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TOWARDS A MODEL OF EDUCATIONAL OUTCOMES:
INVESTIGATIONS WITH AUSTRALIAN
AND FILIPINO STUDENTS

David Arthur Watkins

A collection of papers submitted for the Degree of
Doctor of Philosophy of the Australian National
University by submission of published work.

October 1983

In compliance with the requirements relating to Examination for the Degree of Doctor of Philosophy of the Australian National University, I affirm that the work which follows is entirely or substantially my own. The role of my co-authors, where relevant, is explained in the Introduction to this collection.

David Watkins
October 1983

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TOWARDS A MODEL OF EDUCATIONAL OUTCOMES:
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AN INTRODUCTION TO THE
PUBLICATIONS SUBMITTED

TOWARDS A MODEL OF EDUCATIONAL OUTCOMES: INVESTIGATIONS
WITH AUSTRALIAN AND FILIPINO STUDENTS

AN INTRODUCTION TO THE PUBLISHED WORKS

As required by the rules for submission of published works for the PhD degree at the Australian National University this introduction is designed (1) to indicate briefly the interrelationships between the papers submitted here and their relationships to the overall research program of which they are important components and (2) to clarify the roles that this writer and his collaborators played in the conducting of these studies. In no way is this introduction intended to be either a literature review or a theoretical discourse on the issues involved. Discussions of relevant literature and concepts do appear in some of the papers submitted, however. It is the papers themselves that form the substance of this submission.

BACKGROUND TO RESEARCH

The writer has, for some years, been conducting research designed to improve understanding of the role that individual differences and the context and content of learning play in the attainment of learning outcomes. My earliest work (cf. Studies 2, 3, and 13)* was based on a grossly oversimplified model of academic success (see Figure 1).

* Studies such as these which are associated closely with this research but not actually presented here are listed in an Appendix to this introduction.

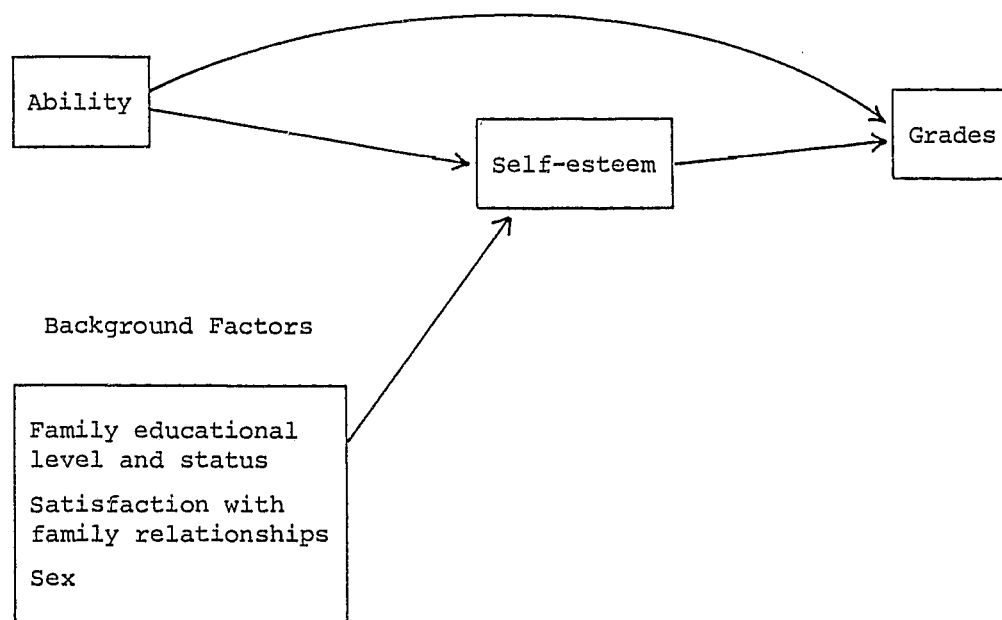


Figure 1. My earliest model of academic performance.

This was partly due to a rather naive faith in the importance of 'self-esteem' and to knowledge that statistical techniques available to me at that time were not really adequate for testing more complex models. The necessity to include factors more closely related to the instructional processes soon became clear also. Fortunately, recent developments both in research methodology and in multivariate statistical computer programs have made it possible to propose and test models which more adequately encompass the complexities of the learning process domain.

Most of the research submitted here has been guided by the Lewinian principle that behaviour is an interactive function of the person and the environment. From this perspective, the way a student goes about his study is a function of his own individual

characteristics and his educational environment. Biggs (1978) presented a model of the study process complex based on this point of view (see Figure 2).

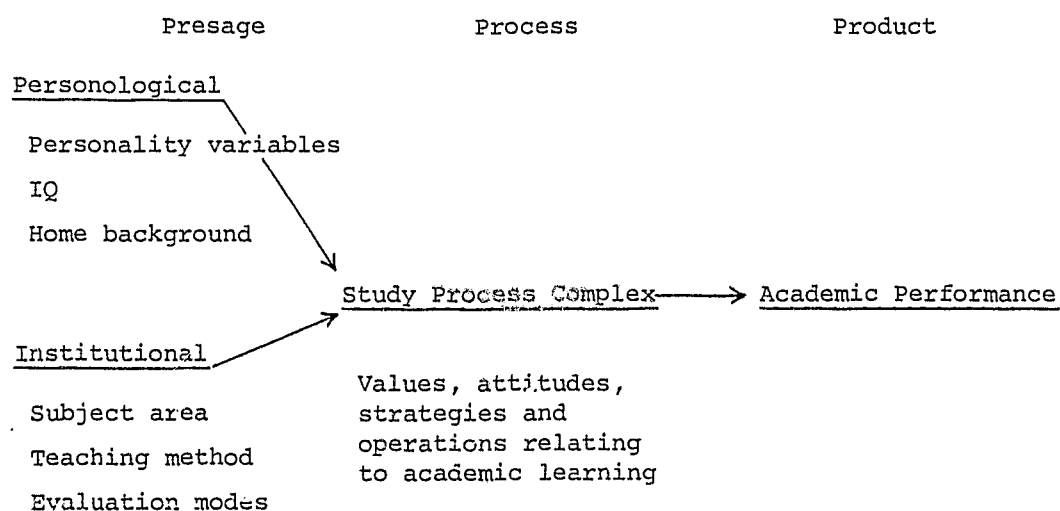


Figure 2. A model of study processes (from Biggs, 1978)

Although educational institutions are presumably intended to promote special environments which facilitate learning, until recently there have been relatively few systematic investigations of the characteristics of those environments. Typically universities have been described in terms of formal categories such as enrolment figure, faculty size, denomination, percentage of graduate students, research productivity of staff, etc. Inter-institutional comparisons have then been conducted using these categories and their effects on outcomes have been analysed (Blau, 1973; Richards *et al*, 1966).

While such formal categories are undoubtedly useful and have led to significant research findings, they can hardly be considered sufficient for understanding the inner workings of a particular institution. Intuitively it seems even more important to discover how the environment of a university is perceived by its consumers - the students of that institution. The pioneering work was done by Pace and Stern (1958), who asked students whether particular statements about teachers and students were true of their college. This general approach can be criticised for not necessarily providing an accurate account of university life, but it does allow students to describe that life as they see it, and this description is true for them no matter how it appears to other people. As Rogers (1965) puts it, "The organism reacts to the field as it is experienced and perceived. This perceptual field is, for the individual, 'reality'" (p.484). It can be argued that so-called 'objective' measures are really only the particular investigator's own subjective perceptions. They do not necessarily represent the reality to which another individual responds. Viewed in this light any subjectivity involved in a measure of environment is an advantage, not a weakness. It is the personal perception of environment that is the main agent for impact in education (cf. Feldman and Newcombe, 1969).

Research from the perspective advocated here, then, has two other guiding principles: that subjective measures are more meaningful than objective measures and that the appropriate unit of analysis is the individual.

The version of the model actually adopted here to try to bring some unity to this research (see Figure 3, page 6) is an extension of Biggs' model discussed above.

A model can be thought of as "a scaled down representation of some object, process or concept" (McLeish, 1970). Thus, like any model this one should be considered an attempt to simplify reality. It tries to encapsulate my understanding of the latest research and theories in this area. At this stage of its development it is essentially a guide for future research and will undoubtedly change with the results of such research.

The model depicted in Figure 3 has five groupings of variables which are linked by a weak causal ordering as indicated by the arrow heads in that figure. Every student enters an educational institution with a number of important personal background characteristics (including previous educational experiences) which have influenced the development of their individual personalities until that time. Self-esteem and locus of control are assumed to be the most significant personality variables in the academic context (recent meta-analyses by Hansford and Hattie (1982) and Findley and Cooper (1983) support this contention). Both these sets of variables (personal background characteristics and personality variables) influence the way students perceive the educational environment into which they have entered. Each of these three sets of variables, in turn, influences the way a student goes about his study both directly, and, in the case of the first two, indirectly through mediating variables. Based on the writings of Entwistle and Biggs,

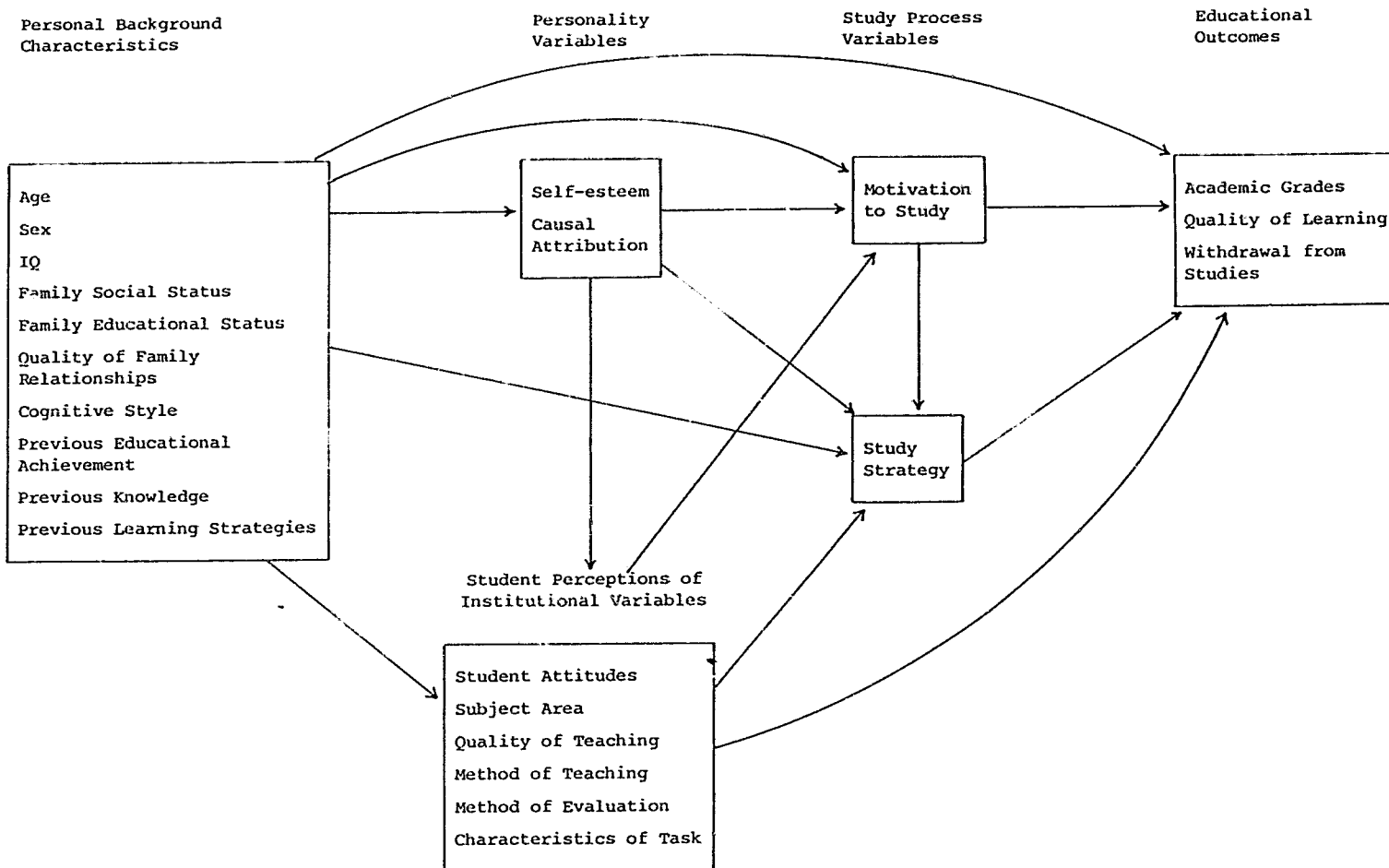


Figure 3. My model of the learning process complex.

study processes are postulated as involving motivational and strategic aspects. This component also involves the concept of depth of processing as proposed by Marton and Säljö (1976a, b) (see papers for further discussion of study processes).

