DOCUMENT RESUME

ED 454 226 SP 040 106

AUTHOR Gordon, Christopher; Debus, Ray
TITLE Enhancing Learning Approaches in an Undergraduate Teacher Education Program.
PUB DATE 2001-04-00
NOTE 43p.; Paper presented at the Annual Meeting of the American Educational Research Association (Seattle, WA, April 10-14, 2001).
PUB TYPE Reports - Research (143) -- Speeches/Meeting Papers (150)
EDRS PRICE MF01/PC02 Plus Postage.
DESCRIPTORS *Context Effect; Educational Quality; Elementary Secondary Education; Higher Education; *Learning Strategies; Preservice Teacher Education; *Self Efficacy; Student Teachers; Teacher Effectiveness; Teaching Methods; Undergraduate Study

ABSTRACT

This study implemented contextual modifications in a preservice teacher education program to improve teaching and learning. The modifications were designed to increase students' use of deep approaches to learning and reduce their reliance on surface approaches. Because of how the teaching and learning environment was conceptualized, in accordance with Biggs' (1993) "3P model," this outcome was dependent on altering students' perception of the learning environment from one that rewarded reproduction of transmitted declarative knowledge to one that encouraged meaningful construction of integrated concepts. Students' perceptions of their competence in performing teaching tasks were expected to improve in response to improvements in quality learning. Growth in personal teaching efficacy was an expected outcome for those students who engaged more strongly in deep approaches to learning. Results indicated that modifications to the teaching methods, task requirements, and assessment processes applied to the treatment group encouraged changes in students' approaches to learning by first, reducing their use of surface approaches, and later, increasing their use of deep approaches. While both treatment and control groups exhibited equivalent growth in teaching efficacy, differences were noted in the sources of information that informed personal teaching efficacy at the conclusion of the course. (Contains 103 references, 11 tables, and 6 figures.) (Author/SM)

Enhancing Learning Approaches in an Undergraduate Teacher Education Program

Christopher Gordon
Charles Sturt University, Australia

Ray Debus
University of Sydney, Australia

Abstract

This paper describes a study in which contextual modifications were implemented in a preservice teacher education program to improve quality teaching and learning. Specifically these modifications were designed to increase students' use of deep approaches to learning and reduce their reliance on the use of surface approaches. Because of the way the teaching and learning environment was conceptualised, in accordance with Biggs' (1993) '3P model', such an outcome was dependent on altering the students' perception of the learning environment from one that rewarded the reproduction of transmitted declarative knowledge to one that encouraged the meaningful construction of integrated concepts. Students' perceptions of their competence in performing the tasks of teaching were also expected to improve in response to improvements in quality learning. Growth in personal teaching efficacy was thus expected as an outcome for those students who engaged more strongly in deep approaches to learning.

The results indicated that the modifications to the teaching methods, task requirements and assessment processes applied to the treatment group encouraged changes in students' approaches to learning by firstly reducing their use of surface approaches and later increasing the use of deep approaches. While both treatment and contrast groups exhibited equivalent growth in teaching efficacy, differences were noted in the sources that informed personal teaching efficacy at the conclusion of the course.

Paper presented at the Annual Meeting of the American Educational Research Association, Special Interest Group: Faculty Teaching, Evaluation and Development

Seattle, April 2001

The central task undertaken in the current study was to create successive contexts for learning, which might encourage students to progressively abandon surface learning approaches and adopt deeper learning approaches (Biggs, 1993; 1999; Entwistle, 1998; Ramsden, 1993c) in an undergraduate teacher education program. The achievement of this outcome was considered desirable because the definitions of deep and surface learning approaches imply those students who followed this pattern would exit the course having achieved higher quality learning than those who maintained high reliance on surface approaches.

Surface approaches are seen as being motivated by the learner's desire to meet minimum requirements with minimum effort. The use of surface approaches results in study behaviours that enable students to reproduce material in a required form without analysis or integration, leading to low quality learning outcomes. Deep approaches, on the other hand, are characterised by an intention to understand the material being studied. Resultant behaviours include the active integration of new information with old, or with information derived from other sources. High quality learning outcomes, including the development of analytic skills, are expected with the use of deep approaches to learning (Biggs, 1993; Entwistle, 1998; Marton & Saljo, 1997; Ramsden, 1992). Achieving approaches are seen as being motivated by the learner's desire to gain high grades. Thus study behaviours are heavily moderated by assessment requirements, but are generally highly structured and efficient. Learning outcomes may vary depending on the requirements of the assessment task. Understanding and integration of learned material may occur, but these outcomes are seen as incidental in an achieving frame. The purpose of the achieving approach is to excel through higher grades rather than necessarily to learn (Biggs, 1989; 1993).

Biggs, (1993, pp 75-76) asserts that the deep approach is the "... only one which is task-centred and task-appropriate ...". The surface approach is inadequate in his view, because its purpose is to avoid failure while minimising effort, and the achieving approach is inadequate because learning is not its central purpose "... Cheating also serves that end".

Students' adoption of particular learning approaches appears to be affected by a number of internal characteristics interacting with a number of contextual features within an

ecological frame. Students' intention in engaging in the learning environment is important, since the intention forms part of the characteristics that differentiate the approaches. Hence, those who intend to understand and integrate material will be more likely to engage in a deeper approach compared with those who wish simply to pass with minimum effort (Entwistle, 1998; Marton & Saljo, 1997). Students' past successes and failures also affect their choice of approach, with those behaviours leading to success in the past, in environments perceived as similar, being more likely to be repeated in the new learning context (Marton, Dall'Alba, & Beaty, 1993). Thus students who have successfully navigated the requirements of university entry examinations may continue to practise the study behaviours they found useful in their recent school experience, once they enter university (Ramsden, Bowden, & Martin, 1988).

Students' choice of learning approach was interpreted within the context of Biggs' (1993) '3P Model' of student learning, reproduced as Figure 1. In this model Biggs and Moore (1993) see students entering the learning environment with certain preconceptions about the nature of learning, about their expectations of success, relevance and enjoyment within it, and preferences about how to engage in the learning process. They would also have prior knowledge and skills, certain cognitive abilities and personality variables that would affect their likelihood of success, as well as attainment goals and a preparedness to apply a certain amount of effort. They would adapt a number of these entry characteristics continuously, in accordance with their perceptions of the teaching context and their relative success in achieving personal learning goals, once they had experienced it. These adjustments may be enacted through the processes of self-regulation as described by Bandura (1997).

The teaching context according to Biggs' model, and supported by others (Kember, 1998; Prosser & Trigwell, 1997; 1998; Trigwell, Prosser, & Taylor, 1994), is established through preconceptions held by the teacher about the process of learning and how that might be facilitated. Perceptions of the learning process as variously transmissive or constructive inform different teaching practices which, in turn, lead to modifications of the students' perception of the learning environment (Clarke & Dart, 1994; Ramsden, 1987; 1992; Trigwell et al., 1994). Teachers' experience and perceptions of their teaching efficacy will moderate their implementation of teaching processes, as will their perception of their students' capacity to manage learning tasks and their perceptions of overall workload (Prosser & Trigwell, 1997; 1998; Ross,

Cousins, & Gadalla, 1996). Importantly, teachers' perceptions about their efficacy in implementing the teaching program are crucial in this model in maintaining or adapting teaching methods (Ross, 1998). Teaching self-efficacy then becomes a salient mechanism for informing the self-regulatory processes involved in Biggs' metateaching concept.

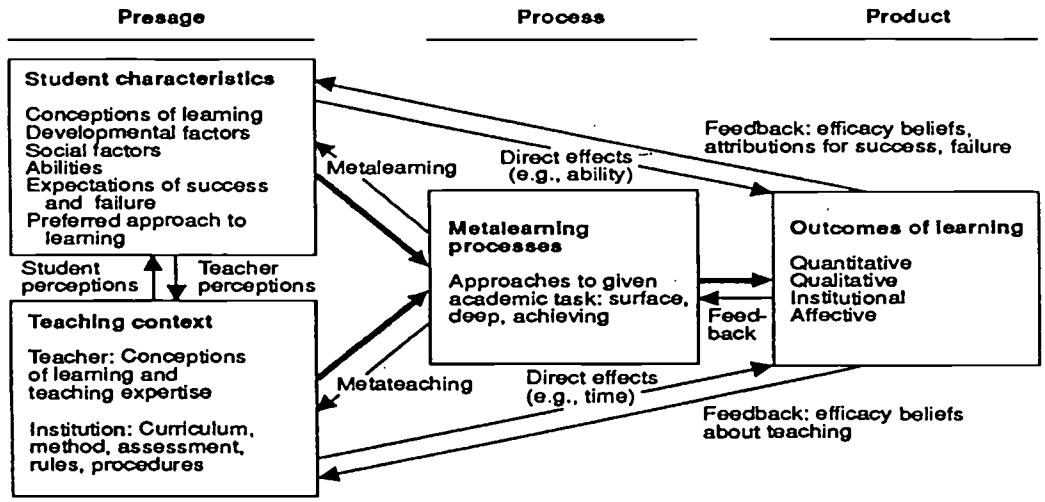


Figure 1. The '3P Model' of student learning (Biggs & Moore, 1993, p. 451)

Biggs' model theorises that on the basis of the complex interaction of its components, students will choose to approach their learning using either surface, deep or achieving strategies, or some combination of these, which best fits their perception of the circumstances. They will be informed by the outcomes of their engagement in the process about the appropriateness of their choice of strategy and may adjust their approach on the basis of the feedback they receive, including feedback about the accuracy of their initial perceptions. The current research sought to encourage students to adopt a deep approach to their learning by modifying presage and process stages in Biggs' model. The greater use of deep approaches would indicate higher quality learning.

It was expected that higher quality learning in a pre-service teacher education program would translate into improved teaching practice, and greater self-confidence in the capacity to manage teaching tasks. For this reason, an increased use of deep learning

approaches on behalf of the students was expected to result in improvements to teaching self-efficacy (Ross, 1998; Tschannen-Moran, Woolfolk-Hoy, & Hoy, 1998).

Since Bandura's original conceptualisation of the self-efficacy construct (Bandura, 1977), and Ashton, Webb & Doda's (1983) identification of teacher self-efficacy as a determining factor in teaching competence, a considerable amount of research has confirmed the centrality of the construct in teacher effectiveness (Bandura, 1997; Pajares, 1996; Tschannen-Moran et al., 1998). This research has demonstrated that teachers with high self-efficacy beliefs are likely to engage in a wide range of more productive teaching practices than teachers with low self-efficacy.

Teachers' self-efficacy for teaching behaviours affects, among other things, their choice and structuring of learning activities; their response to students' attempts in learning tasks; their control orientations and control behaviours; their use of classroom discussions and innovative teaching practices; their responses to children who are difficult to teach; their preparedness to include children with disabilities; their level of stress and their satisfaction with the teaching profession (Bandura, 1997; Pajares, 1997; Ross, 1998; Soodak & Podell, 1993; Tschannen-Moran et al., 1998). As a consequence of these behavioural differences, teachers' self-efficacy has important formative effects on children's developing conceptions of their own academic self-efficacy (Schunk & Zimmerman, 1997; Zimmerman, 1995).

Critical components in the efficacy formulation of teacher effectiveness include the perception by teachers with high self-efficacy that all students are teachable, including those who are difficult to teach (Soodak & Podell, 1993). This perception leads to the application of adaptive problem-solving behaviours and persistence with identified solutions, leading to higher levels of success (Ashton & Webb, 1986). Teachers with a low sense of self-efficacy are more likely to attribute difficulties in teaching to student failure and make fewer, more tentative, innovations to ameliorate the difficulties (Dembo & Gibson, 1985; Gibson & Dembo, 1984).

Teacher education programs which facilitate the development of deep learning approaches may be better able to produce students with the kind of problem solving capabilities which sustain their self-efficacy when in the teaching role. Indeed Ashton (1984, p.31) concluded that "A potentially powerful paradigm for teacher education can be developed on the basis of the construct of teacher efficacy", and suggested a number

of modifications to teacher education programs to enhance preservice teachers' self-efficacy beliefs. These modifications included many of the methods recommended for the promotion of deep learning approaches, especially the development of analytical problem-solving methods from meaningful, context based learning. This constructivist view of the learning process is shared by social cognitive theorists (eg: Schunk & Zimmerman, 1997) and learning approach theorists (eg: Biggs, 1993). Furthermore, learning approach theorists (eg: Marton & Saljo, 1997) assert that the capacity to develop analytical problem-solving skills is considerably enhanced through the use of deep approaches to learning and restricted by the use of surface approaches.

