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ABSTRACT

The aim of this project is to increase teacher education students' understanding of the learning process by focusing on their own learning experiences. In 1990, 67 preservice teacher education students in 4 classes completed measures of academic locus of control, perceived competencies in self-directed learning, and study processes before and after a semester course in a specially designed program in educational psychology. The program focused on students taking a greater responsibility for their own learning by exposing them to a variety of learning experiences. These experiences include negotiation of the curriculum; self-, peer-, and collaborative assessment; and critical reflection on these and other learning experiences by means of an ongoing learning log. Results indicate an increase in academic locus of control for one class; an increase in perceived competence in a number of aspects of self-management in learning; and an increase in deep motive, achieving strategy, and deep approach to learning. These outcomes are discussed in terms of the congruence between these changes and the particular learning experiences to which the students were exposed. This paper concludes with a list of 35 references and 2 appendixes--"Items: Competencies in Self-Directed Learning Scale" and "Student Evaluation of Subject." (Author/IAH)

MODIFYING THE LEARNING ENVIRONMENT OF STUDENTS TO ENHANCE PERSONAL LEARNING

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ABSTRACT

The aim of this project is to increase teacher education students' understanding of the learning process by focussing on their own learning experiences in a semester course in Educational Psychology. 67 preservice teacher education students in 4 classes completed measures of academic locus of control, perceived competencies in self-directed learning and study processes before and after a semester course in a specially designed program in Educational Psychology. The program focussed on students taking greater responsibility for their own learning by exposing them to a variety of learning experiences. These experiences include negotiation of the curriculum, peer discussion and teaching, learning contracts, self, peer and collaborative assessment and critical reflection on these and other learning experiences by means of an ongoing learning log.

Results indicate an increase in academic locus of control for one class, an increase in perceived competence in a number of aspects of self management in learning, an increase in deep motive, achieving strategy and deep approach to learning. These outcomes are discussed in terms of the congruence between these changes and the particular learning experiences to which the students were exposed.

Paper presented at the annual conference of the Australian Association for Research in Education, Sydney, December, 1990.

APPROACHES TO LEARNING AND THEIR MODIFICATION

This study reports on attempts to modify the learning environments of tertiary students with the aim of improving the way they go about learning. Of the variety of conceptualizations of approaches to learning in the literature, the one which suggests the three approaches of ***surface***, ***deep*** and ***achieving***, not only has a sound theoretical basis supported by a substantial body of Australian and overseas research (e.g. Biggs, 1987; Entwistle and Ramsden, 1983; Watkins, 1983), but also, because it specifies the particular processes students use, is amenable to research which focuses on the modification of those processes. The ***deep approach*** is indicated by an intention to understand the material to be learnt, together with strategies such as reading widely, using a variety of resources, discussion, relating the unfamiliar to the familiar, reflection etc. An intention to reproduce the material to be learnt and avoid failure through focusing on specific details and using rote learning strategies characterizes the ***surface approach***. The ***achieving approach*** is exemplified by an intention to excel by using highly organized learning processes. Investigations have indicated that approach to learning depends on both contextual factors and personal characteristics (Biggs, 1987; Entwistle and Waterston, 1988; Ramsden and Entwistle, 1981; Watkins and Hattie, 1985).

Recent research into student learning has indicated that surface approaches are frequently used, and are usually

quite adequate for, success at primary and secondary school level (Biggs, 1985; Entwistle, 1985; Selmes, 1986; Watkins and Hattie, 1985). In their longitudinal study, Watkins and Hattie (1985) report that few students found it necessary to modify their strategies and approach to learning in order to be successful at tertiary level. On the other hand, (Biggs, 1982) reported that university students were more likely to use a deep or achieving approach than were students from colleges of advanced education (CAEs). Our experience at Brisbane CAE[2] has been that, in general, students use surface learning strategies.

Numerous writers have documented practices that encourage surface approaches to learning (Biggs, 1989; Marton, Hounsell, and Entwistle, 1984; Ramsden, 1985, 1987; Watkins, 1984). These include: overload of work, assessment processes requiring and rewarding reproduction of content, poor teaching, poor student-teacher interpersonal relationships and a lack of opportunity for self-management.

In deriving approaches to teaching from his 3P model, Biggs (1989) suggests that the "Products" or outcomes can be influenced in three main ways: additively, interactively, and contextually. It is within the ***interactive*** mode of improving teaching that factors leading to surface learning can be minimized and those leading to deep learning can be maximized. Biggs (1990) believes that student presage factors are resistant to

influence, at least by teachers; whereas, factors within the teaching context such as course content and structure, methods of teaching, including assessment, are more amenable to modification. This suggestion is supported by Ramsden and Entwistle (1981), Ramsden (1985), and Watkins (1984).

BACKGROUND TO THE STUDY

As a result of dissatisfaction with our approaches to teaching, which Biggs (1990) would characterize as Level 2, and our students' approaches to learning, which in general were surface, we decided to try something different. We wanted our students to use deep strategies to increase the likelihood of meaningful understanding. We felt that our approach should centre around helping students achieve greater self management in their learning through giving them greater control over different aspects of the context, particularly control in decision-making. We saw ourselves as being facilitators of learning, somewhat similar to that described by Rogers (1969).

> Learning is facilitated when the student participates responsibly in the learning process. When he chooses his own direction, helps to discover his own learning resources, formulates his own problems, decides his own course of action, lives with the consequences of each of these choices, then significant learning is maximised (pp.162-3).

We wanted to make our approach to teaching similar to what Biggs (1990) has recently labelled Level 3, where the role of the teacher is to interact with students in

ways that will facilitate the students' own active appropriate constructions of meanings.

ORGANIZATION OF THE PROGRAM

This changed approach to teaching has been implemented in a compulsory one semester subject, ***The Psychology of Learning and Teaching***, in a pre-service teacher education course preparing teachers for secondary schools. The organization of ***The Psychology of Learning and Teaching*** is such that at the initial meeting, lecturers present to students an overview of their approach to the subject. This includes a description of their teaching approaches as well as their assessment procedures. Students are then asked to sign on with the lecturer (approach) of their choice. The only constraint on this choice is that all classes have to be of approximately equal size, usually 20-30.

The first attempt at using the new approach was in 1989. Students were reluctant to enrol in this first offering, possibly because it was new and different or because it was described as requiring students to accept responsibility for their own learning and all that this entailed. Since that first occasion however, there has been no difficulty in obtaining the prescribed numbers, probably because of the favourable evaluations of the subject circulated throughout the informal student networks.

1989 was a learning experience for us just as much as it was for our students and a lot of time and effort was spent in close interaction with the students - we had to find out what worked and what didn't. The verbal feedback we received from students was positive and supportive enough for us to continue with the approach in 1990. No quantitative data had been collected, but as a result of this experience, we decided to collect both quantitative and qualitative data during 1990.

IMPLEMENTATION OF THE PROGRAM

What follows is a description of the program structure and some of the learning experiences available for students. The program runs 3 hours per week for 13 weeks, where the contact hours occur as a 3 hour block. The initial meeting of the group is crucial and is discussed in some detail.

The First Day

The first meeting of the group is spent orienting the students to the approach in greater detail. The subject outline is distributed and time is spent discussing the rationale for the approach, the objectives of the course, possible teaching/learning strategies that may be used, and the assessment procedures to be employed. The subject is a 10 credit point subject and consequently, there are three assessment items - a personal learning log (20%), a seminar presentation developed by a "learning group" (defined below) (30%) and a learning contract (50%).

These are discussed in some detail with the students at this point as they incorporate many of the teaching/learning strategies used in the program. They are dealt with in the next section.

When this discussion is completed, students choose who they would like to work with in a learning group. This is followed by a small 'getting-to-know-you' activity within the group, and then each group is asked to introduce themselves to the whole class. By way of introducing the students to co-operative learning, each group is then asked to produce a model of the teaching-learning process ***based on their experiences*** both as a student and as a neophyte teacher. These are prepared on butcher paper using crayons, and when completed are explained to the rest of the class by each learning group.

These models quite often reflect ideal conceptions of learning. A discussion of how students have actually gone about learning during their time at BCAE - what has been emphasised, valued and rewarded - helps to modify these idealistic conceptions because their prior experiences tend to have focussed on a quantitative reproductive approach. This provides a common basis of shared perceptions on which to build and by focussing the discussion on how students expect to go about learning in the ***Psychology of Learning and Teaching*** course, the objectives and rationale for the program is discussed again.