The final component of the model, the outcomes of education, is seen as being influenced by each of the other components. Three different educational outcomes are investigated in the following papers: whether students drop-out or persist in their studies and both the quality and quantity of their learning.

The model depicted in Figure 3 should not be thought of as static. When a student approaches a particular learning task it is his personal history to that time and his personality at that time which interacts with his perception of the educational environment at that time and the characteristics of the particular task. This model can thus account for both the consistency (derived from relatively stable personological variables) and the variability (derived mainly from changing environmental and task characteristics) of a student's approach to learning. In similar vein, the model allows for both individual differences and the context and content of learning (Entwistle, 1981, has also proposed a similar model). The model also allows for the possibility that each student's capacity to learn develops in a similar way. However, my latest research casts doubt on the possibility of such a common sequential development (see Paper n).

THE SUBMITTED PAPERS

The majority of the writer's sixty plus published works could be related to some aspect of this model. The papers actually included in this submission were chosen according to the following criteria:

- i) They were in the main conducted while the writer was a staff member at ANU (a condition of the PhD rules);
- ii) Each of the studies was planned and written up by the writer who also played at least a significant role in the statistical analysis. Collaboration, when utilised, largely played the form of computational assistance and either advice on complex statistical models in the case of Dr Hattie or conducting of testing and advice on wording of questions for Filipino students in the cases of Professor Astilla and Mrs Malimas;
- iii) The studies contributed to the development of the model in one of two ways: either they attempted to resolve problems relating to measurement of the relevant variables or they investigated the links between those variables proposed by the model.

Routine reliability and validity studies are not presented here but they do play a significant role in this research simply because investigations of the adequacy of measuring instruments have too often been neglected in the past (cf. Wylie, 1974). They

are listed in the Appendix. A number of other exploratory studies, which examined only very limited aspects of the model, are also not included here but are similarly listed in the Appendix.

In recent years there has been increasing recognition that psychological theories should be able to account for the variety of human behaviour found in different areas of the world. If studies with very different populations support research hypotheses such hypotheses can be taken more seriously than those supported only by studies of homogeneous populations within one country (Brislin, 1983). Therefore, for many psychologists, the role of cross-cultural studies has become central to theory development. This has been a largely neglected aspect of research into learning processes. A novel feature of the present research was the attempt to validate the model proposed for both Australian and Filipino students.

At first this cross-cultural research program involved conducting parallel investigations in both Australia and the Philippines. In the later stages, because of problems both with measurement which surfaced in the early studies and with access to students of different age groups in each country, the studies grew apart but the overall model was still kept in mind. Of course, findings from studies on only two cultures may not represent universal 'facts', but the present cross-cultural research does constitute a first step towards investigating the appropriateness of the model proposed as a general account of student learning processes.

In this submission the papers presented are classified according to whether they are essentially validation studies or are related to

some aspect of the model (although some fall into more than one category). The papers are briefly summarised below.

VALIDATION STUDIES

Validating Study Process Inventories and Their Underlying Models.

- (a) Assessing tertiary study processes. *Human Learning*, 1983, 2, 29-37.

This paper reported two Australian studies which generally supported the validity of the 'Approaches to Studying' inventory (Ramsden and Entwistle, 1981) and the meaning/reproducing/achieving model of the study process complex. However, Study I did cast some doubt on the precise nature of the factor structure underlying the inventory. Study II, based on intensive interviews of sixty ANU students, gave strong support to the 'meaning' and 'reproducing' orientations and pathology scales of the inventory but did question these latter scales' relationships with styles of learning.

- (b) Australian and Filipino investigations of the internal structure of Biggs' new Study Process Questionnaire (with J. Hattie). *British Journal of Educational Psychology*, 1981, 51, 241-244.

Confirmatory factor analysis is a recently developed technique which is appropriate for testing the validity of theoretically derived factor models. In the present research this approach was used for the first time to test the motive/strategy model

of the learning process complex which is assumed to underlie Biggs' 'Study Process Questionnaire'. The findings from the Australian sample were quite encouraging but doubt was raised about the applicability of this questionnaire for Filipino students.

- (c) Academic achievement and the congruence of study motivation and strategy. *British Journal of Educational Psychology*, 1982, 52, 260-263.

Biggs (1978) suggested that degree of congruence between study motivation and strategy could be a factor in academic achievement. If this hypothesised relationship were to be confirmed there could be important implications for study methods counselling. However, the data reported in this paper failed to support the contention.

- (d) The validity of the four subscales of the Inventory of Learning Processes for a sample of Filipino freshmen college students (with J. Hattie and E. Astilla). *Educational and Psychological Measurement*, 1983, 43, 531-536.

The results indicated that the Elaborative Processing sub-test was useful in predicting achievement at the college entrance level. The data further suggest that the constructs of elaborative processing and deep processing become more closely related to grades at first year college level. No evidence was found of the independent influence on achievement of study methods which emphasised either fact retention or a methodical approach. Like Studies 30 and 36 (see Appendix), these

results indicate that deep level processing is rewarded by Filipino examination marks. These findings were compared with those reported by the authors with Australian students (see Paper 1).

Evaluating Other Measuring Instruments.

Most of the other measuring instruments utilised in this program of research were also relatively new and little evidence of their reliability and validity existed. In the cases of the Cooper-Smith 'Self-Esteem Inventory' and the Crandall 'Intellectual Attribution of Responsibility Scale', there was no evidence of psychometric properties for Filipino subjects. Therefore the writer considered it essential to conduct reliability and validity investigations of the measuring instruments utilised. In the Filipino context, this included consideration of the validity of the concepts involved for Filipino society. Evidence of my research into these properties of the instruments used is reported as a minor part of several of the papers presented here. Some of the routine investigations devoted to reliability and validity are Studies 2, 7, 17, 21, 25, and 30 (see Appendix), while Study 8, based on my MSc thesis, reports the development and evaluation of two self-esteem measuring instruments. Evidence of the validity of the construct of causal attribution for Filipino students from both a prestigious private university and a small barrio school are provided in Studies 22 and 29 respectively. Only one other paper devoted entirely to a validity investigation is actually included in this submission.

- (e) An investigation of the construct validity of three recently developed personality instruments: An application of confirmatory multimethod factor analysis (with J. Hattie). *Australian Journal of Psychology*, 1981, 33, 277-284.

Here confirmatory factor analysis generally supported the convergent and discriminant validity of three Australian personality instruments - two measures of self-esteem developed by the writer and the New England Personality Questionnaire (Fitzgerald and Cole, 1976). These measuring instruments were used in several other of the writer's studies (3, 9, 10, 31).

INVESTIGATIONS INTO ASPECTS OF THE MODEL

Student Perceptions of Institutional Variables and Educational Outcomes.

- (f) Faculty and student orientations to tertiary education: A case study of a Filipino university (with Belen C. Malimas). *Higher Education*, 1980, 9, 707-720.

This research tried to assess the attitudes towards the methods and purposes of tertiary education of Filipino lecturers and their students. It is one of the first studies which has tried to relate congruence of faculty and student views on tertiary education to academic achievement and is certainly the first such study in the Philippines. Some major areas of disagreement between the two groups were found but the degree of

congruence between the faculties' and students' orientations was not significantly related to college grades. The results were briefly compared with the findings of U.S. studies and the writer's related Australian studies (23, 27).

- (g) Testing the validity of a model of student progress at an Australian university. *Educational and Psychological Measurement*, 1982, 42, 571-574.

In this study an attempt was made to extend Tinto's (1975) model of college dropouts which emphasises the longitudinal process of interactions between the students' characteristics and the academic and social systems of the institution. The findings cast doubt on the applicability of Tinto's model to tertiary outcomes other than withdrawal.

Student Perceptions of Institutional Variables and Approach to Study.

Studies (f) and (g) failed to support the contention that student perception of their academic environment was related to educational outcomes as assessed by academic grades and/or persistence. However, the following studies, both reported in the same paper, indicated that such perceptions may influence the way students go about their studying - in particular, the depth of processing they will adopt. This possible paradox can be explained if it is kept in mind that depth of processing seems to be a major factor in quality of learning (see Paper j) but is not necessarily related to academic grades.

- (h) Factors influencing the study methods of Australian tertiary students. *Higher Education*, 1982, 11, 369-380.

This paper reported two studies which showed that traditional psychometric methods, flexibly applied, can be utilised to investigate how the approach to study adopted by students varies according to their perceptions of the context in which the learning takes place. Study 1 explored the relative influence of interest, grade sought, and assessment methods on the depth of processing a student would adopt. As far as this writer is aware this is the only research which has utilised the 'hypothetical situation' technique to investigate learning processes. Study 2 was a conceptual replication of Ramsden and Entwistle's (1981) research linking students' perceptions of their learning environment to the approach to study they would adopt. Both studies have clear implications for tertiary teaching.

Personality and Approach to Study.

- (i) The dimensionality, antecedents and study method correlates of the causal attributions of Filipino children (with E. Astilla). *Journal of Social Psychology*, 1983 (in press).

Results were presented which indicate that Weiner et al's (1971) original model of causal attributions is too restrictive for Filipino students but which do support two of the three dimensions in Weiner's (1979) revised formulation. For the females, higher ratings of the importance of external,

uncontrollable attributions such as luck, fate, exam and material difficulty were related to the adoption of a rote learning approach to study, perhaps out of fear of failure.

Study Processes and Educational Outcomes.

- (j) Depth of processing and the quality of learning outcomes.
Instructional Science, 1983, 12, 49-58.

This paper is based on interviews with sixty Australian tertiary students. Judges classified a student's approach to a learning task as either 'deep' or 'surface' level. Independent assessors rated the quality of the learning outcome of this task using the SOLO taxonomy (Biggs and Collis, 1982). The results strongly supported the hypothesis that depth of processing is related to the quality of learning outcomes.

Background Characteristics, Personality and Educational Outcomes.

- (k) Antecedents of self-esteem, locus of control and academic achievement: A path analytic investigation with Filipino children. *International Review of Applied Psychology*, 1982, 31, 475-491.