Surface approaches, by their nature, are focused towards memorisation and reproduction of course material. In teacher education this may also involve modelling of teaching methods from practicum supervisors. The reproduction of memorised or modelled teaching behaviours in other classroom contexts may in itself be problematic, but when difficulties arise, the appropriate solutions may not be generated by the memorised material. The neophyte teacher would then need to rely on his/her analytical problem-solving skills to identify an appropriate novel solution to the problem. Students who predominantly follow a surface approach to learning would be less likely to identify adequate solutions in these circumstances. Their sense of teaching efficacy would be threatened and likely to be reassessed at lower levels. Students who predominantly follow a deep approach to learning would be better placed to resolve these difficulties as they arise, since their problem-solving skills are nurtured as part of this approach. Consequently their sense of personal teaching efficacy may well be enhanced through the successful resolution of difficult situations. Thus it is argued that the encouragement of deep learning approaches amongst preservice teachers would provide suitable conditions to facilitate the growth of teaching self-efficacy.

It is argued here that the learning approaches adopted by students in response to their perceptions of the learning environment are of particular importance in teacher education, because approaches to learning have been linked with students' conceptions of approaches to teaching (Boulton-Lewis, 1996; Christensen, Massey, Isaacs, & Synott, 1995; Dunkin, Precians, & Nettle, 1994; Gibbs, 1994). The approach adopted by students in their learning may, to a large extent, determine the learning environment they establish as future teachers, which would impact on the learning approach consequently adopted by their students. Hence a form of cultural reproduction would be

established (Gordon, Lim, McKinnon, & Nkala, 1998; Wideen, Mayer-Smith, & Moon, 1998).

The research on student learning approaches has identified a number of interactive contextual variants that impact on the choice of learning approach and consequent learning outcomes. Principally, the collective findings of this body of research favour a shift from the traditional transmission approach to teaching in universities, which fosters a reproduction orientation or surface learning approach, to a meaning-oriented constructivist approach to teaching, which encourages a transformative goal or deep approach on behalf of the learner (Biggs, 1993; 1996; Harris & Graham, 1994; Hoban, 1998; Oxford, 1997; Prawat, 1992; Ramsden, 1993b; Simons, 1991; Vermunt, 1998).

The current study measured the longitudinal development of students from enrolment to graduation. Developmental trends in learning approaches and teaching efficacy, in response to modifications applied to the teaching and learning context, were the principal foci of the investigation. Altered learning contexts were developed through the application of action research methodology involving core members of the teaching team. Program modifications were made explicit to the students and applied pervasively throughout the program, within and across subjects, and with linkages created across semesters. The major goals of the research, and the lecturers' intended approach to teaching, were also explicit to the students. Regular feedback was provided to students and lecturers to inform them of their progress toward the goals and students were repeatedly challenged to examine their learning approach during learning tasks. These efforts were made in order to influence 'presage' factors in Biggs' (1993) '3P model of teaching and learning' in an attempt to foster students' and lecturers' perception of the learning environment as one in which deep approaches to learning were unambiguously favoured (Prosser & Trigwell, 1997; Trigwell & Prosser, 1991a).

These processes were also intended to impact on each stage of the self-regulation process applied to learning, as described by social cognitive theory (Bandura, 1986; 1991). The explicit goals of the research and teaching intentions were designed to influence students' forethought in goal setting and strategy selection. The goals of the project and the challenges made to examine the learning approach used during task completion, represented attempts to refocus students' attention during self-monitoring

of task performance from the achievement of product, to engagement in quality learning processes.

Feedback provided by lecturers on tasks completed by students was often focused on evidence of process, as well as outcomes in terms of product. The process feedback attempted to influence students' self-evaluation and self-reactions so that engagement in deep learning methods were increasingly considered as part of student forethought as they approached subsequent tasks. A cyclic growth in the use of deep learning approaches was thus intended, in line with Zimmerman's (1998b) view of self-regulated learning cycles. Further feedback of group responses to the goals of the research were designed to influence students' and lecturers' self-evaluations and self-reactions as they judged their progress towards longer-term goals.

Modified learning activities and other contextual features created by the manner of subject delivery and task requirements in the present study, represented attempts to intervene at the 'process' level in Biggs' 3P model. The intentions behind these interventions were to provide learning contexts that were logically related to the interventions applied at the 'presage' stage, to facilitate the adoption of deep learning approaches, and to interfere with the application of surface approaches.

Because of the dynamic and interactive relationships between stages in Biggs' model, logical consistency between 'presage' and 'process' was intended to further reinforce student perceptions of the learning environment as being one that requires the application of deep learning approaches (Entwistle, 1986; Prosser & Trigwell, 1999). The logical connections in the program developed were seen as consistent with Biggs' (1996) construct of constructive alignment which he has emphasised as central to the encouragement of deep learning approaches (Biggs, 1999).

Method

The current study employed a longitudinal, quasi-experimental design with repeated measures on non-equivalent dependent variables across three cohorts of preservice, early childhood teacher education students. Learning approaches, teaching efficacy beliefs, and causal attributions for learning outcomes were repeatedly surveyed at pre-determined intervals. The first cohort (Cohort 1) acted as the contrast group, with Cohorts 2 and 3 representing the treatment and comparison groups respectively

(Wilkinson, 1999). Treatment was applied throughout the course experience of Cohort 2, and for the first two years of their course, for Cohort 3. Cohort 3, thus provided data on a partial replication of the treatment applied fully to Cohort 2 (Thompson, 1996; 1999). Cohorts 1 and 2 were surveyed from their entry to the university to the completion of their three-year degree, while Cohort 3 was surveyed on entry and during the second year of their new four-year degree course. An embedded action research paradigm was used to develop, implement, evaluate and revise teaching approaches and specific applications for the treatment and comparison groups. As such, the treatment applied to Cohorts 2 and 3 continuously evolved throughout the course of the study.

A total of 197 students enrolled in the first year of their respective programs. Cohort 1 consisted of 73 students who enrolled in a Bachelor of Teaching course in 1995, Cohort 2 consisted of 70 students who enrolled in the same course in 1996, and Cohort 3 consisted of 55 students who enrolled in the new Bachelor of Education course in 1997. The number of students for whom matched data sets were available for all years of the study were 46 in Cohort 1, which represents a return rate of 63%; 51 in Cohort 2, yielding a 73% return rate; and 37 for Cohort 3, representing a 68.5% return rate. Almost all of these students were female, with no more than 3 males in any one cohort.

Principal sources of data used in the study consisted of student responses to annual administrations of the *Study Process Questionnaire* (SPQ) (Biggs, 1987b), the *Teacher Efficacy Scale* (TES) (Gibson & Dembo, 1984) and the Achievement subscale of the *Multidimensional-Multiattributional Causality Scale* (MMCS) (Lefcourt, 1981). Other student data were derived from structured interviews conducted with selected students, participant observation, and an examination of students' reflective journals. This paper deals only with the survey responses. The results from the qualitative data analysis and other findings are reported in Gordon (2000).

The survey instruments used in the present study were each subjected to confirmatory factor analysis procedures using LISREL 8.2 (Joreskog & Sorbom, 1993) to ensure adequate construct validity. For these analyses a larger sample of 219 students from the same university was used, all of whom were in year 2 of the same or similar preservice teacher education program.

The SPQ (Biggs, 1987a; 1987b) was developed in Australia for use in Australian universities and consists of 42 statements about students' motives and strategies for

learning. Students were required to rate their level of agreement with each statement on the five-point Likert scale. The reported factor structure of the SPQ enables the calculation of scores representing Deep, Surface and Achieving approaches to learning by summing the Likert responses to the fourteen questions identified for each subscale. These subscales may be further subdivided into Motive and Strategy scores by the sum of seven items in each.

When the SPQ was subjected to confirmatory factor analysis neither of the original structures provided an adequate fit to the data. The original 3 factor structure yielded a χ^2 of 2354.86, with df=816 ($p<.001$), a GFI of 0.66 and an AGFI of 0.62; and the original 6 factor structure produced a χ^2 of 2163.25, with df=804 ($p<.001$), a GFI of 0.68 and an AGFI of 0.64. Successive adjustments were made by deleting items from the scale identified by the modification indices as poorly representing each subscale. The final version of the SPQ used in this study consisted of a measure of deep approach comprising 8 items from the original scale, and a measure of surface approach also comprising 8 items from the original scale (see Table 1). Confirmatory factor analysis resulted in a non-significant χ^2 of 118.87 ($df = 93$, $p = .063$), a GFI of 0.94 and an AGFI of 0.91. The achieving strategy subscale was subjected to a separate analysis to determine its adequacy as a scale that could operate in conjunction with deep or surface approaches independently. This scale in its original form (7 items) provided an adequate fit with the data. The analysis with the year 2 data yielded a marginally significant χ^2 of 20.49 ($df = 11$, $p = .039$), a GFI of 0.97 and an AGFI of 0.96.

Table 1. Items Comprising the Modified SPQ

Deep Approach Items	Surface Approach Items	Achieving Strategy Items
SPQ 2	SPQ 7	SPQ 6
SPQ 11	SPQ 10	SPQ 12
SPQ 14	SPQ 13	SPQ 18
SPQ 17	SPQ 19	SPQ 24
SPQ 23	SPQ 28	SPQ 30
SPQ 26	SPQ 34	SPQ 36
SPQ 29	SPQ 37	SPQ 42
SPQ 41	SPQ 40	

Cronbach alphas for the original SPQ were reported as .73 for the surface approach, .81 for the deep approach and .78 for the achieving approach (Biggs, 1987b). The scales modified for the purpose of this study produced similar results with alpha statistics of .72 for the surface approach, .78 for the deep approach and .80 for the achieving approach.

The TES (Gibson & Dembo, 1984) was selected to measure the efficacy expectations of the students in each of the cohorts studied. While the instrument was developed to measure efficacy beliefs among practising teachers, it has been successfully adapted with minor modifications, in other studies of preservice teacher education students (Emmer & Hickman, 1991; Evans & Tribble, 1986; Hoy & Woolfolk, 1990; Saklofske, Michayluk, & Randhawa, 1988; Soodak & Podell, 1997; Woolfolk & Hoy, 1990). The original scale comprised 16 statements along two dimensions: one that described a teacher's confidence in meeting the requirements of typical teaching situations, labelled *personal teacher efficacy* (PTE), and another dimension that described teachers' relative impact on student learning, compared to other external influences, labelled *general teacher efficacy* (GTE). Students were required to rate their level of agreement with each statement on the six-point Likert scale.

Minor modifications to the wording of some items in the TES were undertaken to make the scale suitable for use with prospective teachers, rather than practising teachers (after Saklofske et al., 1988). The initial administration of the surveys in the present study occurred after the students had been attending the university for approximately one month. This was prior to their first practicum experience. Expectations of teaching efficacy therefore were future oriented rather than having a base in past experience. The future orientation of efficacy expectations is consistent with efficacy theory (Tschannen-Moran et al., 1998) and one of the features which distinguishes these beliefs from causal attributions (Bandura, 1997). The wording of items 1, 12, 14, 15, 19, 21, and 25 from the PTE subscale and items 2 and 23 from the GTE scale was thus altered usually by the substitution for the present tense form of the verb 'be' with its future tense equivalent 'would be'. Other changes in wording included substituting the term 'task' for the term 'assignment', considered more suitable in an early childhood setting (as did Huey-Ling & Gorrell, 1998), and the avoidance, where possible, of gender specific personal pronouns (after Coladarci & Brenton, 1991).

Item 14 originally stated:

When a student gets a better grade than he usually gets, it is usually because I found better ways of teaching that student.

The modified item stated:

If a student gets a better grade than usual, it would be because I found better ways of teaching that student.

The two-factor structure of the TES has been replicated in a number of studies using exploratory factor analytical procedures (Coladarci & Brenton, 1991; Emmer & Hickman, 1991; Hoy & Woolfolk, 1990; Rich, Lev, & Fischer, 1996; Saklofske et al., 1988; Soodak & Podell, 1993; 1997). The use of confirmatory factor analytic procedures has not, however, been reported amongst these. Using the TES with different groups of practising teachers, measures of internal consistency (Cronbach's alpha) have been reported to range between .74 – .77 for the PTE factor and between .65 – .72 for the GTE factor (Coladarci & Brenton, 1991; Hoy & Woolfolk, 1993; Rich et al., 1996; Soodak & Podell, 1993). With groups of preservice teacher education students, reported reliabilities range between .68 – .90 for the PTE factor and between .61 – .74 for the GTE factor (Emmer & Hickman, 1991; Evans & Tribble, 1986; Hoy & Woolfolk, 1990; Saklofske et al., 1988; Soodak & Podell, 1997; Woolfolk & Hoy, 1990).