Then follows negotiation about the course content. The students are informed that the only fixed topic to be studied is Learning and what that involves: e.g. Behaviourist, Cognitivist, and Humanist approaches to learning, Constructivist approaches to learning, the 3P model of learning, Metacognition and Metalearning, and learning strategies based on the work of Weinstein and Mayer (1984). We then briefly discuss the 3P model of learning proposed by Biggs (1987) and use this as the starting point of a discussion of what the students consider to be important topics to be addressed after the study of Learning has been completed. The amount of time taken to develop these topics varies from class to class. However, most seem to agree that Motivation, Classroom Management, Learning Styles, Teacher Expectation Effects, and Self-Concept are areas that would be useful to study as a class.

At the conclusion of the first 3 hour session, students are provided with pre-reading which they are to prepare for discussion in their learning groups in the next session.

Assessment Procedures and Teaching/Learning Strategies

The assessment items are:

(1) Maintenance of a Personal Learning Log

Students need to reflect on their learning experiences for a number of reasons:

- to monitor their goals and evaluate their progress towards them;

- to monitor their use of strategies;
- to analyse their learning;
- to facilitate self understanding and personal meaning;
- to become self-aware through being able to trace their development; and
- to interrelate ideas.

To this end, students maintain a ***personal learning log***. This is discussed, goals for the log developed, and ways of keeping the log are decided. It is given a 20% weighting for assessment and is self-assessed by each student according to criteria and standards of performance they determine individually. Students have the opportunity to discuss any entries with their peers or us at any time. From past experience, we have found that a number of students use the log as a means of communicating with us e.g. by posing questions, so we collect the logs at about mid-semester and also end of semester so that we can provide them with feedback.

(2) Learning Groups

A strategy that we believe useful is to have students work cooperatively in small groups, which we call ***learning groups***. These groups typically and ideally are made up of three students, although sometimes pairs have to be used because of numbers. Students select with whom they would like to work during the semester. Normally, the first part of each class meeting period is organized around these learning groups. Two major activities occur in these groups:

(a) ***Group Discussions.*** Students discuss their understandings of assigned readings or other related material they have interacted with. In these discussions, they are encouraged to clarify, challenge and apply concepts and their understandings in specific content areas. While this is going on, we move from group to group so that we can address any misconceptions and also gain an understanding of how our students are going about constructing their knowledge.

(b) ***Teaching Episodes.*** Each member of the group teaches the other members about a topic decided by the group. These teaching episodes occur on three consecutive meeting days about halfway through the semester. The group may decide that they want to learn about a particular topic with each member selecting a particular aspect or perspective e.g. if the group choose to learn about motivation, they may decide that Person A teach about Locus of Control, Person B about Attribution Theory and Person C about Self Efficacy. Alternatively, the group may decide that each group member teaches a topic they are personally interested in e.g. Person A teaches about Gifted Children, Person B focuses on Glasser's Control Theory and Person C teaches Self Concept. The ***teaching episode*** follows a particular format based on a strategy developed by a colleague (Burnes, 1988).

Associated with this activity, each group prepares what we call a ***seminar statement***. This involves indicating what each group member is going to teach and, depending

on how they have decided to operate, developing either group or individual objectives for the seminars. Since they are to assess each other's teaching as well as their own, they have to produce as part of the seminar statement, criteria for this assessment as well as standards of performance to make these judgements.

This activity is weighted at 30%

Peer teaching not only requires the presenter to engage in productive teaching/learning activities, but also involves the presenter in reflecting on knowledge from the point of view of the learner who (presumably) knows less. Feedback from our students indicates that not only do the group members who are taught believe it is a valuable learning experience, but also the 'teachers' believe it is very worthwhile.

McKeachie, Pintrich, Lin and Smith (1986) emphasize the importance and effectiveness of "...students teaching other students" (p. 63) for a variety of goals and content areas. As well, Biggs (1990) asserts that in small group teaching episodes such as these, the interaction resulting is characterized by several features that lead to optimal processing:

> a high level of activity; students are less likely to remain passive in well run groups.
>
> students provide each other with immediate feedback, at a level they can readily encode.
>
> students are more likely to be evenly paced in their respective processing abilities, so that interaction is always engageable.

> in both group- and problem-based learning, students are placed in a context providing a felt need to respond: group expectations and a genuine problem demanding solution, respectively. (Biggs, 1990, p.9.)

Our observations and student feedback support these beliefs.

(3) Learning Contract

In accord with our aim of helping students achieve greater self-direction in their learning, the third item of assessment involves a learning contract. This approach is used for a number of reasons but mainly to allow students to control learning experiences to meet their own needs and interests, and to give them the opportunity to develop skills necessary for educating themselves. The contract may be developed at an individual or learning group level. They prepare learning contracts which specify their intended learning goals, the learning activities they will engage in, and how they will provide evidence that they have reached their goals. These contracts are intended to be negotiated early in the semester to allow for renegotiation during the semester if necessary. Students may elect to have the work collaboratively evaluated with us, in which case they negotiate criteria and standards of performance as well as the above, or they may decide to leave the evaluation to us. The only constraint on what they may select to learn about is that it must relate to the teaching/ learning process.

This work is weighted at 50%.

Other Teaching/Learning Strategies

Much has been written about the effectiveness of teaching learning and study strategies to students (Biggs, 1989, 1990; McKeachie, Pintrich, and Lin, 1985; Ramsden, 1987). Ramsden (1987) asserts that there are two perspectives on strategy training, corresponding to reductionist and holist views of teaching. On consideration, our approach encompasses both of these perspectives.

Our experience has been that some students come into the course with very little understanding of identifying and locating information sources. To help with this, the students are taken to the Education Resource Centre where a librarian shows them how to use the various systems. They need to be able to do this in selecting papers, articles, books and other resources for their peer teaching episodes and learning contracts.

Discussions with students during the initial meetings have indicated that they are generally familiar with rehearsal strategies but less aware of elaboration, organisation, comprehension and affective strategies as described by Weinstein and Mayer (1984). As a result, we show them what these strategies involve, when they may be used, help them understand in what ways and why they will improve their learning, and give them practice through applying them to course material e.g. reading a paper, choosing the most important information, interpreting this through paraphrasing it, applying it to a classroom situation, organising this information through concept

mapping or networking or some other form of graphic organiser. Students are also encouraged to use appropriate strategies in the compilation of their learning logs.

As mentioned previously, the first part of each meeting period is given over to the students working within their learning groups. One of the activities that they may engage in during this time is sharing their understandings of particular course material. This might include discussing specific strategies used and sharing summaries, concept maps and the like. We are continually concerned with students' goal setting and monitoring of strategies, and encourage this through self-evaluation and peer interaction. Other activities that students engage in within their learning group include the analysis of case studies developed by themselves from their Practice Teaching school experiences, and role plays related to the approaches discussed in Classroom Management e.g. Glasser, Dreikurs and Gordon.

Following the *learning group* session is a full class discussion. Here, the *learning group* experiences are shared and again, clarifying, challenging and applying of the concepts occur, this time in a broader context. Lecturers may well introduce complementary and supplementary material. At the end of the session, expectations regarding the next session are clarified.

As mentioned earlier, we are aiming to improve the quality of our students' learning, and to this end we attempt to provide experiences that require metacognitive thinking. These encompass the two important elements emphasised by Paris, Lipsom and Wixson (1983): (1) declarative, procedural, and conditional knowledge, and (2) evaluation, planning, and regulation. We feel that both of these are catered for in the experiences described.

The study reported here is based on data collected during 1990 from students who elected to become involved in this program.

DATA COLLECTION AND ANALYSIS

Sample

The sample consists of 67 students in 4 classes taking the subject ***Psychology of Learning and Teaching***. 2 classes were in Semester 1 and 2 in Semester 2 of 1990. All classes were taught by the senior author. The students come from a variety of content area specializations. Details of the sample are shown in Table 1.

(Table 1 somewhere here)

Information Collected

The rationale for collecting specific data arose from the philosophy underlying Biggs' Level 3 approach and the 1989 experience. This rationale and the measuring

instruments selected are discussed below. Since we were interested in the changes that the program may have caused, data were collected at the beginning and the end of each semester during 1990. On the first day, the students completed the pre-test measures dealt with below before any further discussion of the subject took place.