This study explored a path analytic model linking antecedent variables (IQ, sex, and quality of family relationships) to personality variables (self-esteem and locus of control). Both sets of variables were then considered as antecedents of academic achievement. The results were generally in line with

those of Western research. However, there was evidence that the relationship between sex and locus of control may be different in the Philippines and that there may be a stronger relationship between self-esteem and quality of family relationships in the Philippines than in Western societies.

Background Characteristics, Institutional Variables, Study Processes, and Educational Outcomes.

- (1) The learning processes of Australian university students: Investigations of contextual and personological factors (with J. Hattie). *British Journal of Educational Psychology*, 1981, 51, 384-393.

Two studies are reported which used multivariate techniques to explore sex, faculty, and age differences in the study methods of Australian tertiary students. Correlations with academic grades are also reported. Perhaps the major finding of the study was the relationship between age and approach to study. It is certainly one of the first studies to compare the learning processes of mature age and school leaver tertiary students.

- (m) Identifying the study process dimensions of Australian university students. *Australian Journal of Education*, 1982, 26, 76-85.

This investigation with 540 first year ANU students casts doubt on the validity of the model of the study process domain advocated by both Biggs and Entwistle. Rather, it suggests

that the reproducing dimension can be broken down into surface/confusion and operation learning components. Little evidence was found of the role of achievement motivation in the study methods adopted by these students. The study also supported the findings of an earlier study at another Australian university (see Paper 1) that Arts students and mature age students are more likely to adopt deep level approaches to study. The work reported here was the first stage of a longitudinal study. The second stage involved intensive interviews with a sub-sample of these students (see Papers a and j and Study 35). The third and final stage is reported in the following paper.

Background Characteristics, Personality, Institutional Variables,
Study Processes and Educational Outcomes.

- (n) A longitudinal study of the learning processes of tertiary students (with J. Hattie). Collected Papers, Annual Conference of Australian Association for Research in Education, Canberra, 1983.

This study reports the first attempt to predict and to investigate the way students' learning processes change during the course of their tertiary studies. Hypotheses related to the nature of this change were tested using some of the most significant recent developments in research on student learning and in statistical techniques. Possible contamination due to bias in the follow-up sample (Nielsen et al, 1978) was controlled.

Despite the methodological improvements adopted in this study the results were not clear cut. Initial multivariate analysis indicated that the students' approaches to study became more differentiated by faculty and age differences became less pronounced. However, these results were not confirmed by a repeated measures analysis which indicated only a significant main effect over time, that is, suggesting that the differences that did occur were independent of age, faculty, and sex. Moreover, these changes were not always ones that would be judged positively in a university context; many students expressed increasing disillusionment with their studies. However, at least there was evidence both of an increase in comprehension learning, particularly in relation to operation learning, and of a decrease in the pathology of globetrotting.

Analysis using McDonald's (1983) invariant factor model both supported the validity of this writer's suggested factor structure for the 'Approaches to Studying Inventory' (see Paper 1) and the invariance of this factor structure over time. Cross-validation also supported this writer's factor model rather than that proposed by Ramsden and Entwistle (1981). Taken together with the failure to find any evidence of causal predominance of study motivation over study strategy, this throws some doubt on the motivation/strategy model of learning processes espoused by Biggs and Entwistle.

Furthermore, this research questions whether any model which assumes a common sequential development and does not consider

possible variations due to individual differences or to differences in the content and/or context of learning will ever be able to provide an adequate account of the tertiary learning process. Just what personological or institutional variables would need to be included in an adequate model cannot yet be determined precisely, but this study does at least question whether 'locus of control' has a significant role to play in influencing the students' approach to learning.

AN OVERVIEW OF THE RESEARCH

The research described in the papers summarised above is multifaceted - necessarily so, since its 'object', learning processes and outcomes, is complexly governed by a large number of variables. Serious research in this area involves the initial determination of the relevant factors, the resolution of problems relating to the measurement of these variables, the formulation of a theoretical model to guide empirical work on the relationships and/or interactions between the selected variables and the actual empirical testing of hypotheses generated by the model. In the present case, the research results led to refinements of the model, rendering the investigation even more complex. A further complicating dimension was added to the present research by its investigation of the cross-cultural applicability of concepts and variables derived from Western theory and research. Such cross-cultural work is deemed essential to the development of a general model of human learning in the educational context.

However, despite the unavoidably 'eclectic' nature of the preceding research, the various studies do come together to make a not insubstantial contribution to an understanding of certain aspects of students' learning, viz:

1. The nature and structure of learning processes and their relationships to quantitative and qualitative learning outcomes in both Australia and the Philippines.

This research has lent considerable support to the validity of the concepts of deep and surface processing and to the existence of the learning pathologies, globetrotting and improvidence (Paper a). However, it has also questioned the validity of the motive/strategy model of learning processes advocated by Biggs and Entwistle - the role of motivation and the place of operation learning in this model seem to be particularly in doubt (Papers a, b, c, m, and n).

This research has also provided much needed evidence on the relationship between learning processes and both qualitative learning outcomes (Paper j) and actual examination performance in Australia and the Philippines. Papers a, c, d, l, and m and Studies 25, 30, 34 and 36 presented some of the first such research findings on the latter relationship.

2. Factors affecting learning processes and outcomes.

This research began with exploratory measurement and correlational studies involving only one or two elements of the overall model. Progress has certainly been made in the

selection and measurement of the variables involved. Thus, no evidence for the inclusion of factors such as birth order, family size or field independence has been found. Further investigation is needed into the influence of locus of control on students' approach to their learning - the present studies suggest that this influence may be salient for Filipino but not Australian students. In addition, these investigations have highlighted the influence of age on learning processes when sex and discipline are controlled (Papers l, m, and n). The findings have significance for tertiary education given the increasing number of mature age students entering universities throughout most areas of the world. Furthermore, Paper h demonstrated in a systematic manner that students who are consciously aware of factors related to the context of learning may tend to adapt their learning processes accordingly.

3. The development of learning processes over the course of tertiary study.

Whereas the majority of studies submitted here investigated between-student influences on learning processes the research has now progressed to the stage where within-student studies, involving all components of the model, are being conducted. Thus Paper n reports the results of a major longitudinal study on the development of learning processes in tertiary students. As Wilson (1981) points out, this has been a neglected aspect of research in the area. The use of sophisticated multivariate techniques permitted both the provision of considerable information about how students' learning processes changed and

the testing of hypotheses predicting the nature of this change. It was also possible to investigate the stability of the factor model underlying the 'Approaches to Studying' Inventory.

Future Directions of the Research.

The papers submitted here are a part of a continuing research program. The current and future directions of this research are discussed below.

It was not unexpected that the Australian investigations have outdistanced their Filipino counterparts. This, perhaps, was inevitable given both the previous lack of relevant psychological assessment devices which had been validated for use in the Philippines and my limited access to Filipino subjects. However, a major three stage longitudinal study involving Filipino secondary students is well underway. This study has two main purposes, both related to the development of fundamental aspects of the model:

1. To extend previous investigations of causal influences on learning outcomes by considering (a) affective as well as cognitive learning outcomes; (b) the moderating influence of background characteristics and (c) the possible mediating influence of parental, peer, and teacher pressure. Covariance structures analysis will be utilised to examine the causal relationships involved.
2. To investigate the development of the learning processes of these Filipino students and the relationship of field-

independence, locus of control and other personality and background variables to this development.

Two papers based on the first two stages of this research have now been prepared (see Studies 32 and 36).

Further investigations are also being conducted in Australia. In my current research the causal attributions for academic achievement of Australian students are being probed. The first results are presented in Study 33 while the relationships of internal locus of control and learning processes to ANU grades are examined in Study 34. In addition, a second longitudinal investigation is underway along the lines of Paper n. This study is seen as so crucial to the entire research program that it is essential to replicate it. However, it is hoped to overcome some of the measurement deficiencies of the original study.

Another major new thrust of my research is to explore much more deeply the model of learning processes underlying the 'Approaches to Studying' inventory. This instrument has now been administered on four occasions in Australia and on two occasions in the Philippines (the latter involving the shortened school version). It is intended to utilise recent developments in multivariate modelling to probe the stability and generalisability of the underlying factor model. This approach combined with further item analyses is likely to lead to considerable refinement both of the underlying model of learning processes and of the inventory itself. It may well be necessary to develop separate versions for different subject areas and to develop Australian

and Filipino versions of the questionnaire. It is hoped that it may be possible to carry out several intensive interview studies with Filipino students to probe the approaches to study that they actually utilise. Such studies are undoubtedly a prerequisite for further advancement of the Filipino part of this research program.

CONCLUDING COMMENTS

Education can be viewed as a system. Like other systems, educational systems are complex, and behaviours within them are often apparently inconsistent and, hence, confusing. Yet only with a systematic understanding of the inanimate and human components of such systems are the latter likely to become capable of maximising the potential of their students.

Barriers to understanding of the educational complex have been created not by a lack of relevant general concepts, nor by an absence of data, but, rather, by a failure to interrelate fragments of theory and empirically derived knowledge. The research described above, which is part of a long-term program, represents one attempt to provide an orderly, organising structure within which the operations and effects of educational systems may be understood. The work to date cannot be claimed to have done other than make a start towards achieving this long-term objective, but it is hoped that its continuation within the framework established will help provide a basis both for comprehending the nature of the educational process, per se, and for using this knowledge to the advantage of its participants.

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APPENDIX

Other Papers Associated with Research Program

1. The role of subjective importance in self evaluation. *Australian Journal of Psychology*, 1972, 24, 209-210 (with Jan Park).
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Assessing Tertiary Study Processes

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SUMMARY

Two studies are reported which generally support the validity of the 'Approaches to Studying' inventory and the meaning/reproducing/achieving model of the study process complex. Some doubts are raised, however, as to the nature of the interrelationships between styles of learning and their role in academic success. This research once again demonstrates that it is the younger students who are most in need of study methods counselling, and questions the effort currently being placed on devising teaching methods for adult learners. The need for longitudinal research if the development of tertiary study processes are to be understood is also emphasized.

INTRODUCTION

The last ten years have seen considerable progress in our knowledge of how students go about their study, the reasons why they approach it in these ways, and the influence their orientations to study have on the quality and quantity of their learning.

That students are only partly consistent in their approach to study has been demonstrated in much recent research. The approach of the individual student may vary from course to course and task to task depending on such factors as their level of interest, what they hope to get out of it, their background knowledge of the field, and the type of assessment (cf. Laurillard, 1979; Ramsden, 1979; Säljö, 1979; Thomas and Bain, 1982). However, the identification through psychometric research of characteristic orientations to studying implies a degree of consistency in approach. This methodology has also indicated some degree of consistency in approach depending on the age and field of study of the student. Thus the author's research in Australia has suggested that older students and Arts (rather than Economics or Science) students are more likely to adopt a deep level approach (Watkins and Hattie, 1981; Watkins, 1982).

The 'Approaches to Studying' Inventory

One of the instruments constructed to help analyse the study process complex is the 'Approaches to Studying' inventory. This 64-item, 16 sub-scale questionnaire was developed after considerable pilot study by Entwistle and his colleagues (see Entwistle and Ramsden, 1982, for details). The 16 sub-scales are grouped into one of four orientations to study (see Table 1). The first three orientations, which are closely related to those obtained independently by Biggs (1978), have been replicated in a factor analysis of 2208 U.K. students from 66 academic departments in six contrasting subject areas (Ramsden and Entwistle, 1981). A slightly different picture emerged, however,

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from factor analyses of open university and Australian tertiary students where the reproducing and achieving orientations seemed to merge (Morgan, Gibbs and Taylor, 1980; Watkins, 1982).

