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Full Length Research Paper

Using action research to develop deep learning outcomes within a preservice teacher education context

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This paper describe one aspect of a recent study that investigated the impact and dimensions of several teaching and learning approaches utilised in tertiary institutions. The study aimed to reduce reliance on surface learning techniques and improve deep learning processes amongst a cohort of undergraduate students studying in a Bachelor of Education (Early Childhood) at a regional university in NSW, Australia. The quantitative results of the study have been reported elsewhere and this paper details the whole of course interventions and results of the action research component.

Keywords: Action research, deep learning, preservice teacher education

INTRODUCTION

Considerable research has been undertaken in the last 20 years in an effort to address many of the issues related to teaching and learning in higher education highlighted by the Aulich report (1990). One such line of research has attempted to improve learning outcomes through the modification of learning environments, with the purpose of impacting on the approach students take to their learning. Learning approach theorists (see for example Biggs, 1987; 1993a; 1995; 1993; Entwistle, 1997; Entwistle, Entwistle, and Tait, 1991; Entwistle and Ramsden, 1983; Marton, Dall'Alba, and Beaty, 1993; Ramsden, 1992; 1994) posit that learning outcomes bear a direct and substantial relationship to the approach students adopt in the pursuit of that learning (Biggs, 1989; Dahlgren, 1997; Entwistle and Waterston, 1988; Marton and Saljo, 1997). They further contend that the approach adopted is a result of the student's intent (Biggs, 1989; Marton et al., 1993; Rams-den, 1993b; Van Rossum and Schenk, 1984; Vermunt, 1996), which in turn is largely influenced, among other things, by the context of the learning environment (Biggs, 1996; Dart, 1994; Entwistle et al., 1991; Prosser and Trigwell, 1997; Ramsden, 1997; Trig-well and Prosser,1991).

Lecturers' intentions as teachers are influential among these contextual characteristics (Gow and Kember, 1993; Kember and Gow, 1994; Prosser and Trigwell, 1997; Ramsden, 1992; Ramsden, Bowden, and Martin, 1988; Trigwell and Prosser, 1996; Trigwell, Prosser, and Taylor, 1994), because of lecturers' considerable control over important determining features such as assessment procedures (Biggs, 1995; 1996; Booth, 1993; Entwistle and Entwistle, 1992; Entwistle, 1994; Nightingale, 1997), but also because of their control of structure, sequence and pitch, the mode of presentation, choice of learning materials (Alexander and Murphy, 1997; Clarke, 1995; Clarke, 1996; Entwistle et al., 1991; Entwistle and Tait, 1990; Jackson and Prosser, 1989; McKinnon, Gordon, and Lim, 1996; Ramsden, 1993a), and the learning objectives set (Biggs, 1996). Indeed Wideen et al (1998) emphasise that lecturers' intentions and other structural requirements have inhibited or interfered with program modifications aimed at improving quality learning, especially in teacher education. They report Zeichner and Gore (1990, cited in Wideen et al., 1998, p.133) as suggesting that:

… innovative courses are nullified by the structural fragmentation and competing agendas that typify traditional programs of teacher education.

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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, and Synott, 1995; Dunkin, Precians, and 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, and Nkala, 1998b; Wideen et al., 1998). Furthermore, since teaching involves complex behaviour, regularly requiring the teacher to generate novel solutions to novel problems in novel circumstances, the principles of reflective prac -tice (Schön, 1987) need to be established through the application of learning approaches that facilitate their development (Biggs, 1993a; 1993b; 1996; Janssen, 1996; Prawat, 1992).

To this end, the study reported here employed a longitudinal, quasi-experimental, multiple cohort, design with repeated measures on non-equivalent dependent variable. The aim was to reduce reliance on surface learning approaches used by tertiary students enrolled in an early childhood degree at a regional university and improve reported self-efficacy. The first cohort (Cohort 1) acted as the contrast group, with Cohorts 2 and 3 repre-senting 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 para-digm 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.

Learning approaches, teaching efficacy beliefs, and causal attributions for learning outcomes were repeatedly surveyed at pre-determined intervals for each of three co-horts of students undertaking initial training in early child-hood teacher education within the context of an Australian rural university. For a full description of the methodology the reader is referred to Gordon and Debus (2002).

The project began in 1994 following the conjunction of two independent developments. The first involved the res-earcher's consolidation of the research focus for his doc-toral studies, relating teacher efficacy development and learning approaches in undergraduate teacher education programs. The second resulted from the Head of Sch-ool's attendance at a conference presentation (Clarke and Dart, 1994) dealing with student approaches to learning and consequent learning outcomes. As a result of the insight acquired from the conference presentation, the Head of School sought and gained funding from the university to pilot the implementation of altered approaches to teaching, in a teacher education program, and asked the researcher to co-ordinate the project (Gordon, Lim, McKinnon, Nkala, and Parker, 1995). This paper details the action research process and outcomes of that project from the perspective of the tertiary personnel involved.