The data collected were:

. ***perceptions of capability for self-directed learning.*** Even though students had elected to take our approach which offered them the opportunity of greater self-management of their learning, our 1989 experience indicated that students were at varying levels of readiness for this type of learning. For the 1990 students in both semesters, we assessed their perceptions of their ability in this area using a self-rating instrument, Competencies of Self-Directed Learning (CSDL) provided by Knowles (1975). Students indicated on a 7 point scale the extent to which they possessed nine competencies with a higher score indicating a greater perceived competency. This also identified areas that students and ourselves could attempt to strengthen throughout the semester. The items are shown in Appendix 1.

. ***locus of control orientation.*** A number of 1989 students provided feedback which suggested that being responsible for their own learning was instrumental in their adoption of a deep approach to learning throughout the semester. This notion is supported by other research (Biggs, 1985;

McCombs, 1986; Ramsden, 1985). Consequently, we decided to measure students' academic locus of control.

Students completed the Academic Locus of Control Scale (ALC), a 28-item measure of beliefs in personal control in academic settings for college students developed by Trice (1985). The items

> ...reflect Rotter's (1966) internal/external distinction where internal attributions (low scores) index belief that personal effort is required to achieve success in academic settings, while external attributions (high scores) suggest that powerful others or situational factors largely determine success or failure" (Trice, Ogden, Stevens and Booth; 1987: 483). (Parentheses are Trice ***et al***'s).

. ***approach to study.*** There is a considerable recent history of research on the ***study processes*** of learners. Notable among researchers in this area are Biggs (1987, 1988), Entwistle and Ramsden (1983) and Watkins (1982, 1983). The research has focussed on students at secondary and tertiary levels and has produced valid and reliable measures of individual study processes such as the Study Processes Questionnaire (SPQ) (Biggs; 1987). The SPQ is a comprehensive measure of study processes, allowing the measurement of combinations of students' Surface, Deep or Achieving approaches to study. These approaches have been defined earlier. There are six subscales: Surface Motive, Surface Strategies, Deep Motive, Deep Strategies, Achieving Motive and Achieving Strategies. Pairs of conceptually related subscales can be added to give a measure of an approach. For example, Surface Motive plus

Surface Strategies provides a measure of Surface Approach and so on.

. ***student impressions of the program.*** At the completion of both semesters, students were asked to provide written feedback on their evaluation of their total experiences in the subject. These were open-ended responses with no structured proforma provided and were designed to provide qualitative data to both complement and supplement the quantitative data collected using the instruments above. A representative sample of student responses are shown in Appendix 2. In their ***Learning Logs***, students commented on their personal learning experiences and a representative sample of these are also shown in Appendix 2.

Results

Data analyses were carried out using the SPSS-X package (SPSS Inc; 1988). Because pre- and post-test data were collected across classes, changes that occurred could be due to main effects of CLASS or TIME or to an interaction effect (CLASS BY TIME). Since there was only a single score for ALC, an ANOVA was performed. For the other variables (CSDL and SPQ), the general procedure used was to carry out a multivariate analysis of variance (MANOVA) to test for multivariate effects. If such an effect exists, the MANOVA provides the confidence that univariate measures are operating at the prescribed level of ??=0.05. This was then followed by univariate analysis of variance (ANOVA) for each of the significant variables. Where there were interaction effects,

dependent *t*-tests were then computed as ***post hoc*** tests to determine significant differences. These were Bonferroni adjusted. For main effects, the univariate ANOVA results were used for interpretation.

A number of significant interaction effects were identified. Although these are interesting and provide useful information, they are not discussed in this paper. They are included in a subsequent manuscript (Dart and Clarke; in preparation). Interaction effects are reported but only main effects are discussed. Limitations of the data analyzed are that there is a majority of female respondents, the study relies on self-report data and students select into the program.

1. Academic Locus of Control Scale (ALC). An ANOVA of the pre- and post-test scores across classes indicated that *F* was significant for CLASS, $\{F(3,63)=4.05,\ p<0.05\}$. *T*-Tests of the class means, using a Bonferroni correction of $p<0.0125$ indicate that the significance occurred due to students in Class 4 becoming significantly more internal. The results are summarized in Table 2 and Figure 1.

(Table 2 and Figure 1 somewhere here)

2. Competencies of Self-Directed Learning (CSDL). A MANOVA of the pre- and post-test data across classes for the 9 items of CSDL proved to be significant for the interaction $\{F(27,171)=1.72,\ p<0.05\}$. Univariate *F* values for each item indicated CLASS BY TIME interactions for Items 1 to 4 and a main effect for TIME for Items 5 to 9

as summarized in Table 3. The descriptive data for CSDL are summarized in Table 4 and Figure 2.

(Tables 3 and 4 and Figure 2 somewhere here)

3. Study Processes (SPQ)

The pre- and post-test data for the 6 subscales and the 3 approaches of the SPQ were subjected separately to the MANOVA procedure. The "subscale" data proved to be significant for a CLASS BY TIME interaction ($F(18,180)= 2.30$, $p<0.01$). Univariate F values for each "subscale" indicated a significant interaction effect for Deep Strategy ($F(3,63)=3.01$, $p<0.05$), Achieving Motive ($F(3,63)=5.86$, $p<0.01$) and Achieving Approach, $F(3,63) = 4.71$, $p<0.01$ and a significant main effect for TIME for Deep Motive ($F(1,63)=26.65$, $p<0.001$) and Achieving Strategy ($F(1,63) = 5.24$, $p<0.05$).

The "approaches" data proved to be significant for a CLASS BY TIME interaction ($F(9,189)= 3.03$, $p<0.01$). Univariate F values for each "approach" indicated a significant interaction effect for Achieving Approach ($F(3,63) = 4.71$, $p<0.01$) and significant main effects for TIME for Deep Approach, ($F(1,63)=38.53$, $p<0.001$). Again, interaction effects are not discussed further here. The descriptive data are summarized in Table 5 and Figure 3.

(Table 5 and Figure 3 somewhere here)

In summary, focussing on main effects only:

(a) **ALC:** Class 4 developed a more internal locus of control while other classes showed no change.

(b) **CSDL:** All classes perceived an increase in competencies dealing with learning skills (Items 5 to 9).
(c) **SPQ:** All classes increased in Deep Motive, Achieving strategy, and Deep Approach.

DISCUSSION

Essentially, the program achieved what it set out to do. It adopts an ***interactive*** approach to improving teaching (Biggs; 1989) wherein student and teaching presage factors are dealt with in ways which attempt to minimize surface learning and maximize deep learning. The results are that the program developed skills in self management of learning, and led students to become intrinsically interested in the content of the course (Deep Motive) and to choose to engage in learning activities in an organized way (Achieving Strategy). Further, the program also fostered understanding in students through the use of appropriate strategies (Deep Approach).

With respect to Competencies in Self Management of Learning

Items 5 to 9 of the Knowles' (1975) scale are ***task*** oriented. They deal with the students' abilities to facilitate the achievement of learning objectives by identifying, locating and choosing appropriate human and material resources and by selecting effective strategies that not only utilize those resources but also address the needs of the learners. Although many of the experiences in the program would have helped develop

these skills, one in particular, the teaching episode, focussed explicitly on the competencies necessary to prepare and teach effectively.

Student comments support this conclusion:

(The teaching episode) has developed my ability to tackle a difficult task. At the start of the semester, I felt I would not cope, but I have applied myself to the tasks and feel that I have achieved and it has helped me personally.

When I first found out that I has to teach all by myself, I really panicked. With the support I received and the experiences I had in class, I soon found that I was able to take control of what I needed to do, to identify the area, set my learning objectives, work out how I was going to present it and even engage in self- and peer-assessment.

With regard to Deep Motive:

This quantitative result for Deep Motive can be simplistically seen to indicate an increase in ***intrinsic*** motivation at the expense of ***extrinsic*** motivation. Biggs (1990) warns against this, proposing a more complex value-expectancy interpretation. The qualitative data from students and the organization of the program support this more complex model which Biggs sees as having two tasks for the teacher:

1. To help students ***value*** what they are doing;
2. To give them a reasonable ***expectation*** of success.

With respect to ***value***, Biggs (1990) identifies two significant influences - how students engage the task and task ownership. Elements of the program which address these issues are the ***learning groups*** and all that they involve, the freedom of choice students have in content

and assessment, the responsibility students have toward themselves and other students, the supportive facilitative role adopted by the lecturer and the relevance of the experience and content for the students' competencies as future teachers.