The holistic orientation was incorporated into the inventory based on Pask's (1976) research into learning styles. Pask suggested that the specific learning strategies a student might adopt in a particular learning situation are influenced by predisposition to one of two more general learning styles—comprehension or operation learning. Comprehension learning is displayed by students who consistently prefer a holist strategy (i.e. they try to build up, right from the start, a broad overall view of the learning task). Students who consistently prefer a serialist strategy (i.e. attempting to build understanding out of the components, details, and logical steps of an argument) were designated by Pask as operation learners. Pask proposes that both learning styles are necessary to achieve full understanding. Over reliance on one or other of these learning styles is likely to lead to a pathology of learning—globetrotting in the case of comprehension learning and improvidence in that of operation learning.

The factor analytic studies reported above all have found (1) comprehension but not operation learning or globetrotting to load highly on the meaning orientation factor, and (2) improvidence to load significantly on the same factor as operation learning but also to be significantly positively related to globetrotting. Thus these investigations, although justifying the separation of style from pathology in this inventory, seem to question Pask's theory of the relationship between styles and strategies of learning (or, perhaps, how these variables are operationalized in the 'Approaches to Studying' inventory).

There is as yet little evidence of the relationship between responses to the 'Approaches to Studying' inventory and tertiary academic achievement. Ramsden and Entwistle (1981) report that their British students' self-ratings of academic progress did show the expected relationships with the inventory scales—being most closely associated with organized study methods, positive attitude to studying, intrinsic motivation, deep approach, and syllabus freedom. However, these authors warn about circularity involved in comparing two sets of self-ratings. Somewhat similar findings were reported by Watkins (1982) with Australian students but using actual first year university grades. The meaning orientation factor was significantly associated with performance in Arts subjects whereas the surface/confusion factor (with high loadings on surface approach, fear of failure, disorganized study methods, negative attitudes to study and both learning pathologies) was negatively correlated with academic success across all three faculties examined—Arts, Science and Economics.

Aims of research

Instruments such as the 'Approaches to Studying' inventory may well play a major part in our understanding of the learning processes involved in tertiary study. However, more evidence needs to be obtained of the validity of this questionnaire and the model of the study process complex underlying it. Thus the first study reported here examines once again the inventory's factor structure, predictive power, and age and faculty correlates. The second study was designed to provide information on construct validity by comparing the approach to learning as assessed by this inventory with judgements made on the basis of in-depth interviews.

STUDY I

Method

The subjects were 292 students of the Australian National University (ANU) enrolled in seven of the largest senior courses in the Faculties of Arts, Science and Economics during second semester, 1981. This represented a 70 per cent response, which is unusually good for a postal survey at this institution. Of this number, 273 sat for the annual examinations and their grades were converted to a five-point scale for analytic purposes (ranging from 0 = fail to 4 = high distinction).

Results and discussion

Factor structure of 'Approaches to Studying' inventory

The SPSS program (Nie, Hull, Jenkins, Steinbrenner and Bent, 1975) was used to carry out principal factor analysis followed by oblique rotation to simple structure (using Cattell's scree criterion for determining the number of factors to be extracted). Three factors, which accounted for 50 per cent of the variance, were obtained and are shown in Table 1. Separate factor analyses were carried out for Arts, Science and Economics students but these did not appreciably alter the overall picture.

Factor I was clearly a deep level factor being dominated with positive loadings from Entwistle's meaning orientation and the stylistic component of comprehension

Table 1. Results of oblique factor analysis of 'Approaches to Studying' scales

Inventory Scales	Factors		
	I	II	III
<i>Meaning orientation</i>			
Deep approach	0.69	0.24	-0.32
Inter-relating ideas	0.63	---	---
Use of evidence	0.48	0.35	-0.30
Intrinsic motivation	0.76	---	-0.37
<i>Reproducing orientation</i>			
Surface approach	-0.32	0.43	0.46
Syllabus-boundness	-0.58	0.38	0.38
Fear of failure	---	---	0.48
Extrinsic motivation	-0.47	0.28	0.26
<i>Achieving orientation</i>			
Strategic approach	---	0.51	---
Disorganized study methods	-0.20	---	0.62
Negative attitudes to studying	-0.42	---	0.57
Achievement motivation	---	0.34	---
<i>Holistic orientation</i>			
Comprehension learning	0.52	-0.22	---
Globetrotting	---	---	0.52
Operation learning	---	0.64	---
Improvvidence	---	0.43	0.45

Only factor loadings > |0.20| are listed.

learning and negative loadings from three reproducing orientations and two of the achieving orientation scales. Once again, however, the author has found that Entwistle's reproducing orientation seems to split into more than one factor. The results of this factor analysis support my suggestion (Watkins, 1982) of a surface/operation learning factor (Factor II) and a surface/disorganized factor (Factor III). However, on this occasion the achievement motivation scale loaded 0.34 on the former factor while there were also off loadings from the deep approach and use of evidence scales. Thus this factor seems to represent a cue conscious, achievement motivated approach to study—usually employing operation learning but with some emphasis on a deeper approach, perhaps as required by assessment demands. Overall then this analysis is in line with the meaning/reproducing/achieving model of the study process domain although it does question the nature of the factor structure underlying the inventory.

Correlations with grades

As shown in Table 2, ten of the sixteen inventory scales correlated significantly ($p < 0.05$) with the students' course results. The multiple correlations obtained were: for all students, $R = 0.41$; for Arts students, $R = 0.48$; for Science students, $R = 0.65$ and for Economics students, $R = 0.58$.

When the factor scores were correlated with grades the following results were found: factor I, $r = 0.23$ ($p < 0.01$); factor II, $r = -0.05$; and factor III, $r = -0.28$ ($p < 0.01$). Thus as in my earlier research (Watkins, 1982) it was the surface/disorganized rather

Table 2. Correlations of 'Approaches to Studying' inventory scales with grades

	ALL (273)	Sc (83)	Ec (85)	Arts (105)
<i>Inventory scales</i>				
Deep approach	0.16**	0.13	0.10	0.20*
Inter-relating ideas	0.08	-0.05	-0.08	0.30**
Use of evidence	0.13*	0.13	0.06	0.15
Intrinsic motivation	0.24**	0.22**	0.03	0.27**
Surface approach	-0.28**	-0.17	-0.30**	-0.24**
Syllabus-boundness	-0.20**	-0.10	-0.13	-0.24**
Fear of failure	-0.02	-0.21*	-0.09	0.00
Extrinsic motivation	-0.17**	-0.30**	0.11	-0.12
Strategic approach	0.02	0.10	0.15	-0.01
Disorganized study methods	-0.20**	-0.34**	-0.37**	0.02
Negative attitudes to studying	-0.24**	-0.15	-0.23*	-0.23**
Achievement motivation	0.09	0.22**	0.18	0.06
Comprehension learning	0.01	-0.12	-0.06	0.01
Globetrotting	-0.13*	-0.32**	-0.28**	-0.02
Operation learning	-0.11*	-0.22*	0.05	-0.12
Improvidence	-0.06	-0.18*	-0.02	-0.07
<i>R</i>	0.41**	0.65**	0.58**	0.48**

** $p < 0.01$

* $p < 0.05$

than the surface/operation learning factor which was significantly negatively related to academic performance—this was particularly true for Science and Economics students. Adopting a deep level approach to study (but not comprehension learning) was significantly related to academic success only for Arts students.

Age and faculty differences

The study method factor scores were analysed for age and faculty differences by two way ANOVA. Significant ($p < 0.05$) age and course area main effects were found on the deep and surface/disorganized factors and deep and surface/operation learning factors, respectively. As in my earlier studies (Watkins and Hattie, 1981; Watkins, 1982) it would appear that Arts students were the most likely to adopt a deep level approach but the least likely to use an operation learning style—perhaps because of the nature of their disciplines. Students over thirty years of age were more likely to study at deep level and were least likely to use the disorganized surface level approach.

STUDY II

Method

Sixty students who had completed the 'Approaches to Studying' inventory during the third term of their first year at ANU were interviewed during the middle of their second year at ANU. These subjects were chosen to represent the ten highest scores on the 'meaning orientation' scale and the ten highest scores on the 'reproducing orientation' scale from each of the Faculties of Arts, Science and Economics who would agree to be interviewed (each of these Ss scored at least one standard deviation above that Faculty's mean score on one of these orientations—none of the Ss were high scorers on both orientations).

The interview was loosely structured so that information was obtained on how the students approached a particular learning task (which they had been working on recently in their classes); how they studied in general; what sort of factors affected their approach to study (e.g. subject area, topic, assessment method, grade desired, time constraints, interest level, quality or method of teaching); whether their approach had changed both since leaving school and since their first year at university; and whether their own opinions played any part in their studies.

The indicators of deep and surface processing suggested by Laurillard (1979) and Marton and Säljö (1976) were used to classify the interviewees' usual approach to study. Thus a student who generally tended 'to focus attention on the content as a whole', 'to try to see the connection between different parts', 'to think about the structure as a whole' would be classified as using deep level processing. On the other hand, students who usually 'focused only on the elements of the content', 'saw their tasks primarily as memory tasks', 'approached the task unthinkingly' would be rated as surface level processors. If a subject could not be classified as preferring one or other level of processing on the basis of these indicators or the other interview questions, he or she was placed into an intermediate category.

Each subject was classified both by their interviewer¹ and a judge who studied the

¹ The interviewers and judges were all staff of the Office for Research in Academic Methods, Australian National University. The writer would like to thank Elena Eaton, Claire Atkinson, Bernice Anderson and Sarah Burkinshaw (now Morison) for their assistance. Some findings of this research were presented at the Eighth International Conference on Improving University Teaching, Berlin, 1982.

interview protocol. Neither was aware of the subject's 'Approaches to Studying' scale scores but were familiar with the way the sample was selected.

Results and discussion

The judges and interviewers found that most of the Ss could indeed be classified as having a general tendency to surface or deep processing (not surprising given that the Ss were relatively extreme scorers on one or other orientation). The degree of agreement with the classification made earlier on the basis of Entwistle's inventory was reasonably impressive (see Table 3). Some of this lack of agreement may, of course, be due to lack of consistency in approach to study. The degree of agreement between the interviewer and the judge was even higher.

An investigation was then made of the protocols of Ss who were classified differently by the inventory and both the interviewers and judges. Although there was little difference in the classification rates per faculty there was evidence that the reasons for the classification differences did vary according to faculty.

The Arts classification problems seemed to centre around students who had changed or were in the process of changing their approach from surface to deep level. The following responses by two of the Arts students (classified by the inventory as using 'surface level' processing but judged from their interviews nine months later as using 'deep level' processing) to the question 'Do you think your approach to study/learning has changed since coming to university' illustrate this point:

Yes. I'm learning how to put my argument systematically (its not a matter of knowing the answer but of being able to work your way through opposing views, the argument). I've got to learn *why* I think that way this year. Whereas last year, it was all so new I tended to think—oh! I've got to get this essay done and worked out ways of doing it. . . . Learning how to think I suppose, . . . that's what its all about.