Three phases in the inquiry were agreed to following a series of meetings amongst personnel. Phase 1 represented the collection of baseline data from Cohort 1 (year 1, 1995) who would become the contrast group in an eventual quasi-experimental approach. Their development as a cohort of learners and teachers would be followed with administrations of questionnaires repeated annually. Descriptive data would be gathered, presented and published, identifying key relationships among the dependent variables (Gordon et al., 1998b; Gordon et al., 1995; Gordon, Lim, McKinnon, and White, 1996).

Phase 2 represented the development and implementation of altered teaching and learning contexts by the principal teaching team, and others from time to time, who taught in the Bachelor of Teaching (Early Childhood) course. Phase 2 was to examine the effect of these modifications on the dependent variables and on the relationships between them. Altered teaching and learning contexts were planned to be applied to Cohort 2, who began year 1 in 1996, and to continue in varying forms throughout the length of their course. It would then be possible to compare the traditional approach used with Cohort 1 and the modified approach used with Cohort 2 across the identified dependent variables through longitudinal analysis.

Modifications were required to maintain the subject structure and sequence of the course and principally be restricted to teaching methods, assessment methods, and student engagement with the learning tasks. Assessment was still required to adhere to university policy for the standardisation of grades consistent with a near normal distribution, with set tolerances for the award of particular grades. The teaching modifications were to be developed collaboratively, to meet the specific learning objectives of the course and the subjects it contained. Action research methodology was identified as the appropriate approach to follow in the development, implementtation, evaluation and modification of altered teaching methods. The action research team was to be co-ordinated and led conjointly by the researcher and the course co-ordinator, with heavy reliance on the resea-rcher's input initially, but with gradual transference of responsebility for the initiation of change, to the other team members (Zuber-Skerritt, 1993).

Certain core subjects would be specifically targeted for modification by the action research group each semester, but each member of the team would reinforce the theme

of developing deeper learning approaches across the subjects they co-ordinated. Other subjects could include altered teaching methodology in conjunction with the identified core subject, if the subject co-ordinator desired to do so. The researcher would consult with individual subject co-ordinators as required, especially during subject planning stages, to assist with the development of altered teaching and assessment methods. He would also provide information about the project goals to the stud-ents and feedback about their progress toward these goals after conducting each survey round. In this way, it was hoped that the theme of developing deeper approaches to learning would be pervasive, from the students' perspective, across the course and some information to assist their self-regulation of learning would be available.

Phase three involved the redesign of the three-year Bachelor of Teaching course into the new four-year Bachelor of Education program. Early and ongoing results from the study were to inform this course re-development, through the researcher acting as consultant, and through the insights of the action research team members, who held the core responsibility for re-developing the program. The first intake into the new program would become Cohort 3. By this time it was anticipated that the resea-rcher would have become a peripheral member of the action research team, with greatest responsibility for initiating change resting with the teaching team members. The purpose of including similar repeated measures from this third cohort was to verify that the patterns that developed in Cohort 2 could be repeated. This was nece-ssary to assist, at least in part, in establishing the external validity of the study (Thompson, 1996; Thompson, 1999). Replication of the findings with Cohort 3 could also partly verify that the teaching team had continued to implement the innovations applied to Cohort 2 and that the newly developed course could encourage students to use deeper learning approaches.

Due to the nature of the research and the restrictions placed on the potential design by the requirements of the institution and the context in which the research was to be conducted, a multiple cohort approach using quasi-expe-rimental design was chosen. Participants could not be assigned randomly to control and treatment groups because modified teaching approaches and assessment methods would need to apply to the entire cohort. Even if equity and ethical considerations could have been met, these would have needed to be accomplished through a self-selection, rather than random selection basis. Self-selection would introduce serious threats to validity by virtue of the probability that those self-selecting into the treatment group, may well be those with a predisposition to deeper learning approaches. This eventuality may have made the groups non-equivalent on a key dependent variable.

It is also unlikely that sufficiently impactful teaching innovations could have been delivered without contamination across the groups. A multiple-group, within-cohorts, design would have restricted altered teaching contexts to tutorial application only with lectures remaining in the traditional format. This restriction would have limited the outcomes of the study by unduly containing the level of innovation possible. Thus a quasi-experimental design was considered the only option in the setting, with whole cohorts acting as treatment and contrast groups. It was anticipated that Cohorts 1 and 2 would be unlikely to differ markedly on key variables, as they were students attending the same university in the same course in successive years.

The selection of one program in one university as the focus of the intervention was also considered the most appropriate methodology given the research goals. The outcomes of the study depended on the development of innovative teaching and assessment methods that had relevance in the current context. Neither were methods developed elsewhere simply transported to the current setting, nor was it expected that the methods developed in this setting would be transportable to others, without requiring modification. In such a situation a multiple-case approach, using data gathered from other institutions would not allow direct comparison, since the modifications appropriate to one context may not be appropriate in another.

It was decided that the most valuable approach would be to model an effective process in the creation of innovation, then in later projects apply the process elsewhere, rather than the innovations per se. This resea-rch approach thus fits within Yin's (1994) single case (embedded) design. The single case is produced by the treatment applied to students within a single program in one university. Multiple sources of qualitative and quantitative data were, however, embedded to measure the outcomes of this treatment across a number of different dimensions.