The original TES scale provided an inadequate fit to the data used for the confirmatory analysis in the current study. The two-factor model (PTE and GTE) yielded a highly significant χ^2 of 360.11 ($df = 103$ $p < .001$), a GFI of 0.83 and an AGFI of 0.77. Examination of the output for the original structure indicated that item 27 should be removed because of poor loading on the GTE factor (.03). This item presented similar problems in another study (Soodak & Podell, 1993). When it was removed and the errors of two logically related questions were allowed to correlate, the GTE subscale returned a satisfactory fit with a χ^2 of 12.45 ($df = 8$, $p = ns$) a GFI of 0.98 and an AGFI of 0.95. Modifications to the PTE scale were informed by the modification indices. Item 1 was removed because it showed a moderate loading on the GTE scale as well as PTE. Certain error terms were allowed to correlate where they seemed warranted after examination of the question wording. The final version of the PTE subscale then

returned a satisfactory fit with a χ^2 of 18.77 ($df = 11, p = ns$) a GFI of 0.98 and an AGFI of 0.93.

The final version of the TES returned a marginally significant χ^2 of 81.13 ($df = 61, p = .043$), a GFI of 0.95 and an AGFI of 0.91 when both subscales were subjected to simultaneous analysis. These goodness of fit statistics were considered satisfactory for the purposes of the present study. The structure of the final TES scale containing 8 items for the PTE subscale and 6 items for the GTE subscale is reported in Table 2.

Table 2. Items Comprising the Modified TES

PTE Items	GTE Items
TES 12	TES 2
TES 14	TES 4
TES 15	TES 6
TES 19	TES 16
TES 21	TES 23
TES 24	TES 30
TES 25	
TES 29	

Measures of internal consistency using Cronbach's alpha yielded .76 for the modified PTE scale and .61 for the modified GTE scale. These results are consistent with previous findings that regularly report the internal consistency of the GTE subscale to be lower than that of the PTE subscale. Since the PTE factor was the dependent variable of major interest in the present study, the lower reliability of the GTE scale was not, however, considered problematic. The reliability analysis indicated that the internal consistency of the GTE in the current study could not be improved with the inclusion of other questions in the scale or the deletion of further items. Thus, despite the less than ideal reliability of the GTE subscale, the final version of the TES was accepted as adequate for the purposes of the current study.

The MMCS (Lefcourt, 1981; 1991) was chosen as a measure of locus of control principally because it was specifically developed to measure attributions concerning issues of high reinforcement value for undergraduate university students. As such the scale comprised items that dealt separately with attributions for academic achievement

and affiliation. Only the measures dealing with academic achievement were relevant to the present study and thus this subscale only was administered. Thus the instrument, as used in the current study, consisted of 24 statements concerning attributions for academic success or failure to which the students responded on a 5 point Likert scale. Lefcourt (1981; 1991) reports Cronbach alpha values to range between .50 – .70 for the internal locus of control dimension and between .66 – .88 for external locus of control.

The confirmatory factor analysis of the MMCS indicated a poor fit with the data. The two-factor model (internal and external) yielded a highly significant χ^2 of 1129.33 (df = 251 $p < .001$), a GFI of 0.70 and an AGFI of 0.64. The four factor structure, using ability, effort, context and luck as first order factors fared little better with a highly significant χ^2 of 909.91 (df = 246 $p < .001$), a GFI of 0.74 and an AGFI of 0.69. An examination of the output from these analyses indicated that the two-factor structure proposed by Lefcourt (1981) was wholly unsuitable for the current data. The statements that comprised the subscales for ability and effort did not load together on a single factor, 'internal'. With the current data, the scale could not be considered as having a two-factor structure. Therefore, despite a strong relationship between the two 'external' subscales, context and luck (r = .90), indicating these two could form a unified scale, the MMCS was considered as four separate scales in further analyses.

The precise structure of the MMCS was unimportant in the present study because its purpose was to act principally as a measure of internal validity, as an indicator of any likely Hawthorne effect. Because locus of control is theorised as forming gradually in response to long-term generalised life experiences (Carton & Nowicki, 1994; Lefcourt, 1981), scores on this scale were expected remain relatively stable over the period of the current study. Marked change in MMCS scores could therefore indicate that a Hawthorne effect was present and that interpretation of changes in other dependent variables may need to be reconsidered in the light of such an effect.

Each of the four subscales of the MMCS was then subjected separately to confirmatory factor analysis. The error terms of some items were allowed to correlate with other items within the same subscales. Principally these correlations were due to the statements dealing with responses to success and failure correlating with other like statements. All analyses then produced non-significant χ^2 statistics with GFI ranges between 0.98 - 1.00, and AGFI ranges between 0.91 - 0.99. Reliability measures were

then computed yielding Cronbach alphas of .67 for the ability subscale, .73 for context, .72 for effort, and .74 for luck. These measures of internal consistency were within the range reported by Lefcourt (1981; 1991) and were accepted as adequate for the purposes of the present study.

Procedures

These surveys were administered to each cohort on three occasions. The first surveys were completed in class after the students had been at university for approximately a month allowing orientation time for university study. The second administration occurred at a similar time in the following year, while the third administration was completed at the conclusion of their final year.

Treatment procedures began with Cohorts 2 and 3, following the collection of the initial surveys. Cohort 1 was to follow the program with subjects taught in their original format. Approximately half of the subjects taken by Cohort 2 were modified from their offering to Cohort 1. Each semester, one core subject was chosen as the main carrier of the modifications, in which the theme of developing deeper learning approaches was emphasised. In most semesters other subjects, which were either compulsory or electives, were modified in conjunction with the core subject.

Many of the modifications involved the use of co-operative group problem-based learning methods. These involved the students in pairs or larger groups of up to five students addressing a set task, often in case study format, and producing either a class or public seminar, research poster session, and/or a written report of their research (see: Gordon & Dunshea, 1996; Gordon et al., 1998; Gordon, Lim, McKinnon, & White, 1996; McKinnon, Gordon, & Lim, 1996). Jigsaw format was also used with co-operative learning methods. In other cases the teaching content and method of delivery were refocussed to a personalised dimension (see: Gordon, 2000; White & Gordon, 2000). Personalisation and personal reflection were also encouraged through the use of reflective learning journals and the exposition of personal theories of learning (see: Gordon & Dunshea, 1996; Hoban, 1998).

Assessment tasks were generally shifted away from examinations either by reducing their contribution to the overall grade or removing them altogether. A greater emphasis was placed on assessment techniques that involved a substantial amount of student

exposition, such as essays and written reports. Where reports were lengthy and contributed to a sizeable proportion of the grade, these were submitted progressively in stages, with each stage contributing to the grade (eg: Gordon & Dunshea, 1996). Often where presentations were given to the class, self and peer assessment methods contributed wholly or partially to the grade awarded (eg: White & Gordon, 2000).

Some program changes involved the combination of subjects with material covering similar conceptual areas assisting the students to make linkages across artificial subject boundaries and in particular between theory and practice. Each combined subject offering was linked to a practicum experience. Since the theme of encouraging deep learning approaches was emphasised in each of the modified subjects, to justify the modifications, the integration of subjects assisted in this theme becoming pervasive throughout the course.

The researcher periodically conducted lectures with the treatment groups, providing feedback on the evidence gained thus far in the study, which linked learning approaches and teacher efficacy beliefs through correlational analyses. These data highlighted changes in learning approach and teaching efficacy as measures of progress towards explicit goals. The lectures summarised some of the contextual modifications that had been made to the course delivery to encourage the students' adoption of deeper approaches and emphasised that the students' active engagement with the learning materials was needed to complement these modifications if the goal of developing deeper learning was to be met.

The provision of feedback to the students about their cohort's relative scores on the SPQ and TES is unusual in research design. Here the decision to do so was designed to inform goal-setting and feedback functions of academic self-regulation (Zimmerman, 1998a) and presage factors within Biggs' '3P model' (Biggs, 1988; 1993). According to Biggs' model, learning approaches are adopted in accordance with students' perceptions of the requirements of the learning environment. These perceptions may be developed from previously held views of successful learning behaviours in similar environments and moderated by feedback obtained from the current setting.

The attempts to encourage students to adopt deeper learning approaches were meant to provide students with a conceptual frame to inform their choice of study behaviour and to provide a context to support the use of deeper approaches. The researcher, and the

lecturing staff, believed that if the contextual modifications, their purpose, and the students' current approaches were not made explicit, then many students may not perceive that the opportunity for change was available, or indeed necessary. It was anticipated that making the overall results of students' responses known to them, may encourage them to become more actively engaged in choosing deeper approaches when the context supported these. Approaches to learning ultimately rest on students' choice of behaviour. Feedback about their reported behaviour and potential learning outcomes could assist in ensuring their choices were well informed.

The intent of the course modifications summarised here was to make contextual alterations conducive to the development of deeper learning approaches which were manageable in the context of an existing course by a small team of lecturers who had overall responsibility for the course, but relied on others for much service teaching. In this way, it was thought the process that evolved could be transportable to other teaching settings without requiring a complete course restructure as was the case in other studies reported (Kember & Gow, 1992; Newble & Hejka, 1991).

Because the students in the current study were clearly aware of the study's purpose, it was anticipated that their reaction to this knowledge might pose a major threat to the validity of the conclusions reached. Whether students responded to the contextual variations or to their perception of lecturers' expectations could not be differentiated in the study, nor were they intended to be. Both were considered important, complementary and necessary conditions to encourage students to choose deeper approaches to learning.

A partial control for a potential Hawthorne effect was established by making the aims of the study known to the contrast group (Cohort 1) as well as the other cohorts (Cohorts 2 and 3). Their role as a contrast group was not made explicit to them, nor was the remainder of the research design, but they were informed from the outset that the purpose of the study was to improve deep approaches to learning and teacher efficacy. The nature of these concepts and their hypothesised relationship was explained to them after they had completed their initial surveys. They were also later given similar feedback about their responses to the questionnaires. Their attention was specifically drawn to the significant correlations between deep approach use and high personal efficacy. This control was only partial, however, because the explanations of the study

were not as powerful as those used with the treatment groups without examples of contextual modification being possible. Nevertheless the contrast group were aware of the study's purpose and the response patterns considered ideal by the lecturers and researcher.

In addition, the questionnaires were composed of non-equivalent dependent variables (Cook & Campbell, 1979). The MMCS consists of scales that measure causal attributions, which are theorised to develop in response to long-term experience generalised across environments. As such they are unlikely to change markedly over a three-year period in response to relatively minor contextual variation. It was expected however, that any Hawthorne effect would impact on student responses to the MMCS in the same way as the SPQ and the TES. The statements contained in the MMCS Achievement subscale, especially those pertaining to effort and context, are structurally similar to items on the SPQ. It was expected that students would reasonably construct a similar pattern of responses in the MMCS and the SPQ if they responded in accordance with their perception of the researcher's expectations, rather than their genuine beliefs. A response pattern that differed between the treatment groups and the contrast group, and one that differed between the pattern of change identified by the MMCS and that of the SPQ would indicate that the study was unlikely to have been affected by any Hawthorne effect.

Results

Two sets of multivariate analyses of variance with repeated measures were used as the main analyses. The first of these sets compared the responses obtained from Cohorts 1 and 2 across the three occasions. The second set of analyses concerned responses from Cohort 3 for the first two occasions. An examination of the influences in the development of final teaching self-efficacy is also presented using path analysis.

Results from the MANOVA applied to the learning approach data for Cohorts 1 and 2, revealed that both groups began their course with the use of surface approaches predominating, but the main treatment group (Cohort 2) completed their course reporting a predominant use of deep approaches. While the students in Cohort 1 also modified their use of these learning approaches in a favourable direction, they completed their course with approximately equal reliance on deep and surface approaches. At no time did the use of deep approaches principally guide learning

engagement of students in Cohort 1. Means and standard deviations obtained from these repeated administrations of the SPQ are presented in Table 3.