Sample student comments which relate to these dimensions of ***value*** are:

I was highly motivated to achieve in this subject because of the democratic nature adopted by the lecturer. We were able to choose the topics of our projects and seminars. This is a very democratic approach to learning that stimulates learners to become more autonomous. We could also choose topics that we felt were important to us directly as future teachers. I didn't feel as threatened in my group as I would have giving a seminar to a whole class group. I believe that teachers must consider themselves as educators. Therefore, they must treat their students as co-workers, giving them the responsibility for their own learning. This I felt was promoted in this subject and having seen it work, I will try and adopt some of its framework in schools.

The seminars I felt were particularly effective, as was being able to argue 'real' issues in their 'real' context (our whole classroom approach) with other people my own age.

I liked being able to explore avenues of my own choice. So often we are forced to investigate topics that are of no real interest to me. I learn more when I enjoy what I'm doing. I take more pride in my work.

I liked this course because it brought together aspects discussed in Sociology and Philosophy and made them relevant. The information was related to practical experiences and not just information out of a book.

In relation to ***expectancy***, Biggs (1990) identifies the crucial factor to be the students' efficacy beliefs. He contends that these beliefs are influenced by perception of outcome, teacher expectations, attributions for success and failure, task difficulty, initial goal setting and feedback. We would contend, as does Biggs

(1990), that such beliefs can also be influenced by the development of self management skills.

Elements of the program which focus on ***expectancy*** are the processes which help students to understand their own learning, to set goals, and to develop appropriate criteria and standards of performance. Students receive lecturer and peer feedback which not only is supportive but also stresses effort and the application of learning skills and strategies they are developing. This network of lecturer and peer support is continuously available to allow students to check their progress and receive direction as required.

Relevant student comments are:

I can honestly say I started this subject off poorly, but this was due to many reasons. Firstly, I was taught in a fairly traditional school, where to a certain degree we were 'spoon fed'. I then moved through BCAE in the same way, so this style of learning was new to me; hence I felt we had no direction in our class meetings. After the first few weeks' hiccups I began to appreciate this style of learning and gain control over my own learning. I believe that I analysed information learnt, hence rote learning was abandoned, which was refreshing as this style had played a major role in my education at BCAE. My journals not only evaluated and scrutinised the information learnt, but added a personal highlight where I was able to relate information to past experiences, which made it beneficial to me.

I feel that the work I have put into my journal is quality work - I understand it and I have learnt more in this subject than any other. In fact, I have done more work and put more effort into this log and this subject than anything I have ever done at College ...I think the proof of my knowledge lies only in its application in the classroom. I am bursting to be a good teacher, I feel so loaded up with ideas and thoughts and somehow writing them all down seems inadequate. I can't tell you if I will be a good teacher, but this log is evidence that my head is screwed on properly. Bearing all this in mind, I am about to embark on my final leg of prac. probably to

be politely informed that I know nothing. Sometimes I feel like quite impolitely telling them to 'Get stuffed!'

With regard to Achieving Strategy:

The program aims to influence this by setting up situations where student have to become organized in how they go about learning. There is required pre-reading before each *learning group* session which occurred at the beginning of each 3 hour session. The seminar presentation required the distribution of materials and discussion starters prior to the event etc. In other words, being a responsible member of a *learning group* forced students to organize themselves. Further, exposing students to and giving them experience with the affective strategies of Weinstein and Mayer (1984) would also have contributed to this. Students found that, as the semester progressed and their organizational skills developed, the quality of their learning and their feelings of efficacy increased.

See comments immediately above along with:

I now go about my learning in a more business-like manner - I set goals, arrange a schedule and monitor my progress. I know how to self-verbalize to control my behaviour and I know what strategies to use and when.

With respect to Deep Approach:

Deep Approach is a combination of Deep Motive and Deep Strategy. The significant change in Deep Approach throughout the semester is mainly due to the influence of the Deep Motive scores. However, the use of a wide variety of resources, the application of content to classrooms, the *learning group* and whole class

discussions and reflection on their learning are all strategies in the program aimed at increasing meaningful understanding.

Further, the significant improvement in the students' perception of their skills in self management of their own learning not only contributes to their feelings of self-efficacy, but also to a Deep Approach to learning.

Some confirmatory comments:

I really got into my learning and tried to get an understanding of it. I took a deep approach.

I used a deep approach because I aimed to apply the learning to wider implications of teaching, endeavouring to improve my understanding of student learning. This was possible because the course has been so flexible it gave me the scope to personalise my learning. In doing this everything undertaken was enjoyable, not a chore. Whenever I'm really interested in something I tend to put in my fullest effort and therefore use a deeper learning approach. I liked having control over my assessment and choice in the major presentation. It was great to adapt the assessment to how much I put into everything. I really liked the freedom of choice and assessment approach.

My approach was self-directed. There was no pressure to learn for an exam, which I thought was great. The learning I did was for understanding - I learnt for myself, not an exam. I found myself interested in the subject because it could be related to teaching. I spent time thinking about aspects of learning and teaching, relating it to me as a teacher-to-be. I learnt all that I wanted to. I found that I read extra journals and books just to expand my knowledge and understanding of the subjects. This is not a usual habit of mine.

This study, which has demonstrated increased perceived competence in the self-management of learning and increased Deep Motive, Achieving Strategy and Deep Approach, has indicated that student personal approaches to learning can be changed by modifying their learning

environment within a specific content area. This is consistent with the ***interactionist*** perspective on which this study was based because, by modifying the context in which learning was occurring, student presage variables have been influenced.

From our perspective, what is important about the results of the study is not that there has been a significant increase in students' scores on data collection instruments or that thay say that they are now doing things they were not doing before. What is important to us is the quality of the work being produced by the students. There is evidence in their teaching episodes and projects that they are translating their stated changes in learning behaviour into practice.

A CAUTIONARY NOTE

It should be stated that, although for many students the program achieved what it set out to do, this was not the case for all students. Some students, although they liked the approach, found that external institutional pressures made it difficult to maintain their involvement in the program at a high level. Others just did not like the approach at all. For example:

My approach to learning in this subject started well (deep) but gradually declined as the semester progressed and pressure came from other subjects.

This really didn't suit me - I need someone to kick me and tell me to 'Do it!'

I was interested so I paid attention in class, but that it is where I left it.

Basically I did what I had to to get through. I definitely used a surface approach except for the learning contract which provided me with a good chunk of deeper understanding.

You don't have the time to use a deep approach at College. You do the work to pass the subject.

CONCLUSION

Although this program is only operating in a small way at the moment, its effects are encouraging. A significant number of students, although acknowledging that there is a considerable amount of work involved, believe the effort is worth it and feel that the experience will contribute positively to their own teaching.

The whole subject will have a long term effect because everyone needs to know how they learn, and as teachers we shouldn't forget how students learn.

It is a subject we only do once at College, that I shall be using for the rest of my teaching career.

Feedback from students indicates that they believe they have become more metacognitively aware - they are now able to determine more purposefully skills and strategies appropriate for task demands and to monitor their effectiveness.

I now know a hell of a lot more about learning and how students learn and why they learn how they learn.

I now know how I learn best and I can use this knowledge to teach myself and study to achieve the best results possible for me.

The strong message from this study is that if students perceive that the course you offer them requires understanding and provides opportunities to apply such knowledge and skills so as to enhance their personal competencies, they will choose to use a deep approach.

There is much work yet to be done in this area. For example, his study has only focussed on a specific subject area. Further, the interaction effects to be discussed elsewhere (Dart and Clarke; in preparation) indicate that, although the program and lecturer were the same across classes, there are class-specific changes for some of the measured characteristics. The idiosyncratic nature of these responses suggest that additional information about the particular classroom learning environments, particularly student perceptions of their actual and preferred environments, may be needed in subsequent research. Studies of this nature have been piloted or are in progress (Clarke, 1990; Clarke and Dart, 1990; Clarke, Dart and Chant, 1990a, 1990b) and would support this approach.

Notes

1 The authors wish to acknowledge the contribution of their colleague Dr Paul Burnett who has made a significant contribution to this paper by developing, and advising on the interpretation of, the multivariate analysis model used in this study.

2 This institution has undergone a change in name and status throughout the course of this study. Prior to May 1990, it was the Brisbane CAE; subsequent to then, it has become part of the Queensland University of Technology.