Action Research as an Embedded Paradigm

Action research was chosen as an enabling method in the creation, application and review of innovative approaches to teaching. The nature of the research was essentially creative and collaborative. It required the development and tailoring of altered teaching methods, informed from a basis in theory and some examples of practice. Such practices reported in the literature however, needed modi-fication to suit the particular teaching goals of the course, the nature of the student population, perceived skills of the lecturing staff and requirements of the institution. A similar approach had been reported by Kember and Gow (1992) in the development of an innovative course restructure in Hong Kong with considerable benefits in en-couraging staff development, such that the continuation of the innovations at the conclusion of the program was likely. Zuber-Skerritt (1992; 1993) advocated the use of action research in the renewal and enrichment of educa-tional programs, and of staff commi-tment to teaching, in higher education settings.

Kember and Gow (1992), nevertheless saw a level of contradiction in the dual processes of action research and staff development. They contended that staff development involved directives established externally to the action research group, which by their nature conflicted with the emancipatory conception of action research.

Action research is based upon collaboration, participation, democratic decision making and emancipation through critical self-reflection. Staff development, however, implies some element, at least, of external involvement and/or direction setting (Kember and Gow, 1992, p. 301).

The developmental model of action research advanced by Zuber-Skerritt (1992; 1993) however, accommodates this apparent contradiction. Three successive phases of development through which action research in higher education may move, were proposed by Zuber-Skerritt (1993, p. 47), respectively termed technical, practical and emancipatory. In this frame, the beginning of an action research process may necessarily take a "technical" form where members are co-opted and rely on the assistance of an outside expert or facilitator to provide formative information and encouragement. After at least one cycle to provide a basis for reflection and a model of operation, the action research group may take a "practical" form. In this phase the developing awareness of the group members has empowered them to initiate innovation and they rely on the facilitator as "… a process consultant with a Socratic role …" (Zuber-Skerritt, 1993, p. 47). Finally as the experience and awareness of the group members grow, they become empowered as equals and the role of the facilitator is reduced to collaborative "process moderator" in a team of equals. The final phase defines the emancipatory outcome of action on research paradigm and enables the accommodation of the apparent incongruence suggested by Kember and Gow.

All three phases described by Zuber-Skerritt were expe-rienced during the course of the current study. Initially, the members of the action research team were co-opted by their course co-ordinator's commitment to the research project and entered the project in a technical phase. While they each proved to be eager and committed part-icipants in the program, their original involvement was nevertheless not of their own initiative. The researcher acted as the facilitator, or outside expert, by providing information concerning the theory on which the project was based, together with some examples of practice emanating from the literature surveyed, and from the out-comes of concurrent exploratory studies conducted with other student groups and teaching teams (see for exa-mple: Gordon, 1993; Gordon and Dunshea, 1996; Gordon, Gibson, Hall, Dillon, and Perisce, 1997; Gordon, Lane, and Hall, 1998a; McKinnon, Gordon, Coates, and Grieg, 1997; McKinnon et al., 1996).

Following the first cycle, original members of the action research team independently developed initiatives but often sought the researcher's opinion and suggestions to improve the innovation. The phase of practical orientation had developed for these team members. Meanwhile, some other members of the school staff were invited to join the team for that cycle, because they were teaching a targeted core subject in the course. These new participants began at a technical level. Thus throughout the course of the research, several of the stages proposed by Zuber-Skerritt (1992) may have been represented simultaneously by subgroups or individuals within the larger action research group.

In the final year of the program, team members independently introduced and evaluated innovations and, on one occasion, co-opted the researcher to implement a procedure the team member had planned. They had reached a level of familiarity and confidence with the methodology to develop and implement an approach, still in collaboration with other team members, but without prior consultation with the researcher. These actions represented the emergence of the emancipatory stage, in accordance with Zuber-Skerritt's model.

Continual invention and revision of altered approaches to teaching were necessary because the repeated use of singular methods (particularly assessment methods) may have led to their over-use and resulted in the students becoming bored or using automated processes in their execution. For example, peer assessment, reflective journal writing, and group presentations were some of the methods identified as potentially over-used. Implementing a program containing innovative practices over a three-year course, across subjects, required a sufficient bank of alternate practices to prevent tedium from interfering with students' application of deep learning approaches. Collaborative processes were necessary in the development and implementation of these innovative practices and action research methodology ideally suited the task. As an embedded process it was considered possible to use action research in this way, to complement the simultaneous use of the potentially contradictory, essentially positivist, quasi-experimental methodology. By virtue of the action research process, the intervention applied to the treatment group in the study continually evolved as the study progressed.

The action research team decided that the key elements in the provision of this change-environment were: the development of a pervasive and explicit theme of deeper learning as a favoured approach; creating a culture of co-operative effort towards the achievement of this goal; creating teaching and assessment tasks that made sur-face learning approaches more difficult for students to apply; providing variety in teaching and assessment methods to encourage students to consider their appro-ach on each occasion and alleviate tedium and the development of automated responses.