Table 3. Means and Standard Deviations of SPQ Scores for the Three Cohorts for All Occasions

	Learning Approach	Occasion 1		Occasion 2		Occasion 3	
		X	*SD*	*X*	*SD*	*X*	*SD*
Cohort 1 *n*=46	Surface Approach	29.63	4.82	29.47	3.79	28.02	3.96
	Deep Approach	26.59	4.48	27.03	3.70	27.48	3.88
	Achieving Strategy	21.59	5.19	20.15	4.79	20.87	5.19
Cohort 2 *n*=51	Surface Approach	30.37	4.53	28.69	5.09	25.59	3.73
	Deep Approach	28.06	4.35	27.94	4.63	29.84	4.11
	Achieving Strategy	22.04	5.78	22.35	5.06	22.41	5.17

Note. For surface and deep approaches, maximum score = 40, minimum score = 8. For achieving strategy, maximum score = 35, minimum score = 7.

A Box's M statistic of 60.75, F (45, 28992) = 1.214, $p > .15$ was produced using the data to be analysed. This result indicated that between group variances did not differ from each other, consistent with the MANOVA homogeneity assumption. There was a statistically significant canonical relationship between the dependent variables identified by Bartlett's Test of Sphericity. Between subjects effects for the dependent variables produced a $\chi^2(3, n = 97) = 38.96, p < .001$. Within subjects effects for year of study were $\chi^2(3, n = 97) = 60.55, p < .001$. This result indicated that the standard univariate analysis within MANOVA design may lead to spurious results. For this reason a doubly multivariate MANOVA incorporating Roy-Bargman stepdown procedure was employed (Tabachnick & Fidell, 1996, pp. 476-478). This procedure applies successive covariate analyses to partial out the effects of the intercorrelated variables. The results of this MANOVA for Cohorts 1 and 2 across the three learning approach dependent variables for the three years of study are summarised in Tables 4 and 5.

The multivariate main effect for year was statistically significant indicating that both cohorts varied their learning approaches as they progressed through the three-year course of study. This effect had a large impact, accounting for some 47.9% of the

variance in learning approach scores. The statistically significant multivariate interaction effect between cohort and year of study indicates that the cohorts' pattern of variation over the three years differed, and this difference accounted for some 22.8% of the variance.

Table 4. Multivariate Analyses of Variance for Learning Approach with Cohorts 1 and 2, by 3 Years of Study

Source of Variance	Pillai-Bartlett V	df_1	df_2	F	p	η^2
Cohort	.06937	3	93	2.31073	.081	.069
Year	.47906	6	90	13.79388	.001**	.479
Year x Cohort	.22819	6	90	4.43472	.001**	.228

** $p < .01$

Results of univariate analyses for each of the three learning approach measures are reported in Table 5 using the Roy-Bargman stepdown procedure. Since the stepdown procedure effectively controls for type 1 error rate, probability levels of $p < .05$ can be accepted as the basis for statistical significance (Stevens, 1996, pp. 353-357).

Table 5. Univariate Analyses of Variance for Learning Approach with Cohorts 1 and 2, by 3 Years of Study

Source of Variance	Dependent Variable	Univariate F	df	Stepdown F	df	p
Between Subjects						
Cohort	Achieving	2.20290	1,95	2.20290	1,95	.141
	Surface	1.33088	1,95	2.25031	1,94	.137
	Deep	4.92692	1,95	2.38400	1,93	.126
Within Subjects						
Year	Achieving	.97142	2,190	.97142	2,190	.380
	Surface	26.45263	2,190	26.43977	2,189	.001**
	Deep	6.34364	2,190	8.36462	2,188	.001**
Year x Cohort	Achieving	2.29324	2,190	2.29324	2,190	.104
	Surface	6.16091	2,190	5.85131	2,189	.003**
	Deep	1.58731	2,190	3.77303	2,188	.025*

* $p < .05$; ** $p < .01$

The univariate analyses revealed that student responses on the surface and deep approach subscales were responsible for producing the significant main effect for year of study. Changes on these subscales were statistically significant across the three years,

regardless of cohort membership, while little change was evident in the use of achieving strategies. These cohorts also differed from each other on the extent of change for surface and deep approaches over these years and this difference was responsible for the significant year by cohort interaction.

The pattern of variation for deep and surface approaches is more clearly described by their graphical representation. From a multivariate perspective, Figure 2 shows that both cohorts began their courses reporting high levels of surface approach usage and this was the experience of the students in Cohort 1 for the entirety of their course. While some reduction in surface approach usage occurred during year 3, these students reported a relatively stable level of deep approach usage across the three-year program. The combined effect of this pattern of change for Cohort 1, may have reduced their initial reliance on a surface approach, but this approach remained influential throughout their course.

Students in Cohort 2 reported a more rapid reduction in their use of surface approaches evident across all years, combined with a growth in the use of deep approaches, all of which occurred during their final year in the program. By year 2, students in Cohort 2 had reached the point of relative influence of deep and surface approaches achieved by Cohort 1 at the conclusion of their program. By year 3, Cohort 2 students reported a relative reliance on deep rather than surface approaches. The pattern of learning approach development observed with Cohort 2 was in the direction desired by the current study, for both surface and deep approaches, and was significantly different to the pattern displayed by students in Cohort 1.

Data were gathered from Cohort 3 for the first two administrations of the survey instruments, a period of some 15 months, because of the temporal limit to the study. The three cohorts began their studies in sequential years, but only a four-year period was available for data collection. Consequently, Cohort 3 could be included for the first two years of their course. While only replication in an independent study would provide confirmation of the current findings, it was considered that the partial replication provided by Cohort 3, adds weight to the current conclusions as they to show similar patterns of change to those observed with Cohort 2 (Yin, 1994).

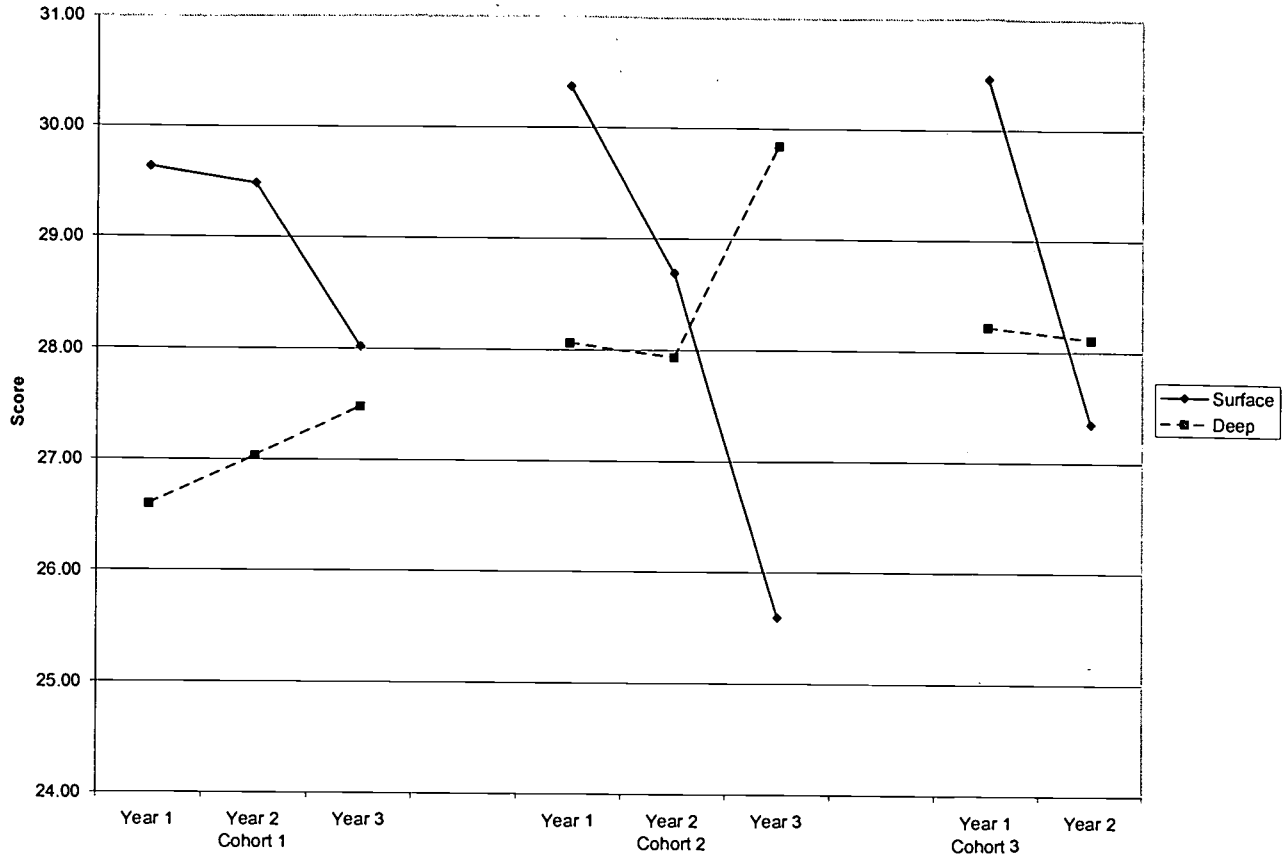


Figure 2. Changes in deep and surface learning approaches, Cohorts 1, 2 & 3

A MANOVA with repeated measures was also conducted for Cohorts 1 and 2, using scores on the TES as dependent variables to determine whether variations in teaching efficacy were observed over the three-year program and whether the cohorts differed in the way their teaching efficacy beliefs developed. Means and standard deviations obtained from these repeated administrations of the TES are presented in Table 6.

Table 6. Means and Standard Deviations of TES Scores for the Three Cohorts for all Occasions

	Teaching Efficacy	Occasion 1		Occasion 2		Occasion 3	
		X	*SD*	*X*	*SD*	*X*	*SD*
Cohort 1 *n*=46	Personal	31.91	6.15	32.93	4.02	34.72	4.20
	General	23.35	3.67	23.03	3.71	24.72	3.92
Cohort 2 *n*=51	Personal	34.12	4.17	34.45	3.99	37.94	3.82
	General	22.65	4.43	22.84	4.36	25.90	4.08

Note. For personal efficacy, maximum score = 48, minimum score = 8. For general efficacy, maximum score = 36, minimum score = 6.

The homogeneity of the covariance matrix met the assumptions of MANOVA with a Box's M test producing the nonsignificant result of $F(21, 32439) = 1.054$, $p = ns$. Sphericity could also be assumed since Bartlett's Test produced a nonsignificant $\chi^2(1, n = 97) = .650$, $p = ns$ for between subject effects. Within subjects effects for year of study were $\chi^2(1, n = 97) = .105$, $p = ns$. The results of this analysis are summarised in Tables 7 and 8.

Table 7. Multivariate Analyses of Variance for Teaching Efficacy with Cohorts 1 and 2, by 3 Years of Study

Source of Variance	Pillai-Bartlett V	df_1	df_2	F	p	η^2
Cohort	.10188	2	94	5.33163	.006**	.102
Year	.50471	4	92	23.43730	.001**	.505
Year x Cohort	.09573	4	92	2.43486	.053	.096

** $p < .01$

This analysis identified a statistically significant multivariate cohort main effect, indicating that these two cohorts differed in their efficacy beliefs. Approximately 10.2% of the variance in scores was attributed to cohort differences in teaching efficacy beliefs. The multivariate main effect for year was also statistically significant, indicating that the efficacy beliefs of both cohorts changed as they progressed through the three-year course of study. This effect had a large impact, accounting for some 50.5% of the variance in efficacy scores. The multivariate interaction effect between cohort and year of study was nonsignificant indicating that the pattern of variation over the three years was similar for each cohort. This interaction effect accounted for some 9.6% of the variance in scores.

The nature of the cohort difference is explained in the univariate analysis reported in Table 8, as a difference between the cohorts in personal efficacy beliefs. General efficacy beliefs did not differ across the cohorts. Both cohorts changed their teaching efficacy beliefs in similar ways as they proceeded through the course. Personal and general efficacy beliefs changed as a result of exposure to the programs of study each cohort experienced.

Table 8. Univariate Analyses of Variance for Personal and General Teaching Efficacy with Cohorts 1 and 2, by 3 Years of Study

Source of Variance	Dependent Variable	Univariate *F*	*df*	*p*
Between Subjects				
Cohort	Personal	10.76107	1,95	.001**
	General	.02202	1,95	.882
Within Subjects				
Year	Personal	25.91504	2,190	.001**
	General	22.32546	2,190	.001**
Year x Cohort	Personal	1.54193	2,190	.217
	General	2.88913	2,190	.058

** $p < .01$

When viewed graphically in Figures 3 and 4, the statistically significant within subject effects for year of study are clarified. Both cohorts reported little change in either personal or general efficacy beliefs during their first year of study. Marked change occurred in the same direction however between the second and final administrations of the survey for both cohorts, which covered the final three semesters of their course.