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APPENDIX 1

Items: Competencies in Self-Directed Learning Scale

1. An understanding of the differences in assumptions about learning and learners and the skills required for learning under teacher-directed learning and self-directed learning, and the ability to explain the differences to others.

2. A concept of myself as being a non-dependent and a self-directing person.

3. The ability to relate to peers collaboratively, to see them as resources for diagnosing needs, planning my learning and learning to give help to them and receive help from them.

4. The ability to diagnose my own learning needs realistically, with help from teachers and peers.

5. The ability to translate learning needs into learning objectives in a form that makes it possible for their accomplishment to be assessed.

6. The ability to relate to teachers as facilitators, helpers or consultants, and to take the initiative in making use of their resources.

7. The ability to identify human and material resources appropriate to different kinds of learning objectives.

8. The ability to select effective strategies for making use of learning resources and to perform these strategies skilfully and with initiative.

9. The ability to collect and validate evidence of the accomplishment of various kinds of learning objectives.

APPENDIX 2

Student Evaluations of Subject

I came to this class not by choice, and feel I may be more suited to a more structured approach. I think I surprised myself in liking the choice that was given.

I hated the log but enjoyed the learning contract even though it was heaps of work. The style of seminar was great, particularly choosing the topics you wanted to learn.

This course suited me because I was able to learn in my own style, but I was also able to look at other learning styles.

I loved the log; should have been worth more so as to motivate to keep up and therefore get the same satisfaction out of it as I did.

My approach to learning in this subject started well (deep) but gradually declined as the semester progressed and pressure came from other subjects.

The seminars were great - I really enjoyed them.

This subject was especially useful as most of the topics were directly related to the classroom. However, I found the work load to be too demanding with readings, log entries, seminar preparation and report, and contract work. The seminars and contract proved to be a great learning experience. It's a good idea to be able to choose areas of interest to research rather than being given a topic which you are not interested in at all.

I now know a hell of a lot more about learning and how students learn and why they learn how they learn.

I liked this course because it brought together aspects discussed in Sociology and Philosophy and made them relevant. The information was related to practical experiences and not just information out of a book.

I really learnt in this subject. Even went home and talked it over with my boyfriend - who had to listen.

Yes! Yes! Yes!! As I keep on saying, and I mean it genuinely, the whole subject is a constant source of intrigue and 'Oh, yes, this relates to that, in my life.' The seminars I felt were particularly effective, as was being able to argue 'real' issues in their 'real' context (our whole classroom approach) with other people my own age. Through this course I have learnt effective strategies for unbiased teaching. I just need more subjects like this that make me get my butt into gear. I've been babied too long. It makes me want to do the work. Thank you!

I liked being able to explore avenues of my own choice. So often we are forced to investigate topics that are of no real interest to me. I learn more when I enjoy what I'm doing. I take more pride in my work. I feel I will be a better teacher because I've been made aware of so much throughout this course. Thank you!

This really didn't suit me - I need someone to kick me and tell me to 'Do it!'

I was interested so I paid attention in class, but that it is where I left it.

My approach was average at first, but when I saw your enthusiasm and interest in the subject I instantly increased my approach to learning. As I mentioned above - your enthusiasm and interest and of course, treating us as individual adults, not just a group of sponges (ready to soak information).

The most satisfying part of the course was the freedom given to us to learn what interested us.

I had almost all of the control over my learning. At all times it was a self-directed process.

I felt very satisfied, this subject was very relevant. I must admit at first the word 'psychology' scared me and I didn't think much of it. However, I found it very worthwhile and very relevant to everyday happenings.

I am most pleased by the depth of understanding I now have of student behaviour, and how I can help students who have learning difficulties.

I enjoyed this course greatly, I found it very relevant and interesting.

I don't normally like having to think for myself, but I did enjoy this.

I now go about my learning in a more business-like manner - I set goals, arrange a schedule and monitor my progress. I know how to self-verbalize to control my behaviour and I know what strategies to use and when.

I've learnt more in 6 months of PY2311 than I've learnt in 2 1/2 years of college.
I believe it was a developmental process that I underwent. After so many years of accepting my learning as something that had to be done, it was very worthwhile to consciously stop and think and do for myself.

Basically I did what I had to to get through. I definitely used a surface approach except for the learning contract which provided me with a good chunk of deeper understanding.

I really got into my learning and tried to get an understanding of it. I took a deep approach.

I was highly motivated to achieve in this subject because of the democratic nature adopted by the lecturer. We were able to choose the topics of our projects and seminars. This is a very democratic approach to learning that stimulates learners to become more autonomous. We could also choose topics that we felt were important to us directly as future teachers. I didn't feel as threatened in my group as I would have giving a seminar to a whole class group. I believe that teachers must consider themselves as educators. Therefore, they must treat their students as co-workers, giving them the responsibility for their own learning. This I felt was promoted in this subject and having seen it work, I will try and adopt some of its framework in schools.

I used a deep approach because I aimed to apply the learning to wider implications of teaching, endeavouring to improve my understanding of student learning. This was possible because the course has been so flexible it gave me the scope to personalise my learning. In doing this everything undertaken was enjoyable, not a chore. Whenever I'm really interested in something I tend to put in my fullest effort and therefore use a deeper learning approach. I liked having control over my assessment and choice in the major presentation. It was great to adapt the assessment to how much I put into everything. I really liked the freedom of choice and assessment approach.

It was also helpful in my personal development and understanding of how I learn, not just my students.

Taking control of actual learning saw me take more interest, do more work, and try harder to achieve my goals. I feel taking control caused this.

I got just as much pleasure out of seeing others grow and have a chance for success, as I did for anything to do with myself.

The whole subject will have a long term effect because everyone needs to know how they learn, and as teachers we shouldn't forget how students learn.

I was pleased because when I found something that interested me I was allowed to go off on a tangent to discover more about it - I was allowed to do this at my own pace.

It is a subject we only do once at College, that I shall be using for the rest of my teaching career. It is very relevant, a wildly exciting subject in my eyes, that I can apply to teaching and everyday life. I know how I learn, why I learn this way, and the ways other people and my students of the future learn.

My approach was self-directed. There was no pressure to learn for an exam, which I thought was great. The learning I did was for understanding - I learnt for myself, not an exam. I found myself interested in the subject because it could be related to teaching. I spent time thinking about aspects of learning and teaching, relating it to me as a teacher-to-be. I learnt all that I wanted to. I found that I read extra journals and books just to expand my knowledge and understanding of the subjects. This is not a usual habit of mine.

You don't have the time to use a deep approach at College. You do the work to pass the subject.

This subject should be done in first year! How can the admin allow this to happen? It forms the basis of teaching and learning. I would have achieved better results on prac if I knew who I was teaching and how to handle them.

Simply the fact that when I have problems I know where I can look for answers.

Student Comments on Learning Logs

When I find out that a subject requires me to keep a personal log I cringe with pain, and sorry Barry, Psychology was no exception. However, I am pleased to inform you that I have really enjoyed this subject and writing the accompanying logs - yes I know, shock, horror, what have I said? Now on completion of these logs I see that keeping them was a very worthwhile learning experience. Keeping these logs allowed me to think through and reflect on the various topics and issues raised during our class meetings. I think perhaps if I didn't keep a log, I would not have thought through the topics as deeply and carefully as I have in these logs.

I feel that the work I have put into my journal is quality work - I understand it and I have learnt more in this subject than any other. In fact, I have done more work and put more effort into this log and this subject than anything I have ever done at College ...I think the proof of my knowledge lies only in its application in the classroom. I am bursting to be a good teacher, I feel so loaded up with ideas and thoughts and somehow writing them all down seems inadequate. I can't tell you if I will be a good teacher, but this log is evidence that my head is screwed on properly. Bearing all this in mind, I am about to embark on my final leg of prac. probably to be politely informed that I know nothing. Sometimes I feel like quite impolitely telling them to 'Get stuffed!'

I have to admit that, at first, the last thing in the world I wanted to be doing was a subject with a pre-requisite of deep thought. Then I suddenly realised that there weren't any pre-requisites (or requisites, for that

matter). This frightened me at first, a subject as serious as Psychology was constructed in a way I was unfamiliar with. The only subject with any hint of an 'open' approach in a classroom was my senior art class. To cut it short, I've really gained a lot from this course. I only wish I had realised its worth at the beginning of the course and made a greater effort. However, the aim has been achieved; I've learnt much about the teaching/learning process and hope to carry it on.