Sources of Data

Data from teaching staff were derived from responses to the *Approaches to Teaching Inventory* (ATI) (Prosser and Trigwell, 1993; 1999), and an in-depth interview conduc-

ted with the course co-ordinator on completion of the project.

Approaches to Teaching Inventory

The ATI (Prosser and Trigwell, 1993; 1999) was chosen as a measure of lecturers' intentions and strategies in a teaching role. This instrument contains 16 questions, each of which provides a statement about an approach to teaching. Responses, on a five-point Likert scale, range from 1 = only rarely, to 5 = almost always. The scale was designed for use with university lecturers and produces scores on two main factors labelled *conceptual change/student focus* (CCSF) and *information transmission/teacher focus* (ITTF). Each first-order factor is composed of two second-order factors relating to teaching intentions and teaching strategies. Exploratory factor analysis undertaken by the authors indicates a clear two-factor structure with satisfactory reliability. Cronbach alpha values of α = .81 for the ITTF scale and α = .75 CCSF scale were reported (Prosser and Trigwell, 1993, pp 471-472). These results were derived from questionnaires completed by lecturers of undergraduate Science however, and the authors caution that the scale's reliability may vary if used with other groups.

Because of the small number of lecturers involved in the current study (n = 6, not including the researcher), it was not possible to confirm either the factor structure or the internal consistency of the scale. An examination of the scale items suggested that they were not discipline specific and would be likely to have equal relevance and applicability for lecturers of early childhood education. Since the original factor structure was clear and the reliability very satisfactory, it was decided to accept that this scale would, in all probability, serve as a suitable measure of these two dimensions of lecturers' approaches to teaching.

As part of a complementary investigation of potential changes in approaches to teaching, the ATI was originally intended for use in this study as a pretest and posttest measure with the lecturers involved in implementing the modified program to Cohort 2. Due to unforeseen personnel changes pretest and posttest measures using the ATI are available for only one member of the teaching staff, the course co-ordinator. The ATI was further used with the remaining core teaching staff as a post hoc measure only, to assist in a determination of implementation fidelity.

The original scale[2] (Prosser and Trigwell, 1993) was used as the pretest measure in the case description for the course co-ordinator. The revised scale (Prosser and Trigwell, 1999) was used as the posttest measure in this case description, and the post hoc measure for the remaining 5 lecturers. Scores for the pre- and posttest measure from this instrument were derived by matching the questions in the original version to those in the revised version.

All items in the revised version were represented in the original version, however the wording of some questions varied.

For example item 31 in the original questionnaire stated: *I feel that examinations should be an opportunity for students to reveal how their understanding of the subject has changed.*

The matching item in the revised version stated:

I feel that the assessment in this subject should be an opportunity for students to reveal their changed conceptual understanding of the subject.

Lesser weight must therefore be placed on the course co- ordinator data, and results should be interpreted from the view that responses in both questionnaires may have been affected by the altered wording of some items. The questionnaire was improved by the revisions conducted by Prosser and Trigwell (1999), thus it was considered more suitable to administer to all lecturers at the conclusion of the study. This unfortunately meant that direct correspondence with the pre- and posttest in the case study was no longer possible.

Course Co-ordinator Interview

At the conclusion of the study, a formal interview was undertaken with the course co-ordinator, who had been an integral member and leader of the teaching team throughout the project. The interview which conducted by the first author, took approximately 45 minutes and covered issues concerning the course co-ordinator's notable experiences over the period of the study, her assessment of the project's effects on the students, herself, other staff in her teaching team, and the school as a whole, in terms of learning outcomes, teaching philosophy and teaching practices. This semi-structured interview was conducted in a conversational style. It was tape recorded and later transcribed. Data from this interview were used to support the findings from the ATI questionnaire and to enable the course co-ordinator to elaborate on issues pertinent to the implementation of the project.

A number of modifications to course structure, content, presentation and assessment were undertaken over the course of the project. For example each semester one core subject was chosen as the main carrier of the modifcations, in which the theme of developing deeper learning approaches was emphasised. Some program changes involved the combination of subjects with mate-rial covering similar conceptual areas assisting the students to make linkages across subjects 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

[2] Prosser and Trigwell (1993) discuss the development of the ATI only. The original scale was reproduced in Martin and Ramsden (1994).

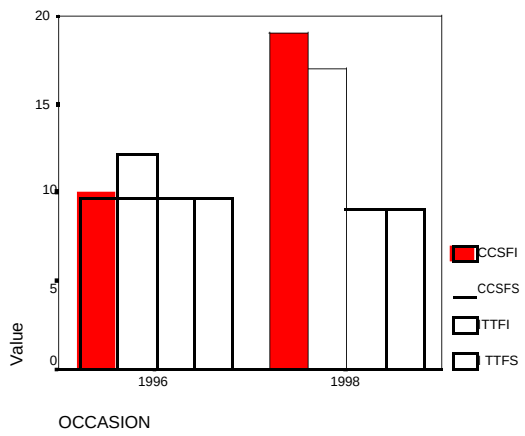

Figure 1. Comparison of approaches to teaching, intention and strategies for Case 1 (1996-1998)

modifications, the integration of subjects assisted in this theme becoming pervasive throughout the course. The interested reader is referred to Gordon (2000).