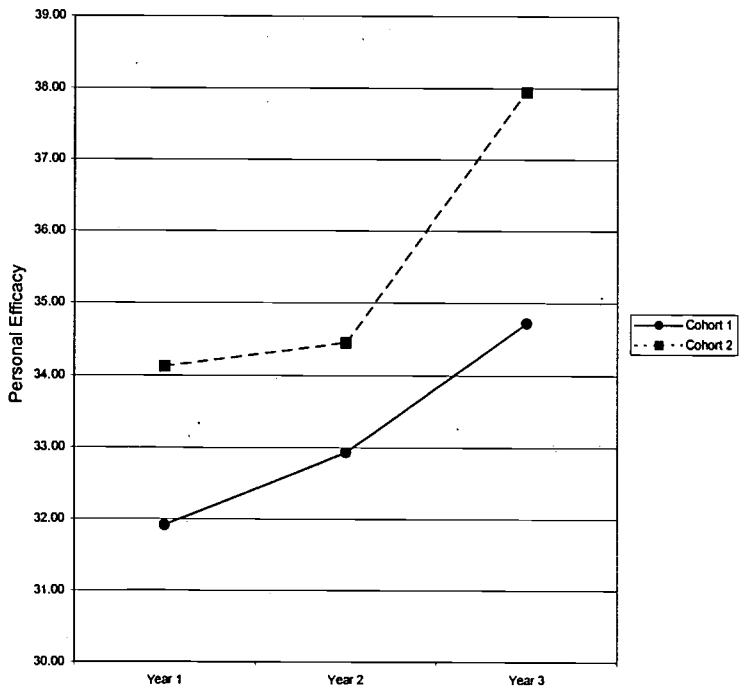


Figure 3. Changes in personal teaching efficacy for Cohorts 1& 2

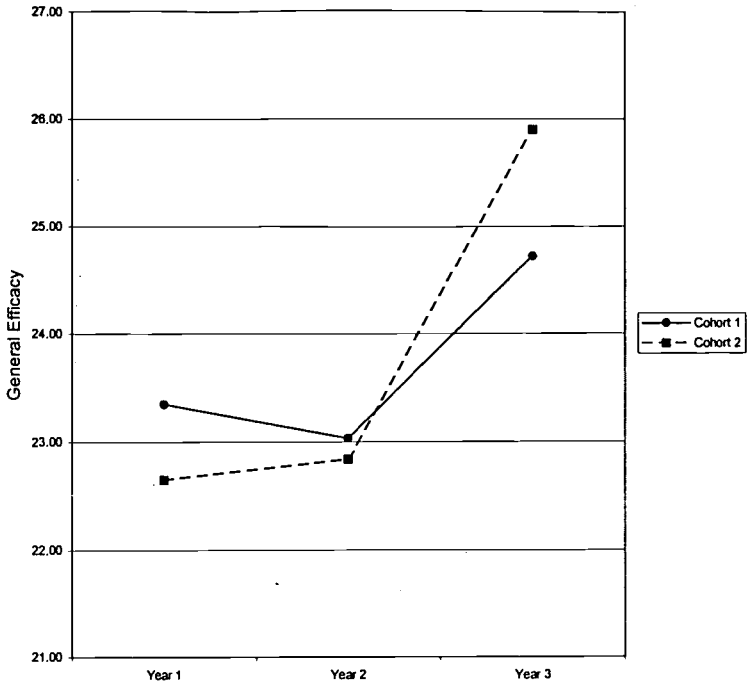


Figure 4. Changes in general teaching efficacy for Cohorts 1 & 2

Very little difference can be seen between the cohorts apart from the higher scores in PTE for Cohort 2 across all years. The trends however are approximately the same for both cohorts. It appears from these results that the differences in learning approaches evident in the previous analysis have not translated into improvements in teaching efficacy beliefs for Cohort 2, since Cohort 1 also followed a similar pattern. The differences however, may be qualitative, rather than quantitative and this issue is further discussed later in the context of the path analyses conducted.

A similar analyses was conducted using scores on the MMCS with the subscales of effort, ability, context and luck as dependent variables. This analysis was conducted in order to determine whether variations in learning attributions were observed over the three-year program and if so, whether the two cohorts responded differently to them, however, no significant main effects or interactions were identified in this analysis. Means and standard deviations for the results of these repeated measures are reported in Table 9.

Table 9. Means and Standard Deviations of MMCS Scores for the Three Cohorts for All Occasions

	Attribution	Occasion 1		Occasion 2		Occasion 3	
		X	*SD*	*X*	*SD*	*X*	*SD*
Cohort 1 *n*=46	Ability	18.98	3.35	18.83	3.29	19.37	2.78
	Effort	23.41	3.51	21.73	3.58	22.15	3.71
	Context	16.30	3.60	18.03	3.87	18.02	3.87
	Luck	14.87	4.20	16.05	3.35	15.46	4.11
Cohort 2 *n*=51	Ability	18.82	2.78	19.18	3.32	18.45	3.36
	Effort	23.65	2.95	23.29	3.28	23.33	3.27
	Context	17.16	3.22	17.27	3.74	16.63	3.77
	Luck	15.55	3.41	14.84	3.68	14.24	3.67

Note. For each scale the maximum score = 30, minimum score = 6.

A relatively even pattern of responding was evident in these scores from both cohorts across all years. The order of importance of these causal attributions was identical for both cohorts and remained the same throughout their university experience. Since this measure was introduced into the study to identify potential Hawthorne effects, the small change in responses to the MMCS strengthens confidence that changes evident in the other scales are genuine.

Because major changes in learning approach and teaching efficacy for Cohorts 1 and 2 did not occur until the latter half of the second, and during the third year of the program, the identification of changes reaching statistical significance for Cohort 3 was unlikely. This likelihood was further reduced because the sample size for Cohort 3 ($n = 37$) was considerably smaller than Cohorts 1 or 2. In effect, the analysis with Cohort 3, represents pattern matching across cohorts on multiple non-equivalent data sources, considered by Yin (1994, pp. 106-110) as a robust mode of analysis, rather than an attempt to identify statistically significant changes independently. Means and standard deviations of all measures across the two occasions for Cohort 3 are reported in Table 10.

Table 10. Means and Standard Deviations of all Measures for Cohort 3 for Two Occasions

	Measure	Occasion 1		Occasion 2	
		X	*SD*	*X*	*SD*
Learning Approach	Surface Approach	30.46	3.37	27.35	4.75
	Deep Approach	28.22	3.98	28.11	3.98
	Achieving Strategy	21.32	6.20	20.65	5.14
Teaching Efficacy	Personal	32.89	4.68	33.03	4.72
	General	22.24	3.57	23.65	3.37
Learning Attribution	Ability	19.86	2.87	19.16	3.67
	Effort	23.03	3.36	23.41	3.29
	Context	17.76	2.93	16.86	4.17
	Luck	16.03	3.45	14.97	3.55

Note. Possible scores for SA and DA range from 8 to 40 and for AS, 7 to 35. For PTE, the possible range is 8 to 48 and for GTE, 6 to 36. For each learning attribution scales possible scores range from 6 to 30.

Repeated measures MANOVA were conducted with the data from Cohort 3 using the same procedures as those conducted with Cohorts 1 and 2. The first analysis examined changes in the three learning approaches over the two years for which data were available for Cohort 3. The second analysis examined changes in the two dimensions of teacher efficacy and the third analysis examined the four measures of learning attribution. Because no between-group analyses were produced for this single cohort, the multivariate results have been aggregated and reported in a single table (Table 11)

Table 11. Multivariate Analyses of Variance for Learning Approach, Teacher Efficacy & Learning Attributions with Cohort 3 by 2 Years of Study

Main effects for Year	Pillai-Bartlett V	df_1	df_2	*F*	*p*	η^2
Learning Approach	.36842	3	34	6.61119	.001**	.368
Teacher Efficacy	.13398	2	35	2.70740	.081	.134
Learning Attribution	.12551	4	33	1.18409	.336	.126

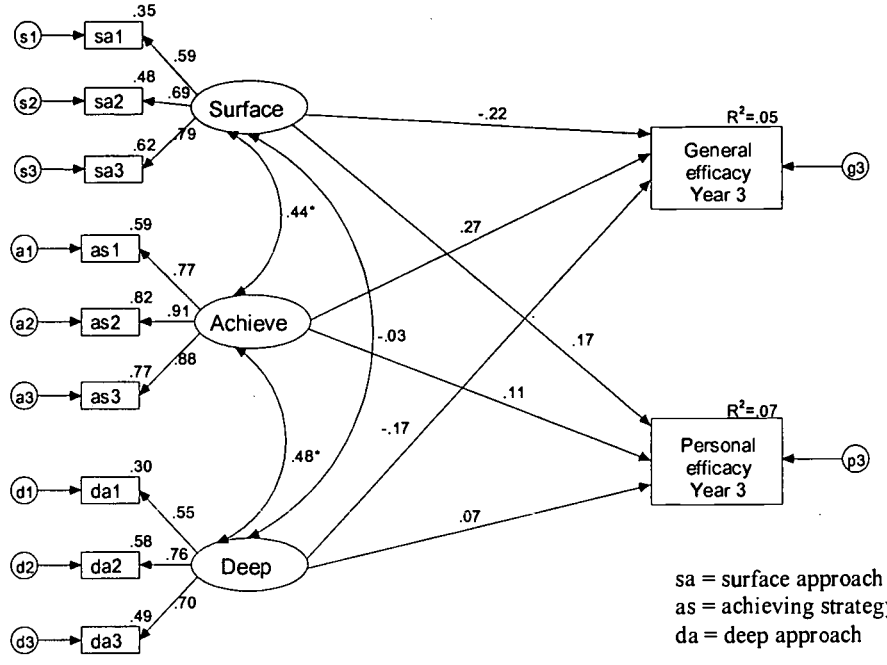
* $p < .05$; ** $p < .01$

Despite the small likelihood of obtaining statistically significant results from these analyses, the multivariate change in learning approach from year 1 to year 2 for Cohort 3 was highly significant and this effect accounted for 36.8% of the variance observed.

From Figure 2, it can be observed that the early pattern of the surface and deep approach variables evident in Cohort 2 has been replicated in Cohort 3. Both cohorts entered the course with surface approaches predominant. By the middle of the second year of the program, the use of surface approaches had diminished sharply, while little change had occurred with the use of deep approaches. While no data are available for Cohort 3 in their final year, the outcomes of this partial replication provide strong evidence that the changes evident in Cohorts 2 and 3 occurred as a result of the altered teaching program, and not from chance or other spurious sources.

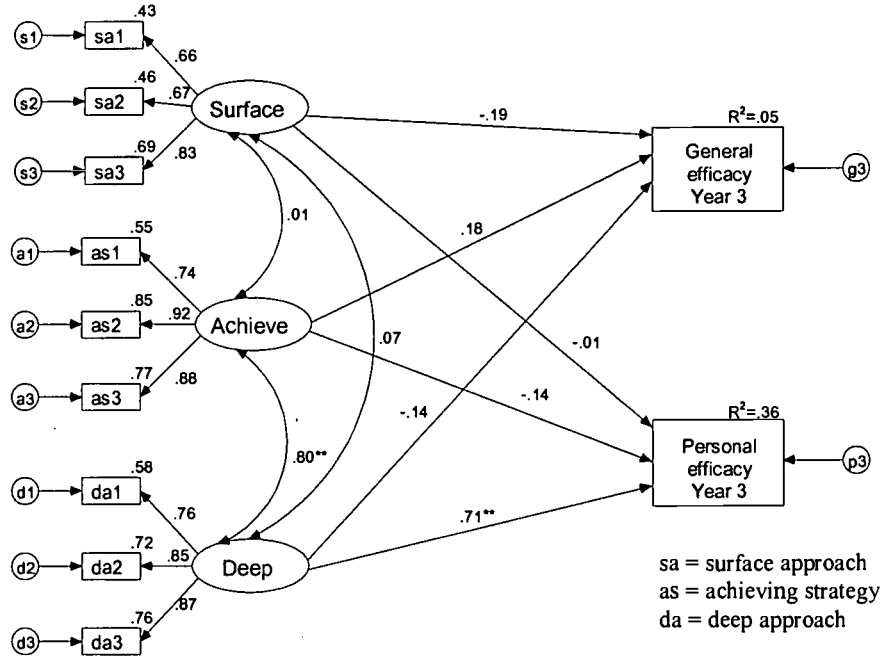
In order to examine the relationships between learning approaches and efficacy beliefs, a series of path analyses were conducted using AMOS 3.6 (Arbuckle, 1997). Investigation of these relationships identified differences in the manner in which PTE was developed in these cohorts. Path analysis of the inter-relationships between learning approaches used by Cohort 1 and their contribution to the PTE and GTE developed at the conclusion of the course (Figure 5), indicated the students' approach to learning had a minimal influence on either dimension of teaching efficacy. The use of all three learning approaches in Cohort 1, across all years of study, explained only 7% of the variance in their final PTE scores and 5% of the variance in their final GTE scores. Of interest in the analysis presented in Figure 5, is the moderate to large covariance between achieving strategy and surface approach (.44, $z = 2.31$, $p = .021$), and between achieving strategy and deep approach (.48, $z = 2.43$, $p = .015$). Achieving strategies in Cohort 1 were adopted by students pursuing surface as well as deep approaches, in approximately equal proportions.