Yes, because I read more—I don't mean *more*, I mean more *in*, so when I'm

Table 3. Extent of agreement of classification according to depth of processing by inventory, interviewer and judge

	Agree	Disagree	Undecided
<i>Inventory v Interviewer</i>			
Arts	16	4	0
Science	15	4	1
Economics	15	2	3
<i>Inventory v Judge</i>			
Arts	16	4	0
Science	15	2	3
Economics	15	2	3
<i>Interviewer v Judge</i>			
Arts	18	2	0
Science	16	1	3
Economics	17	0	3

reading things, I tend to look for things below the surface, and that takes a bit of learning because I'd only read the other way. Whereas now you think: 'I wonder what would've happened if', or 'that's ridiculous'—you start arguing, even mildly, with the writer!

The classification problems with the Science students, on the other hand, seemed to centre on the reluctance or inability of some of the students to articulate their actual approach to study during the interview and a tendency for the interviewer/judge to class these students as 'surface level' processors because of their consistent reliance on serialist strategies—perhaps more due to the nature of the learning tasks than their preferred approach to study.

For several of the Economics students, what appeared to the judges as 'deep level' processing may have been forced upon the students by assessment requirements, as the following comment suggests:

Yes, it (my approach to studying Economics) would have to change because of what the degree requires. I thought I'd be able to get through a degree doing the minimum amount of work but I couldn't. I have to make sure I do extra work, make sure I read the books this time, make sure I understand what's going on rather than going into the exam and hoping for the best.

It is an open question whether such induced deep level processing will become integrated into the learning orientation of these students.

The judges and interviewers were also asked to look out for examples of globetrotting or improvidence in order to validate the pathology scales of Entwistle's inventory. In fact eleven cases of pathological learning processes were identified from the interviews—five of globetrotting only, three of improvidence only, and three who seemed to exhibit both pathologies. For example, one of the Economics students classed as displaying a tendency to globetrotting commented:

I try to read around as much as I can. Sometimes I feel I go off in tangents rather than the issue—miss the tree for the forest.

When the inventory pathology scales were examined every one of these students did score above the overall sample mean (and in all but two cases by more than one standard deviation) on the scale expected. Thus support was found both for the existence of pathological learning strategies and for the validity of the 'Approaches to Studying' inventory to assess these strategies.

CONCLUSIONS

This research has added overall support to the concept of a meaning/reproducing/achieving model of the study process complex as advocated by Entwistle and Biggs but has once again cast some doubt on the precise nature of the factor structure underlying the 'Approaches to Studying' inventory. While adding support to the need for independent style and strategic scales, these findings have perhaps brought into

question Pask's theory of the interrelationships between these ways of learning—in particular those between his learning styles and their corresponding pathologies.

The correlations of the inventory scales with tertiary grades once again have indicated that there may be little relationship between either operation or comprehension learning styles and tertiary grades at this university. There is then growing evidence that learning style *per se* has little to do with academic success in Arts, Science and Economics (although it is possible that more intensive research may uncover relationships between learning styles and specific learning contexts which are blurred when students' responses are combined). It was rather the surface/disorganized factor which once more correlated significantly negatively with academic achievement in each course area investigated. The high loadings of scales such as disorganized study methods, negative attitudes to study, both learning pathologies, and fear of failure on this factor suggests to the writer that there may be a *threshold* component involved here (see also Entwistle and Wilson, 1977). It would seem possible that high scores on such scales would be predictive of academic failure but low scores may not necessarily be related to academic success. Also, it suggests areas in which counselling may be most effective in aiding students to pass their examinations—they seem to imply support for some of the aims (but not necessarily the methods) of the older style study skills programmes disparaged by recent writers such as Gibbs, Morgan and Taylor (1982). That *younger* students were the more likely to score highly on this factor once again indicates that it is the younger students who are most in need of study methods counselling (Mathias, 1981; Watkins and Hattie, 1981; Watkins, 1982). Given, in addition, the generally above average academic performance of mature age students, surely it is time to consider whether too much effort is currently being placed on developing tertiary curricula and teaching methods appropriate for adult learners who, at least at this university, are already generally coping quite well with their learning tasks. There is also a need to consider whether faculty differences found in research with this inventory are due to the nature of the particular items. This seems important as the work of Ramsden (1979) indicates that the concepts of 'deep' and 'surface' may mean different things to Arts and Science students. Possible differences in factor structure between faculties should also be further examined.

Another question still to be satisfactorily answered is the relationship between approach to learning and the *quality of learning outcomes* as represented by the students' understanding of their course material. Biggs' (1979) SOLO taxonomy seems to hold promise as a research tool in this regard.

The findings reported in Study II generally tended to support the construct validity of the 'Approaches to Studying' meaning and reproducing orientations and globetrotting and improvidence scales. The writer is not convinced that this inventory adequately assesses the versatile approach to learning, however. In addition, this research has demonstrated that the approach to learning of some tertiary students is in the process of change. When this consideration is placed alongside the author's consistent findings of age and subject area differences in approach to study it would seem that there is a vital need for *longitudinal* research in this area. Such research should be able to throw some light on the role of changing assessment and course demands, developing cognitive schemas, and relatively stable personality and/or cognitive style predispositions on the formation of a consistent approach to learning. Such research may also be able to indicate how students can be best encouraged to develop a deep level approach to their work—surely the desire of all tertiary educators.

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AUSTRALIAN AND FILIPINO INVESTIGATIONS OF THE INTERNAL
STRUCTURE OF BIGGS' NEW STUDY PROCESS QUESTIONNAIRE

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SUMMARY. The internal structure of the new Study Process Questionnaire (Biggs, 1979) was investigated with samples of 255 Australian and 173 Filipino university students. The internal consistency reliabilities, item and subscale factor analyses were quite favourable for the Australian sample, supporting Biggs' model of the study process complex. However, the low to moderate reliabilities and failure of factor analysis to support Biggs' model indicates that the SPQ may not be suitable for Filipino students.

INTRODUCTION

Recent research has made clear that the naïve assumption that there is such a thing as 'good' study methods which leads to academic success is unfounded (Lafitte, 1963; Entwistle *et al.*, 1971). Rather it has been demonstrated that the relationships among study methods, academic success, the context of learning and characteristics of the individual student are complex (Biggs, 1976, 1978). Biggs (1978) developed the Study Process Questionnaire (SPQ) as a means of operationalising the study process domain. This inventory consisted of 80 items divided into ten unidimensional scales. It has been shown that this version of the SPQ had moderate scale internal consistency reliabilities and there was also support for Biggs' proposed three dimensional (Reproducing, Internalising, and Achieving) underlying model of the study process domain (Biggs, 1978; Watkins and Hattie, 1980).

Biggs' latest version of the SPQ, which is the focus of this study, is based on the proposition that students tend to have several broad motives for studying and several broad strategies for going about their work. He argues that, while many students have mixed motives and strategies, they are usually motivated in one particular way and their study strategy is compatible with their motive. Based on his earlier research, Biggs considers the three most important motive/strategy dimensions to be the following:

(1) *Utilising*

Motive: to undertake further study as a means for obtaining a better job, more money, or some other extrinsic need.

Strategy: overall, simply to avoid failure and specifically to focus on minimal content, primarily factual, as prescribed in class handouts, course outlines, etc., and to rote learn this necessary minimum for reproduction in examinations and/or assignments.

(2) *Internalising*

Motive: to work out one's philosophy of life and to develop special interests and abilities; studies are selected therefore that hold maximum intrinsic interest.

Strategy: to read widely and with maximal understanding (independently of course requirements), to integrate various subjects and make them personally meaningful.

(3) *Achieving*

Motive: to excel in studies as part of a general competitive approach to life and win high status thereby; more specifically, to study with a view to maximising grades awarded.

Strategy: close orientation to course outlines, work schedule tightly organised, assignments completed on time, etc.

(from Biggs, 1979, p. 2)

This latest version of the SPQ (which will be the only version discussed in the remainder of this article) consists of 42 items each tapping one of the three broad dimensions presented above and each divided into motive and strategy subscales of seven items in length.

The aim of this research was to investigate the following aspects of the SPQ when administered to Australian and Filipino university students:

- (a) The internal consistency of the scales and subscales.
- (b) The factor structure of the SPQ items.
- (c) The factor structure of the SPQ subscales (with particular reference to Biggs' motive/strategy model of study processes).

METHOD

Sample

The Australian subjects were 255 first year, full-time undergraduates at the University of New England, a small rural university in northern New South Wales. The Filipino sample consisted of 173 freshmen attending the College of Liberal Arts and Sciences at the University of San Carlos, a major university in the central Philippines. English was the language of instruction at this university, and two Filipino educationalists considered the items relevant to and comprehensible by Filipino tertiary students.

Procedure

The Australian data were collected through a mail survey. The Filipino subjects completed the SPQ during regular lecture time. Due to an unfortunate proof-reading error three items (one from each of the Utilising Motive, Internalising Motive, and Achievement Strategy sub-scales) were omitted from the SPQ when administered in the Philippines. Therefore when Filipino internal consistency coefficients are reported below for these subscales and the corresponding total scales, the values reported are corrected for length.

RESULTS AND DISCUSSION

The internal consistency reliabilities, coefficient α , are reported in Table 1. It can be seen that these values were very adequate for the Australian students and fairly encouraging for the Filipinos, considering the latter's lesser familiarity with English.

TABLE 1
SUMMARY OF INTERNAL CONSISTENCY DATA FOR
THE AUSTRALIAN AND FILIPINO STUDENTS

	Coefficient α	
	Australia	Philippines
<i>SPQ Scales</i>		
Utilising	0.75	0.58*
Internalising	0.79	0.70*
Achieving	0.77	0.68*
<i>SPQ Subscales</i>		
Utilising Motive	0.60	0.51*
Utilising Strategy	0.69	0.51
Internalising Motive	0.67	0.57*
Internalising Strategy	0.72	0.60
Achieving Motive	0.70	0.57
Achieving Strategy	0.74	0.57*

* Corrected for length (see Procedure).

Factor structure

The SPQ items were analysed using unrestricted maximum likelihood common factor analysis (Jöreskog, 1969). Given the certainty of non-linear relations between the items, which is typical with such data, rather than use statistical criteria or other heuristics for choosing

the number of factors, the decision as to the number of factors was made solely on the grounds as to whether the factors could be interpreted. For the Australian sample two, three and six factor solutions were interpretable. For the six factor solution, the six scales outlined by Biggs were clearly evident. For the three factor solution, the first factor related to internalising with some high loadings on utilising strategy; the second factor related to utilising with off loadings on achievement motivation; and the third factor related to achievement strategy. With only two factors extracted, the first related to strategy and internalising motive, and the second to achievement and utilising motivation.

The Filipino data clearly came down to a two factor solution: one factor relating to motivation and the other to strategy. The six and three factor solutions were not clearly interpretable.

From these item analyses, two hypotheses were generated to be tested on the subscale scores. The first hypothesis was based on two factors—a motive and a strategy factor. The second hypothesis consisted of a utilising, an internalising, and an achievement factor. The latter model corresponded to Biggs' model of the study process domain. Confirmatory maximum likelihood factor analysis was used to test these two models. In confirmatory factor analysis a pattern of loadings, with many constrained (usually to zero) and the rest free to vary, can be tested and a χ^2 statistic calculated to evaluate the goodness of fit between the observed and expected matrix. Given the sensitivity of χ^2 to large sample sizes (see Mulaik, 1975) and given that we are primarily interested in evaluating which model best fits the data, then we can use the difference in χ^2 from the two models (with $\Delta df = df_1 - df_2$) to evaluate which model is most descriptive. McDonald and Leong's (1976) analysis of covariance program was used. The results are presented in Table 2.