Fidelity of Implementation

The fidelity with which these course modifications were implemented was investigated using three approaches. Firstly, it was planned to compare the ATI responses from the two lecturers who began implementing the modified program with Cohort 2 during their first semester, with their responses from a second ATI administration at the conclusion of the study. Secondly, the ATI was administered at the conclusion of the course experience of Cohort 2, to the six lecturers responsible for implementing the major modifications. Finally, an in-depth interview was conducted with the course co-ordinator to determine her perceptions about the fidelity of program implementation across the course, and her perceptions of student outcomes. Unfortunately, one of the two lecturers involved in the implementation of the initial modifications became seriously ill and needed to resign her position part way through the program. The other lecturer, who was also the course co-ordinator, did complete the ATI at both the beginning and conclusion of the course experience of Cohort 2, however, on the second occasion the newer version of this instrument needed to be used, as discussed earlier.

Results and Discussion

As previously discussed, the two major dimensions measured by the ATI are labelled *Conceptual Change/Student Focus* (CCSF) and *Information Transmission/Teacher Focus* (ITTF). These dimensions are each further divided into *Intention* (I) and *Strategy* (S) subscales. Hence, for example, CCSFI refers to 'conceptual change/student focus intention' and CCSFS refers to 'conceptual change/student focus strategy'.

The distribution of scores across the four subscales of the ATI for the course co-ordinator described in Figure 1, were obtained after matching items from the original and revised ATI. Only a partial match was obtained by this process and thus the changes identified may only represent a broad approximation of the development of her approach to teaching. Nevertheless, the changes represented in Figure 1 are in the direction consistent with the development of teaching and learning contexts that promote students' adoption of deep learning approaches (Prosser and Trigwell, 1999; Trigwell et al., 1994) and pro-vide some evidence that her implementation of program modifications were likely to be in accordance with the aims of the project.

When the intention and strategy subscales of the two main approaches measured by the ATI are combined, the course co-ordinator's CCSF dimension grew throughout her experience in the project, from an original score of 22, to a final score of 36. Her ITTF dimension remained relatively static, with an original score of 20, to a final score of 18. At the beginning of the program for Cohort 2, she appeared to place approximately equal weight on information transmission and conceptual change. By the conclusion of the program, her relative focus appeared to shift in such a way that considerably greater focus was given to a conceptual change orientation.

Comparison of the scores on the ATI administered in November 1998 to all lecturing staff who undertook modifications to their teaching as part of the project are described in Figure 2. All staff members reported CCSFI and CCSFS as their primary focus at the conclusion of the project. Some lecturers, Cases 2 and 4, reported extreme differentials between conceptual change and information transmission, while others, Case 3 in partic-ular, reported only marginally stronger conceptual change strategy use. Results for the conceptual change and information transmission approaches reported by these staff members, once the scores across the intention and strategy dimensions were collapsed, are reported in Table 1.

All core lecturing staff reported a considerably greater CCSF than ITTF in their orientations to teaching at the end of the program. This outcome is consistent with the development of teaching contexts that foster students' use of deep approaches to learning, and consistent with the aims of the current study (Prosser and Trigwell, 1998; 1999).

From these results, it cannot be determined if the teaching intentions reported through the ATI by the core teaching staff, developed as a result of the study. Indeed, because of these lecturers' knowledge of the aims and theoretical bases of the current research, the possibility that these scores are coloured by lecturers' perceptions of the researcher's desired outcomes, cannot be excluded. Further evidence was, therefore, sought in relation to teaching intentions and learning contexts applied through-out the study, through an in-depth interview with the cour-

Table 1. Approaches to Teaching for Core Lecturing Staff (Nov. 1998)

	Case 1	Case 2	Case 3	Case 4	Case 5	Case 6	*X*	*SD*
CCSF	36	40	31	38	37	33	35.8	3.31
ITTF	18	9	21	8	23	22	16.8	6.68

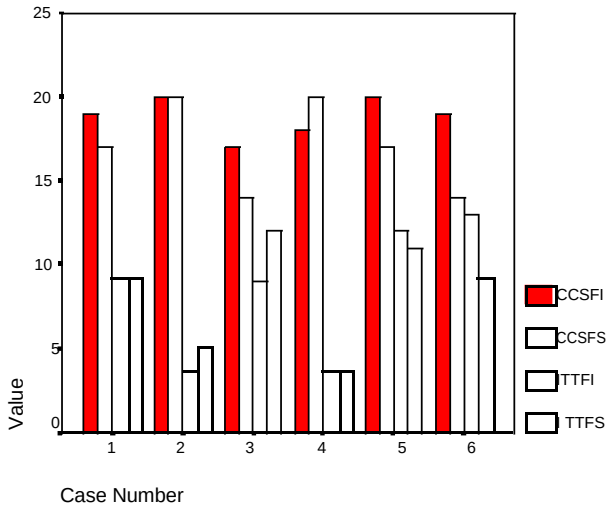

Figure 2. Comparison of approaches to teaching intention and strategy for core lecturing staff

se co- ordinator at the conclusion of the course experie-nce of Cohort 2. Throughout this interview the course co-ordinator identified a number of the program modifications referred to earlier, including the use of reflective journals, problem-based learning, the use of small group methods, linkages of theory to practice, linkages across subject boundaries, feedback sessions by the researcher, alternative assessment methods, reduction in the use of examinations, and the overall number of assessment pieces. She also described the way in which she perceived her involvement in the project had impact- ted on her own professional development and that of her colleagues with-in the early childhood teaching team.