These relationships differed amongst Cohort 2, as depicted by Figure 6, with a significant path identified from the use of deep learning approaches to final PTE, (.71, $z = 2.73$, $p = .006$) contributing to the 36% of the variance in PTE explained in the analysis. The relationships between learning approaches and GTE remained similar to those for Cohort 1, explaining again only 5% of the variance in GTE. The development of beliefs about personal teaching competence among students in Cohort 2, was informed to a considerable extent by their use of deep learning approaches.



Note: numerical indices 1, 2 & 3 refer to the corresponding year of study.
* $p < .05$; ** $p < .01$

Figure 5. Standardised estimates for a semi-saturated model of aggregate learning approach influence on personal and general teaching efficacy (Cohort 1)



Note: numerical indices 1, 2 & 3 refer to the corresponding year of study.
* $p < .05$; ** $p < .01$

Figure 6. Standardised estimates for a semi-saturated model of aggregate learning approach influence on personal and general teaching efficacy (Cohort 2)

The covariance identified in Cohort 1, between achieving strategy use and surface and deep learning approaches, also differed with Cohort 2. A strong relationship between deep learning approach and achieving strategy was generated in this analysis (.80, $z = 4.12$, $p < .001$) and the relationship identified earlier with Cohort 1, between achieving strategy and surface learning approach became negligible with Cohort 2. One explanation for the close association between deep and achieving approaches in Cohort 2 is that those who sought to achieve did so through the use of deep approaches to learning. Deep approaches were overtly favoured as part of the modified program and may have convinced students with an achieving orientation to conform to the desired learning approach.

Discussion

The initial research question sought to investigate whether the altered learning contexts applied in the current study could effect a change in the learning approaches adopted by the students in the course. Specifically, the study sought to examine whether the use of surface approaches could be reduced and deep approaches increased, and how these trends would be represented across the duration of the course. Results from the MANOVA indicated that the learning approaches used by Cohorts 1 and 2 generally moved in similar directions over the period of their course, with a trend towards reducing surface approach usage and increasing deep approach usage. These changes produced considerably greater effects in Cohort 2 than in Cohort 1, and the use of surface approaches began to reduce earlier in the program for Cohort 2. A similar early trend was identified in Cohort 3 with a marked reduction in surface approach usage.

Some contamination of the traditional program from the modified program was noted during the final year of the course for Cohort 1. Some of the lecturers, who applied program modification to Cohort 2, also subsequently taught Cohort 1. Their perception that the teaching methods used with Cohort 2 represented improvements to the traditional approaches, led them ethically to apply some of the modifications during their teaching with Cohort 1. It was expected that the extent of the contamination would have been small, because modifications to the traditional program for Cohort 1 occurred only following their first use with Cohort 2. They may have affected Cohort 1 in their final year, however, and since this was the period of most substantial change in the learning approaches used by Cohort 1, the extent to which these changes represent responses to the traditional program is unclear.

The pattern of learning approach development demonstrated by the Cohort 1 results in the present study are in line with previous research (Marton et al., 1993; Regan & Regan, 1995; Vermunt, 1996), which suggests that students typically enter the first year of university using predominantly surface approaches, especially when they have progressed directly from their final year of secondary education. There is some evidence in the literature that high levels of surface approach are subsequently maintained throughout the students' course experience (Entwistle & Tait, 1990; Gow & Kember, 1990; Marton & Saljo, 1997; Ramsden, 1987; Watkins & Hattie, 1985), with other studies indicating that initially high surface approaches are reduced in favour of increasing deep approaches in later course years (Eklund-Myrskog, 1997; Marton et al., 1993). The results of the present study indicate that changes in the use of learning approaches occurred in the treatment group, in the predicted direction, that the effect of these changes would be readily noticeable (Cohen, 1988) and were unlikely to have occurred by chance (Wilkinson, 1999). This pattern of initial reductions in surface approach followed by delayed gains in deep approach was also consistent with previous findings reported in the literature (Ramsden, 1992; Trigwell & Prosser, 1991a).

The second major focus of the present study sought to investigate whether the changes identified in learning approaches affected students' perceptions of their competence in performing the tasks required of teaching, and their perceptions of the ability of teachers generally to impact on student learning and behaviour, despite other influences. The study sought to examine specifically whether growth in the use of deep approaches and reductions in the use of surface approaches would be associated with, and lead to a strengthening of, students' PTE and GTE. Strengthening of the PTE dimension for Cohort 2, compared with Cohort 1, was considered more likely as a result of improved quality learning produced by greater reliance on deep approaches (Biggs, 1993; 1999; Prosser & Trigwell, 1999; Ramsden, 1992). The GTE dimension was expected to remain relatively more stable across the course for both cohorts because it was anticipated that students of teacher education would have held relatively high initial expectations of teachers' general impact on learners (Gorrell & Hwang, 1995; Herbert, Lee, & Williamson, 1998; Walker & Richardson, 1993).

Students in Cohort 2 began their course with a stronger belief in their personal teaching efficacy than those in Cohort 1, and maintained this differential throughout the program. Notwithstanding this difference, both cohorts developed their perceptions of personal

and general efficacy in a similar pattern. Little change in either efficacy dimension was noted in the first half of the program, but strong growth in both dimensions was observed in the latter half of their course. Thus the expected pattern of higher scores being demonstrated by Cohort 2 in the development of the PTE dimension on the Teacher Efficacy Scale did not emerge. Results for Cohort 3 replicated the early stability in personal efficacy evident in Cohorts 1 and 2.

The first half of the course focused principally on the development of basic teaching skills and initial orientation into the teaching role during practicum placements. The latter part of the program provided increasing experience in classroom teaching within a framework of greater responsibility for teaching tasks and a course-work focus on the development of advanced teaching skills. It is not surprising therefore that greater involvement in multiple teaching tasks and progressive mastery of basic skills were associated with stronger growth in teaching self-efficacy. This pattern of development is consistent with Bandura's (1986; 1997) view that mastery experiences provide the strongest influence on developing concepts of self-efficacy. Early stages of a teacher education program would rely more heavily on techniques of verbal persuasion and modelling to inform developing self-efficacy, which according to Bandura, represent weaker influences.

The development of GTE followed a similar pattern, with no change in the first half of the program, followed by strong growth for both cohorts in the final stage of the course. It seems that for both groups, the perception of teachers' ability to overcome other influences on children's learning and behaviour, developed in consort with student teachers' developing perceptions of their personal competence in performing teaching tasks. The perception of GTE as being a relatively more stable belief is not substantiated from the current research. It appeared that as students developed their beliefs in their own competence, a concomitant view of teachers' influence in general also grew. The development of these two dimensions in consort is a positive outcome insofar as concordance in personal and general efficacy, especially at higher levels, is reported to assist teachers' resilience to pressures within the profession (Ashton & Webb, 1986; Bandura, 1997; Labone, 1995).

Investigation of the relationships between the teacher efficacy and learning approach variables however, identified differences in the manner in which PTE, in particular, was

developed in these cohorts. Path analysis of the learning approaches used by Cohort 1 and their contribution to the PTE and GTE developed by the conclusion of the course, indicated that the students' approach to learning had a minimal influence on either dimension of teaching efficacy. The way students in this cohort went about their learning had little relevance to the development of their beliefs in PTE or GTE. Other influences, such as modelling and mastery experience during practicum placements, may have informed their personal efficacy beliefs, but these were not investigated in the current study.

These relationships differed amongst Cohort 2, with a significant path identified from the use of deep learning approaches to final PTE, largely contributing to the 36% of the variance in PTE explained in the analysis. The development of beliefs about personal teaching competence among students in Cohort 2 was informed to a considerable extent by their use of deep learning approaches. Other influences such as modelling and mastery experiences may well have contributed further to their perceptions of PTE and may have remained the principal influence in the development of general efficacy beliefs.

Learning approach theorists maintain that students who use deep approaches to their learning achieve higher quality learning outcomes (Biggs, 1999; Entwistle, 1998; Prosser & Trigwell, 1999; Ramsden, 1993a). Such outcomes, by definition, are based on a meaningful understanding of the focus of the learning. In this instance, with the focus of learning being teaching, the theory implies that students who used deep approaches would develop greater understandings and more detailed perceptions of the multiplicity of tasks that comprise teaching. These students would construct well considered declarative, procedural and conditional knowledge (Biggs, 1993; 1999). In such circumstances, their perceptions about their own competence in performing teaching tasks may take a different perspective from those who followed surface approaches.

Self-efficacy beliefs depend to a large extent on an individual's perception of the task and the personal requirements necessary for its successful performance (Bandura, 1997; Zimmerman, 1998a). Evidence reviewed from the research literature suggests that students who use different approaches to learning conceptualise the learning environment differently (Clarke, 1996; Dart et al., 1999; Entwistle & Tait, 1990; Ramsden, 1987; Trigwell & Prosser, 1991b). Some evidence is also reported which

suggested that students who vary in their use of approaches to learning, similarly form different conceptions of the teaching environment (Christensen et al., 1995). Thus, those students who engaged in deep approaches to learning may have formed fundamentally different conceptions of the tasks of teaching and the necessary personal requirements to execute those tasks.

Students who developed a high sense of personal efficacy under these circumstances may demonstrate a greater resilience to the pressures of teaching and a greater capability in meeting the complex requirements of successful teaching. These capabilities may include an improved capacity to self-regulate in practice and to use problem-solving processes in novel settings. Students who engaged in their learning through the use of surface approaches may have developed superficial notions of teaching and learning, conceiving of the process in transmission terms (Christensen et al., 1995). Because their learning approach was likely to consist principally of the limited reproduction of declarative and procedural knowledge (Biggs, 1999), their performance in novel or challenging circumstances may be less than ideal, placing their personal efficacy at risk, especially during the early stages of their teaching careers (Ashton & Webb, 1986; Loughran, 1996; Wideen et al., 1998).

Students' adjustment of their learning approach in response to the altered learning contexts established in the present study were consistent with Biggs' (1993; 1999) '3P model'. Three major tenets of this model propose firstly, that student approaches to learning are malleable, and represent a choice on their behalf to engage in their learning using behaviours that are consistent with their perceptions of the learning environment (Biggs, 1993; 1999). Secondly, that these perceptions are established, and thus can be modified, partly through contextual features such as task variables, assessment variables and lecturers' assumed intentions (Biggs, 1999; Prosser & Trigwell, 1999; Ramsden, 1987; Trigwell & Prosser, 1991a). Thirdly the '3P model' asserts that all effects between elements in the model are interactive within an ecological frame and equilibrium may be developed and maintained at a desired level of engagement through the consistent alignment of components within the model (Biggs, 1996; 1999). The outcomes of the current research are consistent with these tenets. The approaches to learning adopted by the students changed as a result of the modified context towards more desired engagement. The alignment of the components of the learning context was a central platform of the modifications applied. Although the differential contribution to

the outcome attributable to constructive alignment (Biggs, 1996) per se, could not be determined, such alignment was a feature of the modifications applied.

The current research identified a link between the manner in which the students learned in this preservice teacher education program, and their resultant teaching self-efficacy. While quantitative outcomes did not differ between the groups, in terms of the absolute growth in teaching efficacy scores, these outcomes were informed through different processes. The argument was made that growth in teaching self-efficacy partially mediated by a deep approach to learning is likely to be qualitatively different. Alterations to the measurement of teaching efficacy in undergraduate students may be required to discern such potential qualitative differences brought about by differing perceptions of task requirements. Students with more simplistic notions of task requirements during teaching and learning interactions may rate their efficacy more highly, perhaps because of a unidimensional view of the task. An increased understanding of the complexity of the teaching role informed through the use of a deep learning approach, could raise the students' perception of the personal resources required to meet the task demands. Such a perception of task requirements could potentially lead to a reduced assessment of self-efficacy, even though personal resources are in fact higher in the latter case. It is suggested here that student teachers in the former situation could be more likely to succumb to the threats to efficacy reported in the literature to impact heavily on beginning teachers (Ashton & Webb, 1986; Benz, Bradley, Alderman, & Flowers, 1992; Evans & Tribble, 1986; Hoy & Woolfolk, 1990; Kemis & Warren, 1991; Soodak & Podell, 1997; Walker & Richardson, 1993) while students in the latter situation may demonstrate greater resilience.