I can honestly say I started this subject off poorly, but this was due to many reasons. Firstly, I was taught in a fairly traditional school, where to a certain degree we were 'spoon fed'. I then moved through BCAE in the same way, so this style of learning was new to me; hence I felt we had no direction in our class meetings. After the first few weeks' hiccups I began to appreciate this style of learning and gain control over my own learning. I believe that I analysed information learnt, hence rote learning was abandoned, which was refreshing as this style had played a major role in my education at BCAE. My journals not only evaluated and scrutinised the information learnt, but added a personal highlight where I was able to relate information to past experiences, which made it beneficial to me.

I have been thinking about what to write in this final log which will evaluate the journey I have made over this past semester ...needless to say I am finding it difficult. The form of this Psychology subject has been a new experience to me - I had been in contact with individualised learning and contract assignments before, however, only in theory. As we all know theory and practice of a topic can often exist in opposition. I will admit that at first (actually this was for four weeks) I did feel uncomfortable with what was expected of me ...and the purpose of the information I was in contact with. Nevertheless, it was a compulsory subject.
It was not until I had been at Prac. that 2 and 2 made 4 so to speak, and the information discussed at class meetings made sense. I really believe that I was narrow-minded in the beginning of this subject ...to speak truthfully. I cannot say why specifically, only that the material seemed to have no relevance. The first thing I learnt however, was how easy it is to become out of touch with what is really happening in school classrooms ...observation is often the best awakener to facts. Once this realisation had 'hit home' I became more interested in the research behind what was discussed in class and so tried to do extra reading so as to enhance and challenge my initial understanding and thought processes on what had been discussed.

When I first started this log I felt a bit threatened by it, because I had never been asked to reflect upon the way I as an individual learn. Reading through my logs I can identify a progression that reveals a development

from surface responses to those involving deep responses, in which I really get to the core of what it is I am all about with regard to learning. One of the most pleasing aspects of my logs are the open and honest entries I have made, which allowed me an opportunity to reflect upon my experiences honestly and thus take action in response to this reflection. The entries that I have made have allowed me the opportunity to come to a greater understanding of the way in which I learn, as well as allowing me the opportunity to use other strategies that I can employ next year within my attempt to bring about a socially-critical approach to teaching. As well, the log has given me the opportunity to critically reflect upon my commitment as a teacher, and the approaches that I will use to bring about a harmonious classroom that is characterized by effective learning.

Table 1 Sample Used in the Study

Class	Males	Females	Total
1	5	11	16
2	3	14	17
3	6	10	16
4	1	17	18
Total	15	52	67

Table 2 Pre- and Post-Test Class Means (M) and Standard Deviations (SD) for ALC

Class	Pre-Test	Post-Test
1	12.4 (3.9)*	11.9 (4.6)
2	9.6 (3.2)	10.7 (4.1)
3	10.4 (3.9)	10.9 (3.8)
4	9.3 (2.8)	7.4 (3.1)

* M (SD)

Table 3 Univariate Fs for CSDL

CLASS BY TIME interaction			TIME main effect		
Item	$F(3,63)$	p	Item	$F(1,63)$	p
1	3.26	<0.05	5	35.12	<0.001
2	4.04	<0.05	6	20.26	<0.001
3	3.24	<0.05	7	26.15	<0.001
4	3.75	<0.05	8	42.82	<0.001
			9	60.27	<0.001

Table 4 Pre- and Post-Test Class Means (M) and Standard Deviations (SD) and Relevant t-tests for CSDL

Item	Class 1 Pre	Post	t	p	Class 2 Pre	Post	t	p
1	3.9(0.9)*	5.1(0.9)	-4.14	0.001	3.6(0.7)	5.3(0.7)	-8.37	0.000
2	5.2(1.0)	5.2(0.9)	0	ns	4.6(1.3)	5.7(0.7)	0.44	ns
3	5.1(1.1)	5.4(1.1)	-1.43	ns	5.8(1.0)	5.9(0.8)	-2.31	ns
4	4.9(1.1)	5.1(0.7)	-0 64	ns	5.4(1.1)	5.8(0.8)	-3.05	ns
5	4.5(0.9)	5.2(0.8)	-		4.9(1.0)	5.5(0.8)	-	
6	5.1(1.3)	5.3(1.0)	-		5.4(1.2)	5.9(0.6)	-	
7	4.9(1.1)	5.5(0.8)	-		5.0(1.3)	5.8(0.6)	-	
8	4.4(1.1)	5.4(0.8)	-		5.0(1.0)	5.7(0.5)	-	
9	4.4(0.9)	5.2(0.8)	-		4.6(0.9)	5.6(0.7)	-	

* M(SD)

	Class 3 Pre	Post	t	p	Class 4 Pre	Post	t	p
1	3.6(0.7)	5.3(0.7)	-6.58	0.000	3.4(1.2)	5.7(0.6)	-7.87	0.000
2	4.6(1.3)	5.7(0.7)	-3.60	0.000	4.9(1.2)	5.8(0.8)	-2.68	ns
3	5.8(1.0)	5.9(0.8)	-0.56	ns	4.9(1.0)	6.0(0.8)	-3.99	0.001
4	5.4(1.1)	5.8(0.8)	-1.46	ns	4.6(1.1)	5.9(0.6)	-5.05	0.000
5	4.9(1.0)	5.5(0.8)			4.2(1.0)	5.7(0.8)		
6	5.4(1.2)	5.9(0.6)			5.2(0.9)	5.8(0.7)		
7	5.0(1.3)	5.8(0.6)			4.8(1.2)	5.9(0.7)		
8	5.0(1.0)	5.7(0.5)			4.9(0.8))	5.7(0.8)		
9	4.6(0.9)	5.6(0.7)			4.4(1.0)	5.3(0.8)		

* M(SD)
Bonferroni adjusted significance p<0.002

Table 5 Pre- and Post-Test Class Means (M) and Standard Deviations (SD) and Relevant *t*-tests for SPQ

	Class 1 Pre	Post	*t*	*p*	Class 2 Pre	Post	*t*	*p*
	"Subscales"							
SM	24.4(4.6)*	23.5(3.9)	-		23.5(4.6)	21.2(5.1)	-	
SS	22.0(4.1)	20.0(3.8)	-		19.7(3.5)	20.196.20	-	
DM	21.7(5.9)	25.1(4.5)	-		22.9(3.5)	25.8(4.3)	-	
DS	22.0(5.1)	25.3(3.9)	-2.97	ns	23.1(3.9)	25.1(4.8)	-2.67	ns
AM	21.6(5.00)	22.3(4.9)	-0.68	ns	21.9(4.2)	21.7(4.1)	0.19	ns
AS	19.4(4.7)	21.9(6.1)	-		20.4(5.2)	21.1(6.4)	-	
	"Approaches"							
SA	46.4(7.2)	43.5(6.6)	-		43.2(6.6)	41.3(10.7)	-	
DA	43.7(10.3)	50.3(7.6)	-		46.1(6.6)	50.9(8.6	-	
AA	41.098.20	44.2(9.8)	-1.42	ns	42.3(6.9))	42.8(8.7)	-0.39	ns
SAc	87.4(10.8)	87.7(12.1)	-		85.5(12.1)	84.1(17.3)	-	
DAc	84.7(16.6)	94.5(16.2)	-		88.4(9.2)	93.7(13.4)		

	Class 3 Pre	Post	*t*	*p*	Class 4 Pre	Post	*t*	*p*
	"Subscales"							
SM	22.3(4.2)	23.6(3.2)	-		23.2(4.4)	22.7(4.9)	-	
SS	22.3(4.9)	21.9(3.2)	-		19.6(3.2)	18.6(5.1)	-	
DM	20.8(4.2)	23.094.5)	-		23.3(4.2)	24.8(3.7)	-	
DS	20.4(3.3)	25.194.0)	-3.53	0.003	24.1(4.0)	24.6(5.7)	-0.50	ns
AM	24.6(5.2)	19.8(4.4)	4.35	0.001	21.8(4.4)	21.7(4.4)	-.17	ns
AS	22.8(5.4)	22.6(4.0)	-		23.1(3.9)	25.0(3.6)	-	
	"Approaches"							
SA	44.6(7.3)	45.5(5.0)	-		42.8(6.9)	41.3(8.0)	-	
DA	41.1(6.3)	48.1(8.5)	-		47.4(7.2)	49.4(8.2)	-	
AA	47.4(8.3)	42.4(6.3)	4.63	0.000	44.9(6.4)	46.7(7.2)	-1.11	ns
SAc	91.7(12.8)	87.9(8.8)	-		87.7(11.4)	87.9(12.1)	-	
DAc	87.4(13.5)	90.5(13.9)	-	-	92.3(11.7)	96.1(11.7)	-	-