In the following extract, the course co- ordinator descrybed one of the central features of the modifications to teaching that occurred within the study. She identified the explication of linkages across subject boundaries as a central feature. In the process of responding to the question, she also engaged in the preliminary generation of techniques that could be implemented to develop subject linkages further, through integrated assignments. Thus, at the conclusion of the project, the course co-ordinator still continued to reflect on the teaching methodology applied through the study, in an attempt to develop further refinements.

Interviewer: What were some of the things that you did try that were different?

Co-ordinator: I think the first thing was probably working across the subjects more - and I think there's much more that we could do with that - so that what you're - the assessment that you do in one subject - you know - is kept quite separate, where I think in lots of ways we're trying to get them to make connections across subjects and I think the best way to do that, is to say - you know - this assignment goes across the two. So we're not just saying it we're actually doing it. So I think we're perhaps more aware of trying some of those things and being more aware of what people were doing at different stages. So I guess, as Co-ordinator, I've usually got a pretty good idea, but I think the others were perhaps more aware of what was going on across different subjects. I think letting go - you know - thinking that we have to do everything all the time - when we're getting people to do assessments every couple of weeks we're doing our job - and I think that takes a while to do that. But I think it's proven that when we - we let go, the results are - you know - as good as we would have hoped they would be, without them having us peering over their shoulders prompting to do them. … So I think - you know - that's a lesson in itself that you'd be surprised what the students can do, when we step back.

In the above extract, the course co-ordinator also related two aspects of the study that impacted on herself and the other members of her teaching team. She indicated that the other members of her team had gained a greater awareness of the processes used in other subjects, and that both she and her colleagues had learned about 'letting go'. It appeared to be an important awareness for the course co-ordinator, that it was possible to relinquish some responsibility to the students for the provision of learning content, and the repeated assessment of its acquisition. She developed this issue further, emphasising the difficulty she experienced about trusting that the students would develop the level of under-standing required of her subject, without the highly directed teach-ing strategies used with previous groups.

Co- ordinator: that's one of the things - one of the things that's perhaps changed, in lots of ways, to a lot of the staff. You don't have to do that. More is not - you know – necessarily better, and having less - fewer pieces of assessment um, and giving them a little, I think, more responsibility in the way that they tackle it perhaps. So they decide. Perhaps that really began, that semester that I worked with [name of lecturer]*. Remember? That would be – what? - at least 3 years ago. Interviewer: That was three years ago, yeah.*

Co-ordinator: In the second semester when we tried the situation analysis learning which I knew a little about –

well we hadn't actually tried it. We worked our way through that um - but in actual fact the students, even at that stage, came up with some quite outstanding ways to do-

what we wanted them to do, rather than us - you know - giving them information all the way along. But it was quite difficult to do though, to trust them to do it, I guess. Or to trust ourselves to let them do it.

When asked to describe how the current research impacted on her personally, the course co-ordinator noted that she had been removed from research for a considerable time. She found her involvement in the study timely and well connected with her teaching. She was able to su-stain her efforts towards the research goals largely because she was not required to lead the research, she could see ongoing results from her efforts and those of her colleagues, and the action research group provided collegial support.

Interviewer: How has it [the research] affected you personally?

Co- ordinator: Well it probably is the right sort of thing for me to be involved in, because I guess I was in that category of people that's primarily a teacher, and the research has been more a peripheral activity. I think - even if I did spend six months in 1980 being a research sort of person in England - but I think, because it's related so much to the teaching, I think that's had an impact - you know - I think that's really important. … Whereas, if it was something that was generated on my behalf, I don't think I would have sustained that work. Whereas, 'cause you were working it primarily, but other people were too - and was being picked up in Special Ed subjects - so it was being [inaudible] - you know. You sort of got swept up with the group too, and I think you could see the outcome, so I think that's what made the impact on me.…

The course co-ordinator was cautious throughout the interview in her attribution of cause and effect. She often qualified her responses with suggestions for alternative explanations and was tentative in her descriptions of changes observed. When asked whether involvement in the research project had similarly affected other members of her teaching team, those who had mainly comprised the action research group for the majority of the study, her response was tentatively affirmative.

Co-ordinator: I think it has. I think what's happened is people have tended to um, follow in the pattern of whatever has been set up, but also to make changes, depending on the personnel. I think it has. um It may vary a little bit in the subject but I think – I mean, I think they're certainly aware of what's - of what's happening. Whether it's mainly – it's impacted outside our group, apart from the Special Ed. people, I'm not sure. I think possibly not.