Perceptions of personal teaching efficacy informed from more accurate assessments of the tasks of teaching and the personal requirements necessary to undertake these tasks successfully, would presumably reflect individual skill more accurately and be more sustainable in practice. The instrument used in the current study did not reflect these qualitative differences in perception. Future research would therefore be necessary to identify the nature of the relationships suggested here and their impact, if any, on the relative resilience of teaching self-efficacy developed through deep approaches to learning.

Conclusions

The results of the current study suggest that the methods adopted to improve the quality of teaching and learning in the focus program were effective in meeting its major goals. Strategies were developed to meet the requirements of the local context through the application of action research methodology. They were also designed to apply pervasively across the course, rather than being subject specific or restricted to single semesters. As such these results conform to the outcomes of earlier research (Kember & McKay, 1996; Newble & Hejka, 1991) and to outcomes predicted by theory (Kember & Gow, 1992; Zuber-Skerritt, 1993). Specific teaching techniques used in this study may not be applicable in other contexts. Teaching practices and assessment methods for example, may require further modification to be adapted in other courses of study and other methods not applied to the current program, may need to be developed. The process of generating these potential modifications used in the current study may be transportable to other settings.

Two major issues remain unresolved in the current research. The first relates to differences observed in the way in which the development of PTE was informed. The development of PTE for students in Cohort 1 was unrelated to their learning approach. It was speculated here that the information they gathered to inform their developing sense of efficacy may have emanated largely from practicum experiences, and since their course was less explicit in providing links between theory and practice, the contribution of learning approach may have been minimised. The students in Cohort 2, however, informed their sense of PTE quite substantially from their use of deep approaches to learning. It was speculated that this contribution of meaningful learning to teaching efficacy development in Cohort 2, should lead to these beliefs being more realistic, with a more accurate assessment of task demands and resource requirements. Further research is necessary to determine whether this is the case

It was further suggested that beginning teachers whose efficacy beliefs were formed on the basis of deep learning approaches, may demonstrate greater resilience to the threats to efficacy identified to impact on teachers in their early years in the profession. The current study was restricted to the undergraduate experience of the students who took part. Investigation of students' conceptions of efficacy, learning approaches and responses to the pressures of teaching in the early years, would assist in clarifying the

currently assumed importance of developing high PTE and deep approaches to learning, during undergraduate years.

The outcomes of the current research indicate that considerable value lies in the careful construction of learning environments in teacher education, with the aim of enhancing students adoption of deep learning approaches. The nature of the task is complex, multifaceted and context specific, most likely requiring the development of unique solutions in each environment. Nevertheless, the current research demonstrates that such solutions can be developed and applied within the prevailing constraints of a pre-existing course, without the need for major redevelopment of course structures.

Acknowledgements

The authors wish to gratefully acknowledge the significant contribution to the conduct of the current study provided by Ms Jan White, Ms Tracy Simpson, Ms Ann Klosco, Ms Julie Martello, Dr Myra Dunn, Dr Garry Hoban, Ms Robyn Bentley-Williams and Mr Morton Johnson. These people were responsible for designing and implementing the teaching programs around which the study was based. Their talent, expertise and commitment to quality teaching and learning were essential ingredients in the attainment of its outcomes. Dr David McKinnon's assistance is also gratefully acknowledged for his advice concerning the methodology used in the current study and the process of scale modification.

References

Arbuckle, J. (1997). Amos Users' Guide: Version 3.6. Chicago, Il: SmallWaters Corporation.

Ashton, P. (1984). Teacher efficacy: A motivational paradigm for effective teacher education. Journal of Teacher Education, 35(5), 29-32.

Ashton, P., & Webb, R. (1986). Making a difference: Teachers' sense of efficacy and student achievement. New York: Longman.

Ashton, P., Webb, R., & Doda, N. (1983). A study of teachers' sense of efficacy. Final report (Research Report): National Inst. of Education, Washington, DC. (ERIC Document Reproduction Service No. ED 231833).

Bandura, A. (1977). Self-efficacy: Toward a unifying theory of behavioral change. Psychological Review, 84(2), 191-215.

Bandura, A. (1986). Social Foundations of Thought and Action: A Social Cognitive Theory. Englewood Cliffs, New Jersey: Prentice Hall.

Bandura, A. (1991). Social cognitive theory of self-regulation. Organizational Behavior and Human Decision Processes, 50, 248-287.

Bandura, A. (1997). Self-Efficacy: The Exercise of Control. N.Y.: W.H. Freeman and Company.

Benz, C., Bradley, L., Alderman, M., & Flowers, M. (1992). Personal teaching efficacy: Developmental relationships in Education. Journal of Education Research, 85(5), 274-284.

Biggs, J. (1987a). Student approaches to learning and studying. Hawthorn: Australian Council for Education Research.

Biggs, J. (1987b). Study Process Questionnaire Manual. Melbourne: ACER.

Biggs, J. (1988). The role of metacognition in enhancing learning. Australian Journal of Education, 32(2), 127-138.

Biggs, J. (1989). Approaches to the enhancement of tertiary teaching. Higher Education Research and Development, 8(1), 7-25.

Biggs, J. (1993). From theory to practice: A cognitive systems approach. Higher Education Research and Development, 12(1), 73-85.

Biggs, J. (1996). Enhancing teaching through constructive alignment. Higher Education, 32, 347-364.

Biggs, J. (1999). Teaching for quality learning at university: What the student does. Buckingham: Open University Press.

Biggs, J., & Moore, P. (1993). The process of learning. (3rd ed.). Sydney: Prentice Hall.

Boulton-Lewis, G. (1996). Teachers as adult learners: Their knowledge of their own learning and implications for teaching. Higher Education, 32, 89-106.

Carton, J., & Nowicki, S. (1994). Antecedents of individual differences in locus of control of reinforcement: A critical review. Genetic, Social and General Psychology Monographs, 31-81.

Christensen, C., Massey, D., Isaacs, P., & Synott, J. (1995). Beginning teacher education students' conceptions of teaching and approaches to learning. Australian Journal of Teacher Education, 20(1), 19-29.

Clarke, J. (1996). Students' perceptions of different tertiary learning environments. Paper presented at the Joint Conference of the Australian Association for Research in Education and the Education Research Association, Singapore.

Clarke, J., & Dart, B. (1994). The relationship between students' approaches to learning and their perceptions of what helps and hinders their learning. Paper presented at the Australian Association for Research in Education, Newcastle, NSW.

Cohen, J. (1988). Statistical Power Analysis for the Behavioral Sciences. (2nd ed.). Hillsdale, N.J.: Lawrence Erlbaum Associates.

Coladarci, T., & Brenton, W. (1991). Teacher efficacy, supervision and the special education resource room teacher. Paper presented at the Annual meeting of the American Educational Research Association, Chicargo, IL.

Cook, T., & Campbell, D. (1979). Quasi-Experimental Design and Analysis Issues for Field Settings. Boston: Houghton Mifflin.

Dart, B., Burnett, P., Boulton-Lewis, G., Campbell, J., Smith, D., & McCrindle, A. (1999). Classroom learning environments and students' approaches to learning. Learning Environments Research(2), 137-156.

Dembo, M., & Gibson, S. (1985). Teachers' sense of efficacy: An important factor in school improvement. The Elementary School Journal, 86(2), 173-184.

Dunkin, M., Precians, R., & Nettle, E. (1994). Effects of formal teacher education upon student teachers' cognitions regarding teaching. Teaching and Teacher Education, 10(4), 395-408.

Eklund-Myrskog, G. (1997). The influence of the educational context on student nurses' conceptions of learning and approaches to learning. British Journal of Educational Psychology, 67, 371-381.

Emmer, E., & Hickman, J. (1991). Teacher efficacy in classroom management and discipline. Educational and Psychological Measurement, 51(3), 755-765.

Entwistle, N. (1986). Approaches to learning in higher education: Effects of motivation and perceptions of the learning environment. Paper presented at the American Educational Research Association, San Francisco.

Entwistle, N. (1998). Approaches to learning and forms of understanding. In B. Dart & G. Boulton-Lewis (Eds.), Teaching and learning in higher education (pp. 72-101). Camberwell, Vic.: ACER.

Entwistle, N., & Tait, H. (1990). Approaches to learning, evaluations of teaching, and preferences for contrasting academic environments. Higher Education, 19, 169-194.

Evans, E., & Tribble, M. (1986). Perceived teaching problems, self-efficacy, and commitment to teaching among preservice teachers. Journal of Educational Research, 80(2), 81-85.

Gibbs, G. (1994). Preface to the proceedings of the 1st International Improving Student Learning Symposium. In G. Gibbs (Ed.), Improving student learning: Theory and practice . Oxford, UK: Oxford Centre for Staff Development.

Gibson, S., & Dembo, M. (1984). Teacher efficacy: A construct validation. Journal of Educational Psychology, 76(4), 569-582.

Gordon, C. (2000). Encouraging the Development of Deeper Learning and Personal Teaching Efficacy: Effects of Modifying the Learning Environment in a Preservice Teacher Education Program. Unpublished Ph.D, University of Sydney, Sydney, Australia.

Gordon, C., & Dunshea, G. (1996). Learning approach, teacher efficacy and instructional alignment. Paper presented at the joint conference of the Australian Association for Research in Education and the Education Research Association, Singapore.

Gordon, C., Lim, L., McKinnon, D., & Nkala, F. (1998). Learning approach, control orientation and self efficacy of beginning teacher education students. Asia Pacific Journal of Teacher Education and Development, 1(1), 53-64.

Gordon, C., Lim, L., McKinnon, D., & White, J. (1996). Learning about learning while learning about teaching. Paper presented at the joint conference of the Australian Association for Research in Education and the Education research Association, Singapore.

Gorrell, J., & Hwang, Y. (1995). A study of efficacy beliefs among preservice teachers in Korea. Journal of Research and Development in Education, 28(2), 101-105.

Gow, L., & Kember, D. (1990). Does higher education promote independent learning? Higher Education, 19(3), 307-322.

Harris, K., & Graham, S. (1994). Constructivism: Principles, paradigms, and integration. The Journal of Special Education, 28(3), 233-247.

Herbert, E., Lee, A., & Williamson, L. (1998). Teachers' and teacher education students' sense of efficacy: Quantitative and qualitative comparisons. Journal of Research and Development in Education, 31(4), 214-225.

Hoban, G. (1998). Reciprocating self-study: A reflective framework for conceptualising teaching-learning relationships. (ERIC Document Reproduction Service No. ED 423216).

Hoy, W., & Woolfolk, A. (1990). Socialization of student teachers. American Educational Research Journal, 27(2), 279-300.

Hoy, W., & Woolfolk, A. (1993). Teachers' sense of efficacy and the organizational health of schools. The Elementary School Journal, 93(4), 355-372.

Huey-Ling, L., & Gorrell, J. (1998). Preservice teachers' efficacy beliefs in Taiwan. Journal of Research and Development in Education, 32(1), 17-25.

Joreskog, K., & Sorbom, D. (1993). LISREL 8: Structural Equation Modeling with the SIMPLIS Command Language. Chicago, Il.: Scientific Software International.

Kember. (1998). Teaching beliefs and their impact on students' approach to learning. In B. Dart & G. Boulton-Lewis (Eds.), Teaching and learning in higher education (pp. 1-25). Camberwell, Vic.: ACER.

Kember, D., & Gow, L. (1992). Action research as a form of staff development in higher education. Higher Education, 23, 297-310.

Kember, D., & McKay, J. (1996). Action research into the quality of student learning. Journal of Higher Education, 67(5), 529-554.

Kemis, M., & Warren, R. (1991). Examination of the relationships between perceived teaching potential, commitment, and efficacy and performance, satisfaction, preparation, career orientation and academic ability. Paper presented at the Annual Meeting of the Mid-Western Educational Research Association, Chicago, Ill.

Labone, E. (1995). Teacher burnout and teacher efficacy: Trends over time. Paper presented at the Annual Conference of the Australian Association for Research in Education, Hobart, Tas.