TABLE 2
GOODNESS OF FIT OF DATA TO HYPOTHESISED UNDERLYING
MODELS FOR AUSTRALIAN AND FILIPINO STUDENTS

	Australia		Philippines	
	χ^2	df	χ^2	df
Hypothesis 1 (Motive/Strategy)	144.13	8	52.96	8
Hypothesis 2 (Utilising/Internalising/ Achieving)	25.72	6	47.67	6
Difference between hypothesis 1 and 2	118.41	2	5.29	2

For the Australian group the three factor hypothesis was statistically significantly better than the two factor hypothesis. For the Filipino data statistically there was no difference in the $\Delta\chi^2$ (probability of difference = 0.08). Hence on parsimony grounds alone we should prefer the two factor model—this was confirmed by examination of the factor patterns.

Thus this factor analysis of the SPQ subscales lent support to Biggs' motive/strategy model of study processes from the Australian but not the Filipino data.

CONCLUSIONS

This investigation of the internal structure of the SPQ provided very satisfactory results from the Australian sample—adequate to good internal consistency coefficients; item factor analysis which supported the existence of Biggs' subscales of the SPQ; and a subscale factor analysis which supported the validity of Biggs' model of the study process domain. The SPQ can then be recommended for further use with Australian students.

Unfortunately the Filipino data (with their low to moderate internal consistency coefficients and factor analyses which failed to support Biggs' model) suggest that the SPQ may not be appropriate for use with Filipino students.

The writers consider that further research is required with a wider range of Filipino and Australian students before it is possible to determine if the results of this study are a reflection of true linguistic, educational, or personological differences between students of these countries or are simply attributable to sampling error. It is certainly true that earlier research has indicated that major differences exist between Filipino and both Australian and US university students' views of the aims and methods of tertiary education (Watkins and Malimas, 1980). However, of course, such findings do not necessarily indicate that the same measuring instruments are not valid in these countries. Indeed research on the US developed Inventory of Learning Processes (Schmeck *et al.*, 1977) with the same Australian and Filipino subjects as used in this study found more favourable factor analytic evidence for the validity of that inventory with the Filipino rather than the Australian sample (Watkins and Hattie, 1981).

Additional evidence is thus required to investigate to what extent the SPQ is country bound and also to provide support for the validity of the SPQ as a measure of study methods.

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ACADEMIC ACHIEVEMENT AND THE CONGRUENCE OF STUDY MOTIVATION AND STRATEGY

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SUMMARY. This research with 540 Australian university students failed to support Biggs' (1978) suggestion that mismatch between study motivation and strategy was inversely related to academic performance.

INTRODUCTION

Biggs (1978, 1979) has presented a model of the study process domain of university students based on the assumption that by tertiary level students have developed reasonably stable motives and strategies for going about their learning. In the most recent version of his Study Process Questionnaire (Biggs, 1979), Biggs distinguishes three dimensions of study processes—utilising, internalising and achieving. Each of these dimensions has a motivational and a strategical component, and are as follows:

1. *Utilising Motivation (M1)*: There are two interrelated motives: pragmatic reasons for coming to university and avoidance of failure.
Utilising Strategy (S1): The study strategy is aimed at avoiding failure but doing as little work as possible. The student becomes syllabus-bound and studies only the minimum amount for reproduction in examinations.
2. *Internalising Motivation (M2)*: The student sees coming to university as a way to self-actualisation and is interested in the subject matter for its own sake.
Internalising Strategy (S2): The student is syllabus-free, reads widely, attempts to interrelate material and build up an overall framework that is personally meaningful.
3. *Achieving Motivation (M3)*: The motive is to obtain the high grades for their own sake as part of a general competitive attitude to life.
Achieving Strategy (S3): The student is highly organised, hard working, and 'plays the game' (e.g., ensures assignments are completed on time).

Biggs argues that while these three dimensions may not fully account for the whole study process domain, they "seem to offer a parsimonious and theoretically coherent model for conceptualising the more important ways in which students may feel about, and behave towards, their study" (Biggs, 1979, p. 383). He goes on to point out that this model allows students to have mixed motives and multiple strategies if necessary.

Support for Biggs' three dimensions has been provided in factor analytic studies by Entwistle *et al.* (1979) and Watkins and Hattie (1980), while Hattie and Watkins (1981) reported data supporting the specific motive/strategy model outlined above for Australian but not Filipino students.

Biggs (1978) pointed out a plausible hypothesis derived from such a study process model which could have major implications for student counselling. The data indicate that most students tend to respond to his motive and strategy inventory items so that certain motives and strategies go together and there is additional evidence to suggest that these observed motive/strategy combinations are adaptive ones. Biggs suggested that some cases of under-achievement may be due to a value-motive-strategy mismatch (in his 1979 formulation the 'value' component was dropped). He contends that it may be empirically possible to show that high achievement occurred for congruent complexes and low achievement in cases of mismatch.

METHOD

It was decided to test this congruence hypothesis with a sample of Australian university students.

Subjects: The subjects were 540 Arts, Economics and Science students in their first year at the Australian National University.

TABLE 1
CORRELATIONS OF MOTIVE/STRATEGY RATINGS WITH QUESTIONNAIRE SCALES

	Utilising Motivation rating	Utilising Strategy rating	Internalising Motivation rating	Internalising Strategy rating	Achieving Motivation rating	Achieving Strategy rating
<i>Study Process Questionnaire Scales (N = 255)</i>						
Utilising Motivation	0.53	0.33	-0.29	-0.19	0.14	0.28
Utilising Strategy	0.38	0.39	-0.33	-0.32	0.11	0.20
Internalising Motivation	-0.14	-0.21	0.42	0.34	0.20	0.03
Internalising Strategy	-0.10	-0.31	0.36	0.49	0.15	0.12
Achieving Motivation	0.31	-0.06	-0.12	0.06	0.56	0.46
Achieving Strategy	0.10	-0.23	0.02	0.25	0.24	0.42
<i>Approaches to Studying Questionnaire Scales (N = 540)</i>						
Reproducing Orientation	0.50	0.39	-0.41	-0.27	0.11	0.15
Meaning Orientation	-0.34	-0.37	0.46	0.51	0.08	0.06
Achieving Orientation	-0.06	-0.20	0.02	0.19	0.41	0.43

Research Notes

Measures: The subjects were asked to rate on a six-point Likert-type scale from 1 (unimportant) to 6 (very important) how important each of Biggs' three motives and three strategies were for them. They were given a brief description of each motive and each strategy. For example, Utilising Motivation was described as 'To undertake further study as a means for obtaining a better job, more money, etc.' Data collected but not reported during earlier research (Hattie and Watkins, 1981) supported the convergent and discriminant validity of these ratings as measures of the corresponding motive/strategy dimensions as assessed by Biggs' Study Process Questionnaire (see Table 1). Further evidence of the construct validity of these ratings was provided by the correlations with the scales of the 'Approaches to Studying' inventory (Ramsden and Entwistle, 1981), also shown in Table 1. The latter inventory's Reproducing, Meaning, and Achieving Orientations correspond closely to Biggs' Utilising, Internalising, and Achieving dimensions, respectively. The students' grade point averages (GPA) were calculated from their results at their first year annual examinations.

Statistical procedures: Lack of congruence between motive and strategy was assessed in the following ways:

(a) for each motive and corresponding strategy separately,

$$\text{i.e., } |M_i - S_i|, i = 1, 2, 3$$

(b) for the sum of the above three motive/strategy dimensions,

$$\text{i.e., } \sum_{i=1}^3 |M_i - S_i|$$

Each of these four discrepancy scores (three in the case of (a) and one for (b)) was obtained for each student and then correlated with that student's GPA. These discrepancy scores were also subjected to a sex $\times$ age $\times$ faculty analysis of variance to determine if motive/strategy mismatch was related to these factors.

Mismatch was also assessed in another manner. It was thought that lack of congruence may only be a significant influence on lower academic performance in cases where motivation was high. Therefore only those students who had rated a motive as of high importance (defined as an importance rating of 6 or 5) were considered in this final part of the analysis. For each dimension the 'high' motivation group was subdivided according to whether the corresponding strategy was considered 'high', 'medium' or 'low' (indicated by strategy importance ratings of 6 or 5, 4 or 3, and 2 or 1 respectively). The academic performances of these three groups were then compared by analysis of variance.

Due to the number of statistical tests involved the 0.01 level of significance was adopted for significance testing.

RESULTS

None of the statistical tests outlined above was found to be significant. Thus ANOVA found no evidence of sex, faculty, or age main effects or higher order interactions when the discrepancy scores were analysed separately for each dimension or in combination. The correlations between each of these discrepancy scores and grades ranged in value from 0.01 to -0.07. The results of ANOVA of the grades of the 'high' motivation subjects divided into 'high', 'medium' and 'low' strategy groups as described above were also not significant: $F(2,254) = 0.58$, $F(2,239) = 0.41$, and $F(2,62) = 1.25$ for motives M1, M2, and M3 respectively.

CONCLUSION

As far as the writer is aware there is no empirical support for Biggs' suggestion that motive/strategy mismatch may be related to academic achievement. Certainly the results of the present investigation are not in accord with this proposition. It is of course quite possible that Biggs' hypothesis holds only for particular student minorities such as those of low ability or those of specific personality types. However, it would require considerable further research before any such suggestions could be verified and before it is possible to accept the validity of the congruence hypothesis in any form.

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THE VALIDITY OF THE FOUR SUBSCALES OF THE
INVENTORY OF LEARNING PROCESSES FOR A SAMPLE
OF FILIPINO FRESHMAN COLLEGE STUDENTS

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The college entrance examination scores and first-year college grade point averages of 123 Liberal Arts and Science students at a Filipino university were related to their responses to each of the four subscales of the Inventory of Learning Processes: (a) Deep Processing; (b) Elaborative Processing; (c) Fact Retention; and (d) Methodical Study. The results indicate that the Elaborative Processing subtest was valid in predicting achievement at the college entrance level. The data suggest that the constructs of Elaborative Processing and Deep Processing may become even more closely related to college grades. No evidence was found for the independent influence on achievement of study methods which emphasised either fact retention or a methodical approach.

THE Inventory of Learning Processes (ILP) was developed by Schmeck, Ribich, and Ramanaiah (1977) to assess individual differences in the way people process information. The approach is based on recent laboratory studies in the areas of human learning and memory (e.g., Craik and Tulving, 1975). The purpose of the present paper was to relate scores on each of the four subscales of the ILP to two criteria of academic achievement in the Philippines. The latter

involved (a) college entrance examination scores and (b) achievement in first year college examinations.

Method

Instruments

Predictors. The ILP scale is composed of 62 true-false items which are distributed among four subscales: (a) Deep Processing (18 items), (b) Elaborative Processing (14 items), (c) Fact Retention (7 items), and (d) Methodical Study (23 items). The Deep Processing subscale was designed to assess the extent to which students evaluate critically, organise conceptually, and compare and contrast the material that they are studying. The Elaborative Processing subscale contains items which assess the degree to which students transform new information into their own terminology, use their own experience to generate concrete examples, and make use of visual imagery to encode new ideas. As Schmeck et al. (1977) use the term, 'elaboration' does not involve any change in depth of processing. Schmeck (1982) has suggested that 'versatile' learning as conceptualised by Pask (1976) may be revealed by summing scores on the Deep and Elaborative Processing scales. The Fact Retention scale reflects attention to details and specifics rather than generalities. The Methodical Study scale involves items tapping how hard and how systematically the student works—along the lines of the old 'How to Study' manuals.