In the above extract, the course co- ordinator made the distinction between the impact of the research on members of her own team and those in other teaching teams within the school. Some attempts had been made to inform the wider staff of the school about the aims of the research and to report some early findings, by making presentations at several staff meetings and faculty colloquiums. These presentations were made at the behest of the Head of School, because of her observation that the study was effective in improving quality teaching and learning. The course co-ordinator observed that these presentations had made little difference to lecturers in other teaching teams and only those involved in the project's action research process had modified their approaches.

Her observation that changes within her own team were based mainly on an awareness of the modifications others had made, and a desire to follow patterns established by other lecturers, appeared to understate other statements made earlier in the interview. On previous occasions she had, for example, indicated that the project had altered the perception of the core lecturing staff during her response to a question that asked if the project had impacted on the students in the course.

Co-ordinator: I think on the whole they're [the students] usually pretty good, but maybe this group was perhaps even more so, but perhaps that's because our awareness was heightened too. Like I think what you're doing had an impact on the staff. So whether indirectly we influenced that possibility - you know - we were focusing on other things as well, and trying different things, rather than just worrying about - you know - that's 40% that's 20%.

The context of this response was a discussion surroundding the use of peer assessment and the co-ordinator's observation that the students in Cohort 2 were, on the whole, less competitive and more co-operative in their working relationships. Her statement about the impact of the current study on the perceptions of other lecturers in her teaching team was intended as a qualification of her observations of student behaviour. During her prior com-ments concerning teaching modifications made, the broad-based staff knowledge of teaching contents and teaching strategies, the issue of relinquishing responsibi-lity, and the support provided by her team in relation to her own development, all involved a discussion of her teaching team in a collective sense.

On most occasions when the interview questions required a response in the form of a judgement, the course co-ordinator responded tentatively, and regularly qualified her observations with suggestions of alternative explanations. It was therefore accepted that she generally used a tentative communication style. Since the substance of her responses consistently reported close agreement between course modifications described in subject outlines, and reports from students during interviews about their course experience, it was also accepted that the program implementation was generally consistent with the aims of the research and the interventions planned. Since these conclusions were also consistent with the results obtained by the completion of the ATI from each member of the core teaching staff, the program modifications designed for implementation during the cur-rent study were accep-ted as having been implemented with acceptable fidelity.

CONCLUSION

This paper has detailed one aspect of a study that utilised a quasi-experimental design with repeated measures on non- equivalent dependent variables, to determine the impact of altered teaching contexts on the learning experiences of a sample of tertiary students. The data suggested that an embedded action research model was appropriate in encouraging tertiary personnel to adopt teaching principles and processes designed to increase deeper learning approaches.

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REFERENCES

Alexander P, Murphy PK (1997). College instruction and concomitant changes in students' knowledge, interest, and strategy use: A study of domain learning. Contemporary Educational Psychology. 22: 125-146.

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

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

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

Biggs J (1993b). Student learning and theory: Where do we currently stand? Paper presented at the 1st International Improving Student Learning Symposium, Warwick University, UK.

Biggs J (1995). Assessing for learning: Some dimensions underlying new approaches to educational assessment. The Alberta Journal of Educational Research. 41(1): 1-17.

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

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

Booth A, (1993). Learning history in university: student views on teaching and assessment. Studies in Higher Education. 18(2): 1993.

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

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 (1995). Tertiary students' perceptions of their learning environments: A new procedure and some outcomes. Higher Education Research and Development. 14(1): 1-12.

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.

Dahlgren L (1997). Learning conceptions and outcomes. In F. Marton, D. Hounsell, N. Entwistle (Eds.), The experience of learning: Implications for teaching and studying in higher education (2ed). pp: 23-38). Edinburgh: Scottish Academic Press.

Dart B (1994). A goal mediational model of personal and environmental influences on tertiary students' learning strategy use. Higher Education. 28: 453-470.

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

Entwistle A., Entwistle N (1992). Experience of understanding in revising for degree examinations. Learning and Instruction. 2: 1-22.

Entwistle N (1994). Experiences of understanding and strategic study. Paper presented at the American Educational Research Association. (ERIC Document Reproduction Service No. ED 374704).

Entwistle N (1997). Contrasting perspectives on learning. In F. Marton, D. Hounsell, and N. Entwistle (Eds.), The experience of learning: Implications for teaching and studying in higher education (2ed). pp: 3-22. Edinburgh: Scottish Academic Press.

Entwistle N, Entwistle A, Tait H (1991). Academic understanding and contexts to enhance it: A perspective from research on student learning. In T. Duffy, Lowyck, J., Johanassen, D. (Ed.), Designing environments for constructive learning pp: 331-357. Berlin: Springer-Verlag.

Entwistle N, Ramsden P, (1983). Understanding student learning. London: Croom Helm.

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

Entwistle N, Waterston S (1988). Approaches to studying and levels of processing in university students. Br. J. Edu. Psychol. 58: 258-265.