Lefcourt, H. (1981). Research with the locus of control construct. New York: Academic Press.

Lefcourt, H. (1991). Locus of control. In J. Robinson, P. Shaver, & L. Wrightsman (Eds.), Measures of personality and social psychological attitudes (Vol. 1, pp. 413-499). San Diego, Cal.: Academic Press.

Loughran, J. (1996). Learning about teaching: A longitudinal study of beginning teachers. Australian Educational Researcher, 23(2), 55-77.

Marton, F., Dall'Alba, G., & Beaty, E. (1993). Conceptions of learning. International Journal of Educational Research, 19(3), 277-300.

Marton, F., & Saljo, R. (1997). Approaches to learning. In F. Marton, D. Hounsell, & N. Entwistle (Eds.), The experience of learning: Implications for teaching and studying in higher education (2 ed., pp. 39-58). Edinburgh: Scottish Academic Press.

McKinnon, D., Gordon, C., & Lim, L. (1996). Learning how to learn while learning about research. Paper presented at the joint conference of the Australian Association for Research in Education and the Education research Association, Singapore.

Newble, D., & Hejka, E. (1991). Approaches to learning of medical students and practising physicians: Some empirical evidence and its implications for medical education. Educational Psychology, 11(3), 333-343.

Oxford, R. (1997). Constructivism: Shape-shifting, substance, and teacher education applications. Peabody Journal of Education, 72(1), 35-66.

Pajares, F. (1996). Self-efficacy beliefs in academic settings. Review of Educational Research, 66(4), 543-578.

Pajares, F. (1997). Current directions in self-efficacy research. In M. Maehr & P. Pintrich (Eds.), Advances in motivation and achievement (Vol. 10, pp. 1-50). Greenwich, Connecticut: JAI Press.

Prawat, R. (1992). Teachers beliefs about teaching and learning: A constructivist perspective. American Journal of Education, 100(3), 354-395.

Prosser, M., & Trigwell, K. (1997). Relations between perceptions of the teaching environment and approaches to teaching. British Journal of Educational Psychology, 67, 25-35.

Prosser, M., & Trigwell, K. (1998). Teaching in higher education. In B. Dart & G. Boulton-Lewis (Eds.), Teaching and learning in higher education (pp. 250-268). Camberwell, Vic.: ACER.

Prosser, M., & Trigwell, K. (1999). Understanding learning and teaching: The experience in higher education. Buckingham: Open University Press.

Ramsden, P. (1987). Improving teaching and learning in higher education: The case for the relational perspective. Studies in Higher Education, 12(3), 275-286.

Ramsden, P. (1992). Learning to Teach in Higher Education. London: Routledge.

Ramsden, P. (1993a). Effective teaching in higher education. Paper presented at the National Teaching Workshop: Promoting Teaching in Higher Education, Griffith University, Qld.

Ramsden, P. (1993b). Theories of learning and teaching and the practice of excellence in higher education. Higher Education Research and Development, 12(1), 87-97.

Ramsden, P. (1993c). Using research on student learning to enhance educational quality. Paper presented at the 1st International Improving Student Learning Symposium, Warwick University, UK.

Ramsden, P., Bowden, J., & Martin, E. (1988). Students' learning and perceptions of teaching: School effectiveness reconsidered. Paper presented at the Annual Meeting of the American Educational Research Association, New Orleans.

Regan, L., & Regan, J. (1995). Relationships between first year university students' scores on Biggs' Study Process Questionnaire and students' gender, age, faculty of enrolment and first-semester grade-point-average. Paper presented at the Australian Teacher Education Association, Sydney.

Rich, Y., Lev, S., & Fischer, S. (1996). Extending the concept and assessment of teacher efficacy. Educational and Psychological Measurement, 56(6), 1015-1025.

Ross, J. (1998). The antecedents and consequences of teacher efficacy. In J. Brophy (Ed.), Advances in Research on Teaching (Vol. 7, pp. 49-73): JAI Press.

Ross, J., Cousins, J., & Gadalla, T. (1996). Within-teacher predictors of teacher efficacy. Teaching and Teacher Education, 12(4), 385-400.

Saklofske, D., Michayluk, J., & Randhawa, B. (1988). Teachers' efficacy and teaching behaviors. Psychological Reports, 63, 407-414.

Schunk, D., & Zimmerman, B. (1997). Social origins of self-regulatory competence. Educational Psychologist, 32(4), 195-208.

Simons, P. (1991). Constructivist learning: The role of the learner. In T. Duffy, Lowyck, J. & Jonassen, D. (Ed.), Designing environments for constructive learning (pp. 291-313). Berlin: Springer-Verlag.

Soodak, L., & Podell, D. (1993). Teacher efficacy and student problem as factors in special education referral. The Journal of Special Education, 27(1), 66-81.

Soodak, L., & Podell, D. (1997). Efficacy and experience: Perceptions of efficacy among preservice and practicing teachers. Journal of Research and Development in Education, 30(4), 214-221.

Stevens, J. (1996). Applied multivariate statistics for the social sciences. (3rd ed.). Mahwah, New Jersey: Lawrence Erlbaum Associates.

Tabachnick, B., & Fidell, L. (1996). Using multivariate statistics. (3rd ed.). N.Y.: Harper Collins.

Thompson, B. (1996). AERA editorial policies regarding statistical significance testing: Three suggested reforms. Educational Researcher, 25(2), 26-30.

Thompson, B. (1999). Common methodology mistakes in educational research revisited, along with a primer on both effect sizes and the bootstrap. Paper presented at the Annual Meeting of the American Educational Research Association, Montreal.

Trigwell, K., & Prosser, M. (1991a). Improving the quality of student learning: The influence of learning context and student approaches to learning on learning outcomes. Higher Education, 22, 251-266.

Trigwell, K., & Prosser, M. (1991b). Relating approaches to study and quality of student learning outcomes at the course level. British Journal of Educational Psychology, 61, 265-275.

Trigwell, K., Prosser, M., & Taylor, P. (1994). Qualitative differences in approaches to teaching first year university science. Higher Education, 27, 75-84.

Tschannen-Moran, M., Woolfolk-Hoy, A., & Hoy, W. (1998). Teacher efficacy: Its meaning and measure. Review of Education Research, 68(2), 202-248.

Vermunt, J. (1996). Metacognitive, cognitive, and affective aspects of learning styles and strategies: A phenomenographic analysis. Higher Education, 31, 25-50.

Vermunt, J. (1998). The regulation of constructive learning processes. British Journal of Educational Psychology, 68, 149-171.

Walker, L., & Richardson, G. (1993). Changing perceptions of efficacy: From student teachers to first-year teachers. Paper presented at the Annual meeting of the Mid-South Educational Research Association, New Orleans, LA.

Watkins, D., & Hattie, J. (1985). A longitudinal study of the approaches to learning of Australian tertiary students. Human Learning, 4(2), 127-141.

White, J., & Gordon, C. (2000). There's a bug in my ear: Value adding through authentic interview techniques. Contemporary Issues in Early Childhood, 2(1), 287-298.

Wideen, M., Mayer-Smith, J., & Moon, B. (1998). A critical analysis of the research on learning to teach: Making the case for an ecological perspective on inquiry. Review of Educational Research, 68(2), 130-178.

Wilkinson, L. (1999). Statistical methods in psychology journals. American Psychologist, 54(8), 594-604.

Woolfolk, A., & Hoy, W. (1990). Prospective teachers', sense of efficacy and beliefs about control. Journal of Educational Psychology, 82(1), 81-91.

Zimmerman, B. (1995). Self-efficacy and educational development. In A. Bandura (Ed.), Self-efficacy in Changing Societies (pp. 202-231). New York: Cambridge University Press.

Zimmerman, B. (1998a). Academic study and the development of personal skill: A self-regulatory perspective. Educational Psychologist, 33(2/3), 73-86.

Zimmerman, B. (1998b). Developing self-fulfilling cycles of academic regulation: An analysis of exemplary instructional models. In D. Schunk & B. Zimmerman (Eds.), Self regulated learning: From teaching to self-reflective practice (pp. 1-19). N.Y.: Guilford Press.

Zuber-Skerritt, O. (1993). Improving learning and teaching through action learning and action research. Higher Education Research and Development, 12(1), 45-58.

U.S. Department of Education
Office of Educational Research and Improvement (OERI)
National Library of Education (NLE)
Educational Resources Information Center (ERIC)

Reproduction Release

(Specific Document)

I. DOCUMENT IDENTIFICATION:

Title: Enhancing Learning Approaches in an Undergraduate Teacher Education Program	
Author(s): Christopher Gordon and Ray Debus	
Corporate Source:	Publication Date: April 2001

II. REPRODUCTION RELEASE:

In order to disseminate as widely as possible timely and significant materials of interest to the educational community, documents announced in the monthly abstract journal of the ERIC system, Resources in Education (RIE), are usually made available to users in microfiche, reproduced paper copy, and electronic media, and sold through the ERIC Document Reproduction Service (EDRS). Credit is given to the source of each document, and, if reproduction release is granted, one of the following notices is affixed to the document.

If permission is granted to reproduce and disseminate the identified document, please CHECK ONE of the following three options and sign in the indicated space following.

The sample sticker shown below will be affixed to all Level 1 documents	The sample sticker shown below will be affixed to all Level 2A documents	The sample sticker shown below will be affixed to all Level 2B documents
PERMISSION TO REPRODUCE AND DISSEMINATE THIS MATERIAL HAS BEEN GRANTED BY SAMPLE TO THE EDUCATIONAL RESOURCES INFORMATION CENTER (ERIC)	PERMISSION TO REPRODUCE AND DISSEMINATE THIS MATERIAL IN MICROFICHE, AND IN ELECTRONIC MEDIA FOR ERIC COLLECTION SUBSCRIBERS ONLY, HAS BEEN GRANTED BY SAMPLE TO THE EDUCATIONAL RESOURCES INFORMATION CENTER (ERIC)	PERMISSION TO REPRODUCE AND DISSEMINATE THIS MATERIAL IN MICROFICHE ONLY HAS BEEN GRANTED BY SAMPLE TO THE EDUCATIONAL RESOURCES INFORMATION CENTER (ERIC)
Level 1	**Level 2A**	**Level 2B**
☑	☐	☐
Check here for Level 1 release, permitting reproduction and dissemination in microfiche or other ERIC archival media (e.g. electronic) *and* paper copy.	Check here for Level 2A release, permitting reproduction and dissemination in microfiche and in electronic media for ERIC archival collection subscribers only	Check here for Level 2B release, permitting reproduction and dissemination in microfiche only

Documents will be processed as indicated provided reproduction quality permits.
If permission to reproduce is granted, but no box is checked, documents will be processed at Level 1.

I hereby grant to the Educational Resources Information Center (ERIC) nonexclusive permission to reproduce and disseminate this document as indicated above. Reproduction from the ERIC microfiche, or electronic media by persons other than ERIC employees and its system contractors requires permission from the copyright holder. Exception is made for non-profit reproduction by libraries and other service agencies to satisfy information needs of educators in response to discrete inquiries.

Signature:	Printed Name/Position/Title: Christopher Gordon, Senior Lecturer in Education	
Organization/Address: Charles Sturt University, Panorama Ave., Bathurst 2795 Australia	Telephone: +61 2 63384463	Fax: +61 2 63384417
	E-mail Address: cgordon@csu.edu.au	Date: 12 March, 2001

III. DOCUMENT AVAILABILITY INFORMATION (FROM NON-ERIC SOURCE):

If permission to reproduce is not granted to ERIC, or, if you wish ERIC to cite the availability of the document from another source, please provide the following information regarding the availability of the document. (ERIC will not announce a document unless it is publicly available, and a dependable source can be specified. Contributors should also be aware that ERIC selection criteria are significantly more stringent for documents that cannot be made available through EDRS.)

Publisher/Distributor:
Address:
Price:

IV. REFERRAL OF ERIC TO COPYRIGHT/REPRODUCTION RIGHTS HOLDER:

If the right to grant this reproduction release is held by someone other than the addressee, please provide the appropriate name and address:

Name:
Address:

V. WHERE TO SEND THIS FORM:

Send this form to the following ERIC Clearinghouse:	
ERIC Clearinghouse on Assessment and Evaluation **1129 Shriver Laboratory (Bldg 075)** **College Park, Maryland 20742**	**Telephone: 301-405-7449** **Toll Free: 800-464-3742** **Fax: 301-405-8134** **ericae@ericae.net** **http://ericae.net**

EFF-088 (Rev. 9/97)