g. Thomas and Bain, 1984; Watkins and Hattie, 1981)). So, unfortunately both for the course and for our study, the students in this course must have very mixed perceptions about the assessment in the seven subjects. Using GPA as a measure of academic outcomes was therefore problematic as it became questionable as to what outcome was being measured. However, for what was essentially a naturalistic study we felt constrained to use the outcome measure actually used for the course.

The correlations between hours of independent study and class attendance and GPA were not significant. For this class, doing more work did not result in significantly better grades.

Conclusion

The motive for this study was the widespread concern with workload, particularly in engineering courses, and the potentially undesirable effects on the learning approaches of students. After a very intensive study of one class for one week, we can find no evidence that the students in this particular course suffer from excessive workload. The mean working week for the students was 43.8 hours, which is appreciably below the 52 hours obtained by combining timetabled class hours with the independent study time estimated as necessary by the lecturers. Despite this shortfall in hours, every student achieved a passing GPA. The individual diary entries contained some very frank comments about the teaching in the course, yet there were no complaints of excessive work and no evidence that students were adopting strategic approaches as a result of excessive work requirements. As workload had been a prime concern when the course was re-designed, the course designers appear to have been successful in this respect.

There is now considerable literature on the relationship between the teaching context and student approaches to learning (e.g. Biggs, 1989; Bowden, 1988). Effectively, it was this literature which inspired the present study. At the level of contextual variables, our evaluation has concluded that one aspect of the teaching context — namely workload — is about right but another variable — assessment

— clearly needs attention. The diaries also turned out to be useful evaluative tools for the individual subjects, revealing several areas of student concern.

Yet within the overall conclusion drawn from aggregated statistics, there remain individual students who are working long hours. There was a very limited range in class attendance hours but a great disparity in hours of independent study; the maximum being five times the minimum. What is rather sad about the individual statistics is that all too often the long hours of private study went unrewarded. The case study of the student high on both surface and achieving approaches was a prime example of a student who worked long and hard but got poor grades because he consistently used an inefficient surface approach to study tasks.

These individual cases suggest that, alongside care with contextual variables at the course level, there is still a need for attention to the individual student. Individuals such as the student in the case study could benefit considerably from individual study counselling which could help the development and employment of more appropriate learning approaches for tertiary study. Unfortunately, like many institutions, ours does not yet have a service which gives individual counselling on learning approaches.

This study itself provides some useful evidence for study counsellors. It points to the inefficiency of a surface approach and shows that corner-cutting by not properly engaging a task can ironically lead to the task taking longer. The results have shown that there is not a simple relationship between learning approaches, study time and academic outcomes. Use of an inefficient surface approach is undoubtedly a handicap, but sufficiently motivated students can still pass if prepared to work long hours. Adopting a deep approach does not guarantee success; hard work is still necessary. Outcome is not a pure dependent variable as the nature of assessment and the way it is perceived by the students can affect both the study approach and the amount of work.

Use of the student diaries seems to have produced accurate data on the amount of work the students undertook. The diaries in conjunction with the SPQ gave a rich insight into the students' study approaches, motivation and activities. The exercise served as a detailed evaluation of the course. Use of a study diary could, therefore, be recommended as an appropriate methodology for studies of workload, study time, work and leisure activities, and study strategies. We intend to continue this study by using the same method with other courses which did not pay attention to workload at the design stage and, therefore, may be overloaded.

The present was a small-scale study exploring a methodology for a topic which is widely recognised as important but, nevertheless, has not seen a great deal of publications in the accessible literature. Any conclusions drawn must be viewed as tentative in the light of the small sample for this study which was of one class in an institution. What does emerge reasonably clearly is evidence of the complex inter-relationship between a number of variables including learning strategies, motive, study time, workload, assessment and learning outcomes. There is a need for further research in this area and such research should take a holistic approach which allows for the interaction of these various contextual variables.

Methodologies which might be appropriate are interpretive qualitative case studies and/or linear structural equation modelling.

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