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.

Gordon C (1993). Co-operative Problem-based Learning in Teacher Education. Paper presented at the School of Teacher Education, Teaching Development Colloquium, Charles Sturt University, Bathurst, NSW.

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 PhD thesis, the University of Sydney, Sydney, NSW, also available at http://setis.library.usyd.edu.au/adt/public_html/adt-NU/public/adt-NU20031211.155006/index.html

Gordon C, Debus R (2002). Developing deep learning approaches and personal teaching efficacy within a preservice education context. Br. J. Edu. Psychol. 72 (4): 483-511.

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, Gibson F, Hall V, Dillon J, Perisce P (1997). Training school psychologists in the use of the Vineland Adaptive Behavior Scales: A situated learning experience. Paper presented at the XXth Annual Colloquium of the International School Psychology Association, Melbourne, Vic.

Gordon C, Lane B, Hall V (1998a). Transmitter assisted learning: Supported practice in authentic settings. Bathurst: Charles Sturt University.

Gordon C, Lim L, McKinnon D, Nkala F (1998b). Learning approach, control orientation and self efficacy of beginning teacher education students. Asia Pac. J. Teach. Edu. Dev. 1(1): 53-64.

Gordon C, Lim L., McKinnon D, Nkala F, Parker J (1995). Learning to learn: Teaching to learn. Paper presented at the 25th Annual Conference of the Australian Association for Research in Education, Hobart, Tas.

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.

Gow L, Kember D (1993). Conceptions of teaching and their relationship to student learning. Br. J. Edu. Psychol. 63: 20-33.

Jackson M, Prosser M, (1989). Less lecturing, more learning. Studies in Higher Education. 14(1): 55-68.

Janssen P, (1996). Studaxology: The expertise students need to be effective in higher education. Higher Education. 31: 117-141.

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

Kember D, Gow L (1994). Orientations to teaching and their effect on the quality of student learning. J. High. Edu. 65(1): 59-74.

Martin E, Ramsden P (1994). Effectiveness and efficiency of courses in teaching methods for recently appointed academic staff. Canberra: Australian Government Publishing Service.

Marton F, Dall'Alba G, Beaty E (1993). Conceptions of learning. Inter. J. Edu. Res. 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 (2ed): pp. 39-58. Edinburgh: Scottish Academic Press.

McKinnon D, Gordon C, Coates A, Grieg S (1997). A community-school-university initiative designed to cater for students with reading difficulties in year 7. Paper presented at the Annual Conference of the Australian Association of Special Education, Brisbane, Qld.

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.

Nightingale P (1997). Assessment and improvement of student learning . http://ultibase.rmit.edu.au/Articles/night1.html: ultiBASE.

Prawat R (1992). Teachers beliefs about teaching and learning: A constructivist perspective. Am. J. Edu. 100(3): 354-395.

Prosser M, Trigwell K (1993). Development of approaches to teaching questionnaire. Res. Dev. High. Edu. 15: 468-473.

Prosser M, Trigwell K (1997). Relations between perceptions of the teaching environment and approaches to teaching. Br. J. Edu. Psychol. 67: 25-35.

Prosser M, Trigwell K (1998). Teaching in higher education. In B. Dart and 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 (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). Using research on student learning to enhance educational quality. Paper presented at the 1st International Improving Student Learning Symposium, Warwick University, UK.

Ramsden P (1994). Current challenges to quality in higher education. Innovative Higher Education, 18(3): 177-188.

Ramsden P (1997). The context of learning in academic departments. In F Marton, D Hounsell, N Entwistle (Eds.), The experience of learning: Implications for teaching and studying in higher education (2 ed): pp 198-216. Edinburgh: Scottish Academic Press.

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.

Schön D (1987). Educating the reflective practitioner: toward a new design for teaching and learning in the professions. San Francisco: Josey-Bass.

Senate Standing Committee on Employment Education and Training (1990). Priorities for reform in higher education. Canberra, ACT: Australian Government Publishing Service, Aulich Report.

Thompson B (1996). AERA editorial policies regarding statistical significance testing: Three suggested reforms. Edu. Res. 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 (1991). Improving the quality of student learning: The influence of learning context and student approaches to learning on learning outcomes. Higher Education. 22: 251-266.

Trigwell K, Prosser M (1996). Congruence between intention and strategy in university science teachers' approaches to teaching. Higher Education, 32: 77-87.

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

Van Rossum E, Schenk S (1984). The relationship between learning conception, study strategy and learning outcome. Br. J. Edu. Psychol. 54, 73-83.

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

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. Rev. Edu. Res. 68(2): 130-178.

Wilkinson L (1999). Statistical methods in psychology journals. Am Psychol, 54(8): 594-604.

Yin R (1994). Case Study Research: Design and Methods. (2nd ed.). Newbury Park, CA: Sage.

Zuber-Skerritt O (1992). Action research in higher education. London: Kogan Page.

Zuber-Skerritt O (1993). Improving learning and teaching through action learning and action research. High. Edu. Res. Dev. 12(1): 45-58.