Schmeck (1982) summarised evidence supporting the reliability and validity of the ILP scales for American and Australian students. Two of the present investigators have provided partial support for the factorial validity and internal consistency of the ILP scales in a study with 173 Filipino college students (Watkins and Hattie, 1981a).

Criterion measures. The college entrance scores were assessed by the National College Entrance Examination (NCEE) developed by the Fund for Assistance to Private Education (1973) while first year college grade point average (GPA) was the measure of college achievement.

Subjects

The subjects of this report were 123 of the previously mentioned 173 Filipino college students for whom complete college entrance examination scores and first-year college grades were available.

They were in their first year of study in the College of Liberal Arts and Science at a prestigious private university in the central Philippines. English is the language of instruction at this university.

Data Analysis

In addition to calculation of product moment correlations among all variables, a path analysis was conducted.

Results

The product moment correlations among the four ILP subscales, NCEE scores, and GPA are shown in Table 1.

It can be seen that significant ($p < .05$) correlations were found amongst all four ILP subscales; between GPA and the NCEE measure and between GPA and (a) the Deep Processing subscale and (b) the Elaborative Processing subscale; and between NCEE scores and the Elaborative Processing subscale. The correlations of the composite sum of the Deep Processing and Elaborative Processing subscales with NCEE scores and with GPA were found to be 0.26 ($p < .05$) and 0.30 ($p < .05$), respectively.

These relationships were further examined by path analysis. To construct this figure the following assumptions were made: (1) the NCEE scores would be a causal determinant of college GPA, and (2) the ILP subscales would be involved in both direct causal relationships with college grades and indirect causal relationships mediated by the NCEE scores.

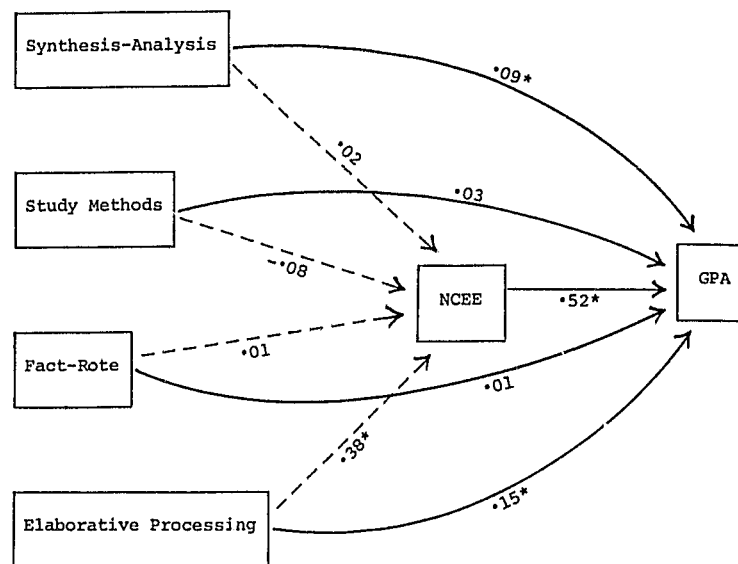
The ensuing path analysis diagram and path coefficients (stan-

TABLE 1
Intercorrelations Among the Two Criterion Measures and the Four Predictor ILP Subscales

	Criterion Measures		ILP Predictor Subscales			
	GPA	NCEE	DP	EP	FR	MS
<i>Criterion Measures</i>						
Grade Point Average (GPA)	—					
National College Entrance Examination Scores (NCEE)	58*	—				
<i>Predictor Variables</i>						
ILP Deep Processing (DP)	21*	11	—			
ILP Elaborative Processing (EP)	38*	37*	33*	—		
ILP Fact Retention (FR)	16	11	41*	31*	—	
ILP Methodical Study (MS)	10	10	40*	22*	26*	—

Note.—Decimal points omitted from correlation coefficients.

* $p < .05$.



* Made a significant ($\alpha = .05$) independent contribution to R .

Figure 1. Path analysis diagram and path coefficients.

dardised regression coefficients) are presented in Figure 1. This model accounted for 38% of the variance of GPA and 14% of the NCEE variance.

It can be seen that the Elaborative Processing subscale was the ILP measure with the major direct relationship to both NCEE and GPA. The total effect of Elaborative Processing subscale on GPA is seen to be $(.15 + .38 \times .52 = .35)$. The calculated effect was thus slightly more indirect than direct. On the other hand, the computed influence of the Deep Processing subscale on GPA seemed to be primarily direct. Neither the Fact Retention nor the Methodical Study subscales was found to have any significant independent relationship to either measure of academic success.

Discussion

The results of this study suggest that the construct of elaborative processing is a factor in success at college entrance level in the Philippines. However, both this form of processing and the associated construct of deep processing may well become even more important at college level. Neither an emphasis on retaining facts nor the use of methodical study methods as measured appears to

have an influence on achievement independently of the other two ILP subscales. These results are similar to those reported by Watkins and Hattie (1981b) for the marks of Arts students at an Australian university and by Schmeck and Grove (1979) for the GPA of American college students. However, the latter study did also find that the Fact Retention subscale had a minor but significant relationship to GPA and that the effect of the measure of deep processing on GPA was mostly mediated by the college entrance examination scores, whereas the apparent effects of scores on the Fact Retention and Elaborative Processing subscales on college GPA were mainly direct. The Australian study also revealed that the Methodical Study subscale was related to the tertiary performance of Arts students. However, no support was found for the suggestion (Schmeck, 1982) that 'versatile' learning, as represented by summation of scores on the Deep and Elaborative Processing subscales, is more strongly related to academic achievement than is either subscale alone.

Conclusions

Despite some minor differences, these studies lend cross-cultural support to the view that, at least for Liberal Arts students, being able to encode information deeply and to translate it into one's own terminology are likely to be related to academic success at tertiary level. This conclusion is supported by data from laboratory studies indicating that deep and elaborative processing may be the two most powerful ways of retaining information (Craik and Tulving, 1975).

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AN INVESTIGATION OF THE CONSTRUCT VALIDITY OF THREE RECENTLY DEVELOPED PERSONALITY INSTRUMENTS: AN APPLICATION OF CONFIRMATORY MULTIMETHOD FACTOR ANALYSIS

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The advantages of using confirmatory factor analysis in the analysis of multitrait-multimethod (MTMM) matrices are discussed. This method is then applied to investigate the convergent and discriminant validity of three Australian developed personality instruments — two measures of self-esteem (Watkins, 1978) and the New England Personality Questionnaire (Fitzgerald & Cole, 1976). Examination of a MTMM matrix based on the responses of 275 university students generally supported the construct validity of these instruments.

The purpose of this paper is to discuss the advantages of using confirmatory factor analysis to analyse multitrait-multimethod (MTMM) matrices and to apply this technique to investigate the construct validity of three recently developed Australian personality instruments. Two are measures of self-esteem — a questionnaire and a weighted rating scale (Watkins, 1978). The third is the New England Personality Questionnaire (NEPQ) which provides measures of anxiety, extraversion, and flexibility (Fitzgerald & Cole, 1976).

Multitrait-Multimethod Analysis

The criteria that Campbell & Fiske (1959) proposed for investigating the convergent and discriminant validity of psychological measuring instruments have been widely used and constitute a major contribution to the methodology of construct validation. They suggested that these aspects of construct validity be assessed by means of a MTMM matrix which consists of the intercor-

relations between each of several traits measured by each of several methods. They put forward four criteria for evaluating such a matrix. Firstly, that the correlations among measurements of the same trait by different methods (convergent validity) should be statistically significant and of sufficient magnitude to justify further usage. Secondly, that these convergent validities should exceed correlations between different traits measured by different methods. Thirdly, that the convergent validities should exceed the correlations between different traits measured by the same method. Finally, that a similar pattern of trait intercorrelations should be present in the heterotrait-monomethod and the heterotrait-heteromethod submatrices.

Jackson (1969) pointed out, however, that these criteria are really little more than preliminary recommendations. They do not provide objective, quantitative grounds for assessing whether a MTMM satisfied the requirements of convergent and discriminant validity. Jackson also noted a number of statistical problems associated with applying these informal criteria. Since that article of Jackson a number of different strategies have been suggested for more adequately assessing MTMM

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matrices. The basic aim of all these approaches is to provide an analytic method for appraising the validity of content variance independently of method variance. In a recent review and critique of these methods, Schmitt, Coyle, and Saari (1977) suggest that the most satisfactory are multimethod factor analysis (Jackson, 1975) and path analysis (Werts & Linn, 1970). This latter technique can also be carried out by confirmatory factor analysis (c.f. Mulaik, 1975). Both Jackson's method and the confirmatory factor analysis approach force the investigator to state explicitly his or her assumptions concerning the traits and methods under examination and the implications of these assumptions can then be tested. The investigations of both Schmitt et al., and Lomax and Algina (1979) indicate, however, that these two methods can sometimes lead to quite different conclusions about discriminant validity. Lomax and Algina argue that confirmatory factor analysis may be preferable to Jackson's procedure because the latter can produce factor loading matrices in which like named traits have salient loadings on the same factor, even though the former analysis indicated highly correlated traits.

Confirmatory Factor Analysis

Armstrong (1967), in an article called "Derivation of theory by means of factor analysis, or Tom Swift and his electric factor analysis machine", criticized researchers who treat exploratory factor analysis as a method for automatically generating theory. He argued that there was a need for factor analysis to be guided by prior substantive theory but unfortunately the usual methods of exploratory factor analysis were not suited to that task. This is rather the realm of confirmatory factor analysis. Using this approach one first formulates a factor-analytic model about how certain factor variables determine the

common variance of certain observed variables, and then tests the goodness of fit of the model to the data.

Confirmatory factor analysis is particularly suited to the analysis of MTMM matrices. A number of possible factor structures can be hypothesized to underlie such matrices and the validity of each of these models can then be tested. For example one could hypothesize that (a) there are only method factors; (b) there are method factors and a general factor; (c) there are trait factors (i.e. supposed measures of the same trait all load highly on the same factor but not on other factors); (d) there are trait factors and a general factor; (e) there are method factors and trait factors. Evidence of closest fit of the data to models (c), (d), and/or (e) would tend to support the construct validity of the measures included in the MTMM as they indicate convergent and discriminant validity.

To illustrate the application of this approach let us consider the data reported later in this paper. The MTMM matrix presented here involved the inter-correlations between four (supposedly) different traits measured by two different methods, namely:

Traits	Methods
A. self-esteem	1. questionnaire
B. extraversion	2. rating scale
C. anxiety	
D. flexibility	

If the measuring instruments do demonstrate construct validity in the Campbell and Fiske sense, then factor analysis should reveal four factors each with high loadings only from the questionnaire and rating scale measures of the same trait. However, from the nature of these traits, some relationship might be expected between those trait factors (Wylie, 1974). There also could well be evidence of separate factors for both questionnaire and rating scale methods. In addition some general factor such as social desirability or general

emotional adjustment may underlie eight measures. The presence (or absence) of method and/or general factors does not imply or deny the construct validity of the instrument. It is the confounding influence of method factors which made the interpretation of matrices as proposed by Campbell and Fiske hazardous.

Considerations such as these may lead to the determination of models which were tested in this study. These models are:

- Model I: Two method factors
- Model II: One general, two method factors
- Model III: Four trait factors (correlated)
- Model IV: One general, four trait factors (correlated)
- Model V: Two method, four trait factors (uncorrelated)
- Model VI: Two method (uncorrelated) and four trait (correlated) factors

The goodness of fit of each of these models to the data obtained was tested. If no satisfactory model was found, other models could have been examined. Unfortunately, due to the ensuing lack of degrees of freedom, it was not possible to test the model where all two method and four trait factors were correlated.