Bonferroni adjusted significance for "subscales" $p<0.005$
Bonferroni adjusted significance for "approaches" $p<0.01$
* M(SD)

SM: Surface Motive DM: Deep Motive AM: Achieving Motive SAc: Surface Achieving
SS: Surface Strategy DS: Deep Strategy AS: Achieving Strategy DAc: Deep Achieving
SA: Surface Approach DA: Deep Approach AA: Achieving Approach

Figure 1 Pre- and Post Test Class Means for ALC

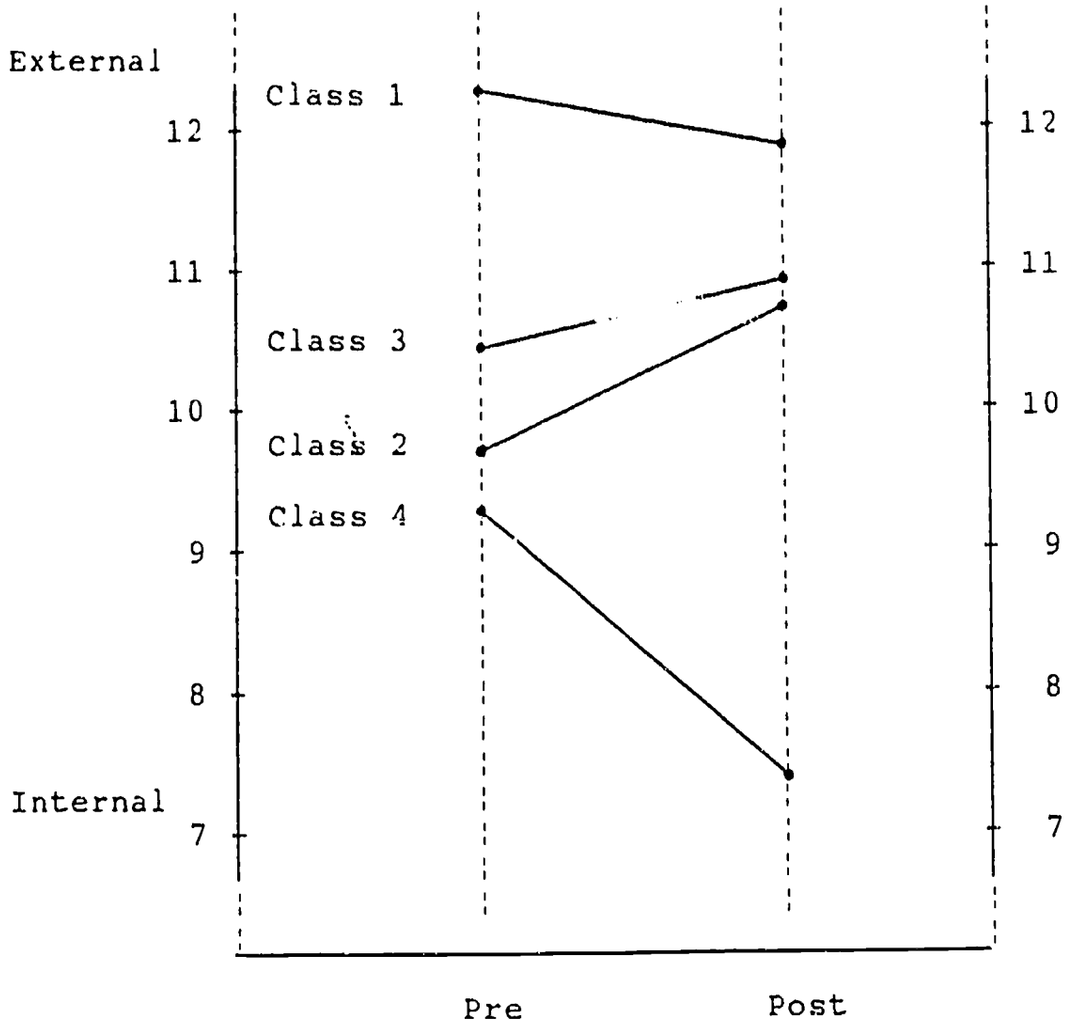
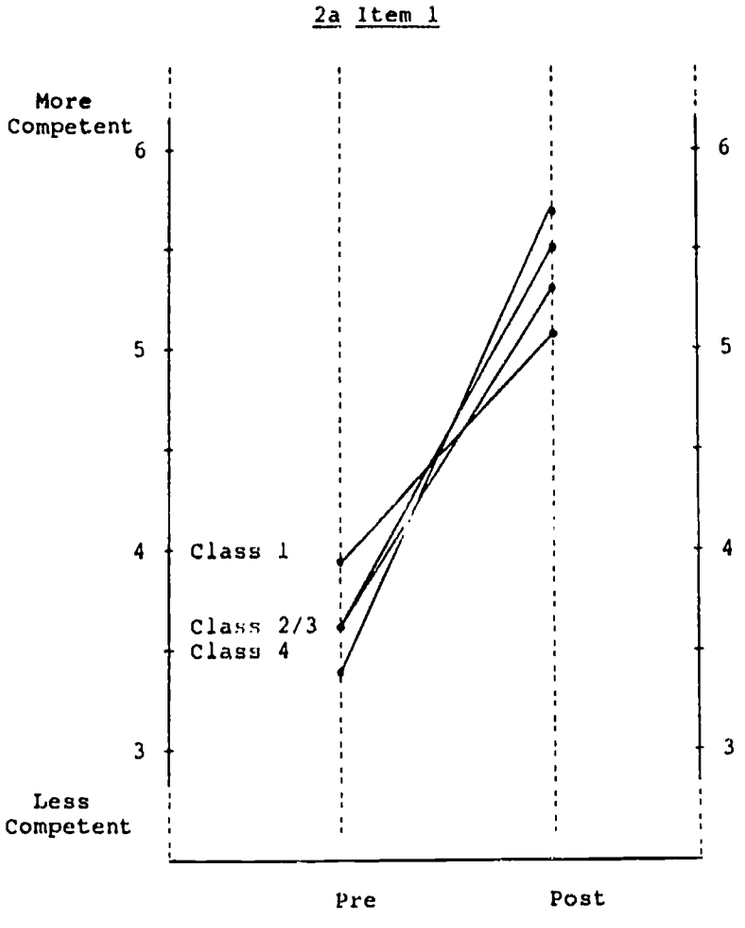
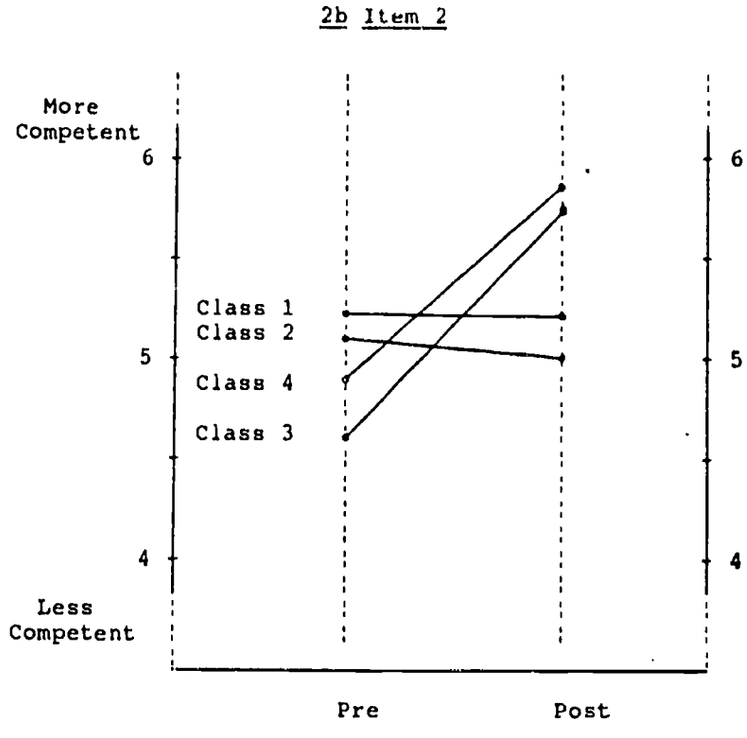
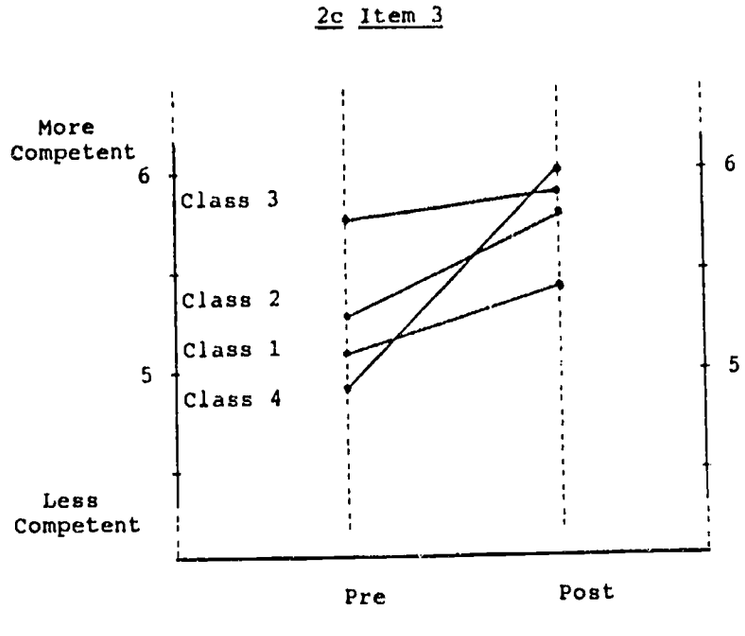


Figure 2 Pre- and Post-Test Class Means for CSDL Items with Interaction Effects







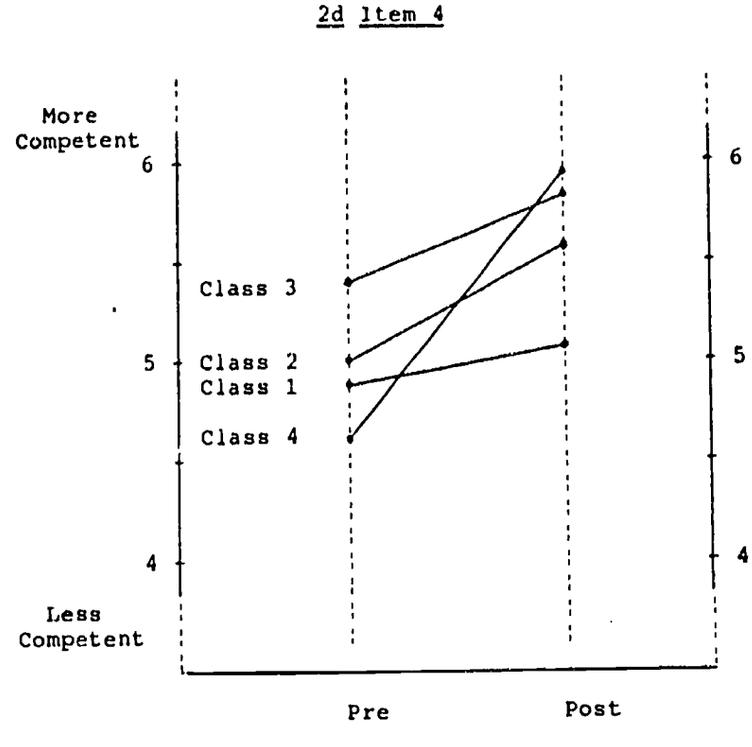
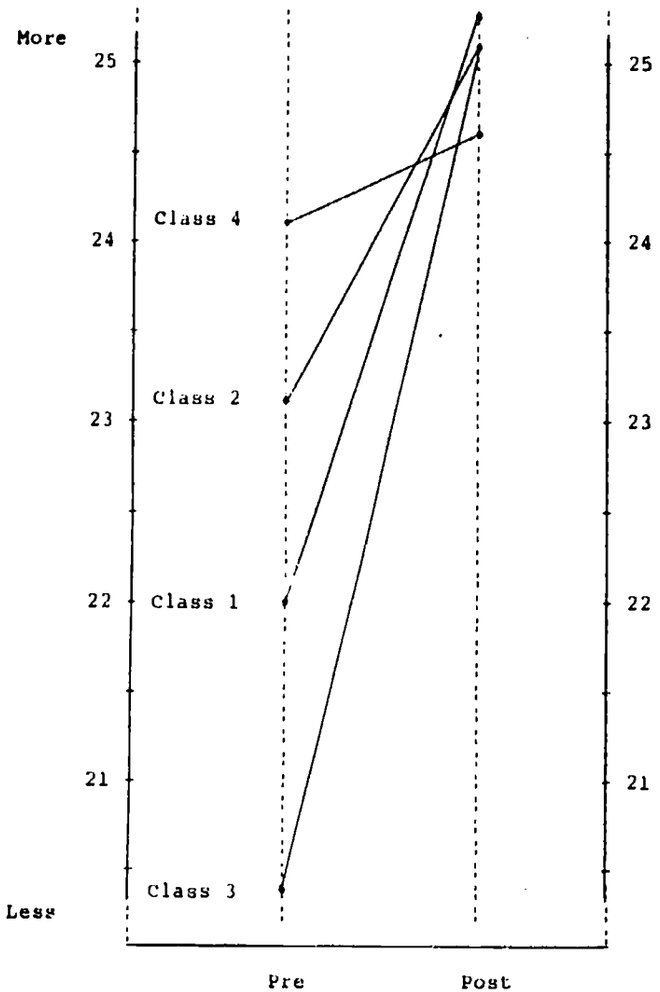
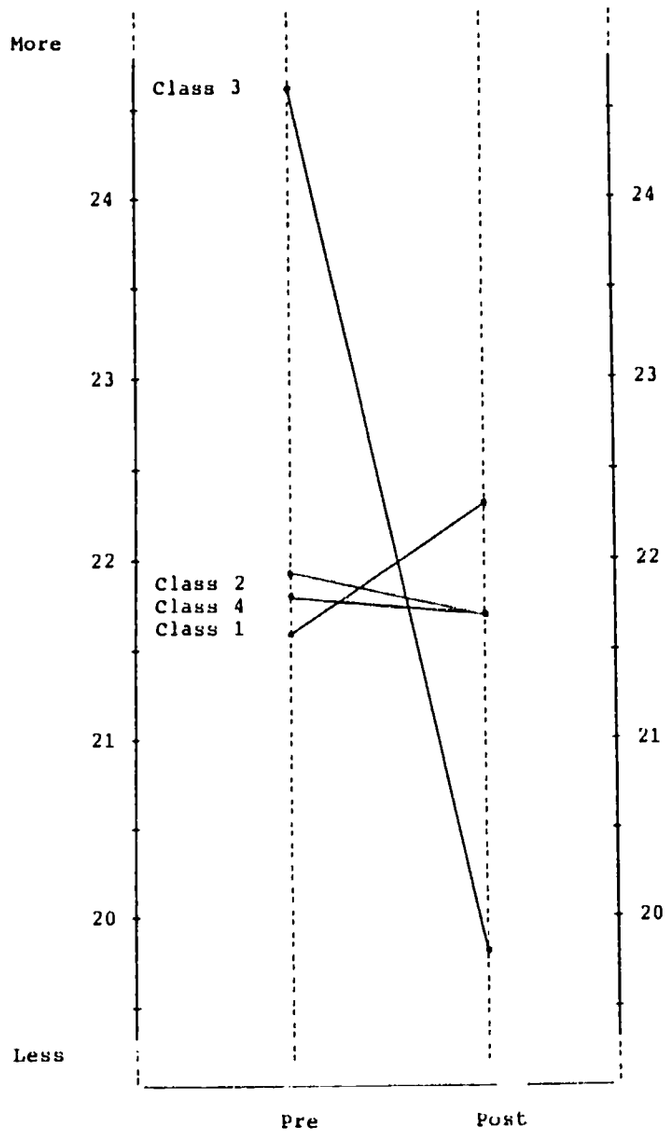


Figure 3 Pre- and Post-Test Class Means for SPQ Subscales and Approaches with Interaction Effects

3a Deep Strategy



3b Achieving Motive



3c Achieving Approach