Different hypotheses about the correlations between these factors were assessed by systematically varying the factor dispersion matrix. For example, when we were testing model I (two method and four trait factors — uncorrelated) the factor pattern matrix was hypothesized to be of the following form:

Trait	Method	Method Factors	
		1	2
A	1	m_{A1}	0
B	1	m_{B1}	0
C	1	m_{C1}	0
D	1	m_{D1}	0
A	2	0	m_{A2}
B	2	0	m_{B2}
C	2	0	m_{C2}
D	2	0	m_{D2}

ance of certain observed and then tests the goodness of fit of the model to the data. Confirmatory factor analysis is particularly suited to the analysis of matrices. A number of possible structures can be hypothesized to underlie such matrices and the goodness of fit of each of these models is tested. For example one might hypothesize that (a) there are four factors; (b) there are four factors and a general factor; (c) there are trait factors (i.e. supposed to load on the same factor but not on other factors); (d) there are trait factors and method factors; (e) there are method factors. Evidence of the fit of the data to models (c), (d), and (e) would tend to support the validity of the measures in the MTMM as they indicate discriminant validity. The application of this model to the data in this paper. The MTMM model here involved the intercorrelations between four (supposedly) different traits measured by two methods, namely:

Methods

1. questionnaire
2. rating scale

measuring instruments do not have construct validity in the Campbell and Fiske sense, then factor analysis could reveal four factors each loading only from the questionnaire and rating scale measures of the trait. However, from the evidence of separate factors for questionnaire and rating scale measures (e.g. 1974). There also could be evidence of separate factors for questionnaire and rating scale measures in addition some general factor of social desirability or general

emotional adjustment may underlie all eight measures. The presence (or absence) of method and/or general factors does not imply or deny the construct validity of the instruments but it is the confounding influence of such factors which made the interpretation of matrices as proposed by Campbell and Fiske hazardous.

Considerations such as these were what lead to the determination of the models which were tested in this paper. These models are:

- Model I: Two method factors
- Model II: One general, two method factors
- Model III: Four trait factors (correlated)
- Model IV: One general, four trait factors (correlated)
- Model V: Two method, four trait factors (all uncorrelated)
- Model VI: Two method (uncorrelated), four trait (correlated) factors

The goodness of fit of each of these models to the data obtained was tested. If no satisfactory model was found other models could have been examined. Unfortunately, due to the ensuing lack of degrees of freedom, it was not possible to test the further model where all two method and four trait factors were correlated.

Different hypotheses about the intercorrelations between these factors were assessed by systematically varying the factor dispersion matrix. For example, when we were testing model V (two method and four trait factors — all uncorrelated) the factor pattern matrix was hypothesized to be of the following form:

Trait	Method	Method Factors		Trait Factors			
		1	2	A	B	C	D
A	1	m_{A1}	0	t_{A1}	0	0	0
B	1	m_{B1}	0	0	t_{B1}	0	0
C	1	m_{C1}	0	0	0	t_{C1}	0
D	1	m_{D1}	0	0	0	0	t_{D1}
A	2	0	m_{A2}	t_{A2}	0	0	0
B	2	0	m_{B2}	0	t_{B2}	0	0
C	2	0	m_{C2}	0	0	t_{C2}	0
D	2	0	m_{D2}	0	0	0	t_{D2}

— where m_{ki} are loadings on the two method factors and the t_{ki} are loadings on the four trait factors. Thus the first four rows represent the four traits under method 1 and rows five to eight represent the same four traits under method 2.

Here all the zeros are constrained and the other loadings are free to be estimated. We could also test the hypothesis of two method factors and four trait factors, but where the trait factors are not the method factors can be correlated (model VI), by so patterning the correlation matrix between the factors. The degree of fit to be observed data could then be tested.

The Measures

The self-esteem measures whose construct validity is investigated in this report were developed by Watkins (1978) based on the view that most existing measures of self-esteem do not even attempt to take into account the value system of the individual subject. He proposed a relatively straight forward method of measuring self-esteem derived from an aggregate of a subject's self-ratings in different areas of their life weighted by the relative importance of those life areas to the subject. Using this approach Watkins constructed a weighted rating scale measure of self-esteem (SER) appropriate for Australian tertiary students. He also developed a self-esteem questionnaire (SEQ) based on life areas rated important by other Australian college stu-

dents. In an evaluation of these instruments, based on a study with 235 Psychology students at Melbourne university, Watkins (1978) presented fairly encouraging evidence for the reliability and validity of the instruments, together with a revised version of the SEQ. Although this general approach to the measurement of self-esteem has now been adopted by a number of researchers both in Australia and the United States, further evidence is needed for the construct validity of the particular instruments developed for Australian tertiary students.

Fitzgerald and Cole (1976) developed the New England Personality Questionnaire (NEPQ) to assess the significance of the personality variables extraversion, anxiety, and flexibility in the context of an innovative programme of continuous practice teaching in New England primary schools. The construct validity of the NEPQ has been supported by several factor analytic studies and investigations of the attitude change and behaviour of trainee teachers. However, there has been no examination of the convergent and discriminant validity of this instrument to date.

This paper then reports the results of a multitrait-multimethod confirmatory factor analytic investigation of the construct validity of these instruments designed for use with Australian tertiary students.

METHOD

The NEPQ, and self-esteem instruments were included in a regular survey of the student body by the Educational Research Unit at the University of New England. The subjects of this study were 275 first year internal students (152 male, 123 female).

In order to obtain measures of the NEPQ scales by a different method subjects were asked to rate themselves using 6-point Likert-type scales on each

of the variables extraversion, anxiety, and flexibility (see Appendix). To assist the subjects in this task, word pictures of the sort of person who would score high and low on each of these scales were also presented (see Appendix). Such self ratings have been used to help establish the validity of the Eysenck Personality Inventory (Harrison & McLaughlin, 1969).

To test the adequacy of the fit of the six models presented earlier McDonald and Leong's (1976) confirmatory structure analysis programme (COSAS) was used. This programme allows patterns of constrained and free parameters to be specified as shown above and then maximizes the goodness of fit to the original matrix. A χ^2 statistic for testing the goodness of fit is calculated providing the model is not over-determined; that is, when there are degrees of freedom to test the model.

The adequacy of the fit of the six models to the observed data was assessed in a number of ways. Firstly the χ^2 goodness of fit test was applied. It is desirable that the χ^2 obtained not be significant at the .01 level and thence that we could not reject the hypothesis that the model adequately fits the data. By using the normal Wilson & Hilferty (1931) transformation this χ^2 can be converted to a z score ($z = 2.58$ at $\alpha = .01$). Mulaik (1975) points out that with sample sizes of 100 or more slight but unimportant departures from the model are to be expected. Thus, in addition, the goodness of fit is indicated by the sizes of the residuals remaining in the observed-variables correlation matrix. In this research we will report whether any residuals exceed .10 in absolute magnitude. The final test of model adequacy is that there should be no Heywood cases. A Heywood case is an improper solution where the value of the unique variances is so small that it indicates that there is no measurement error and thus we have perfectly reliable tests — a situation that is

unrealistic in the behavioural :
(Martin & McDonald, 1975).

RESULTS AND DISCUSSION

The multitrait-multimethod obtained is shown in Table 1. T divergent validities of the three sonality instruments under in tion here were generally suppo the data presented in this tab nificant ($p < .01$) and sub (with the exception of flexibility relations were found between th traits with different instrument magnitude of these questionna rating correlations (bar flexibility of the same order as reported Eysenck Personality Inventory rison & McLaughlin, 1969). measuring devices also satisfi Campbell & Fiske requirements criminant validity as in every c: convergent validities exceeded t responding different trait — sar different) method correlations, similar pattern of intercorrelatio ween measurements of differen by the same method was found f methods. Therefore all three ments did indeed satisfy the Ca and Fiske requirements for co

The Multitrait
(a)

Traits		A
1. Questionnaires		
A. self-esteem		
B. extraversion		30
C. anxiety		-28
D. flexibility		06
2. Rating Scales		
A. self-esteem		53
B. extraversion		49
C. anxiety		-35
D. flexibility		05

Note: --- indicates convergent v

ables extraversion, anxiety, (see Appendix). To assist in this task, word pictures of person who would score on each of these scales presented (see Appendix). Things have been used to help validity of the Eysenck Inventory (Harrison & 1969).

adequacy of the fit of the presented earlier McDonald (1976) confirmatory structural programme (COSA) was programme allows patterns and free parameters to as shown above and then the goodness of fit to the trix. A χ^2 statistic for testing of fit is calculated provided is not over-determined; then there are degrees of test the model.

quacy of the fit of the six the observed data was a number of ways. Firstly, a goodness of fit test was applied. We that the χ^2 obtained not at the .01 level and we could not reject the hypothesis that the model adequately fits using the normal Wilson & 1951) transformation this χ^2 converted to a z score, ($z = 2.58$). Mulaik (1975) points out sample sizes of 100 or more important departures from are to be expected. Thus, in the goodness of fit is indicated of the residuals remaining served-variables correlation in this research we will report residuals exceed .10 in absolute magnitude. The final test of adequacy is that there should be no Heywood case is a solution where the value of variances is so small that that there is no measurement and thus we have perfectly fits — a situation that is

unrealistic in the behavioural sciences (Martin & McDonald, 1975).

RESULTS AND DISCUSSION

The multitrait-multimethod matrix obtained is shown in Table 1. The convergent validities of the three personality instruments under investigation here were generally supported by the data presented in this table. Significant ($p < .01$) and substantial (with the exception of flexibility) correlations were found between the same traits with different instruments. The magnitude of these questionnaire-self rating correlations (bar flexibility) was of the same order as reported for the Eysenck Personality Inventory (Harrison & McLaughlin, 1969). These measuring devices also satisfied the Campbell & Fiske requirements for discriminant validity as in every case the convergent validities exceeded the corresponding different trait — same (and different) method correlations, and a similar pattern of intercorrelations between measurements of different traits by the same method was found for both methods. Therefore all three instruments did indeed satisfy the Campbell and Fiske requirements for construct

validity (although the relatively low correlation between the flexibility measures must cast doubt on this scale of the NEPQ).

However, there are still some important questions left unanswered. Is there a general factor (for example "adjustment" or "social desirability") underlying these instruments? Are the traits related or unrelated to each other? Is there evidence of method factors? These are some of the questions answered by the results of the confirmatory factor analysis presented in Table 2.

It is clear that models I, II, V, and (to a lesser extent) III did not adequately fit the observed data and that the best fits were provided by models IV and VI. In terms of a strict statistical fit model VI did adequately fit the data. In addition, for model VI no Heywood variables were present, and the residuals remaining in the observed-variables correlation matrix showed a good fit with the largest discrepancy never exceeding .10 in absolute magnitude. Model VI was a far superior fit than its nearest rival model IV in terms of these criteria.

Thus the confirmatory factor analysis suggested that an adequate fit to the ob-

TABLE 1
The Multitrait-Multimethod Matrix Obtained
(decimal points omitted)

	Questionnaires					Rating scales			
	Traits	A	B	C	D	A	B	C	D
1. Questionnaires									
A. self-esteem									
B. extraversion		30							
C. anxiety		-28	-36						
D. flexibility		06	15	-09					
2. Rating Scales									
A. self-esteem		53	32	-38	-02				
B. extraversion		49	61	-22	08	35			
C. anxiety		-35	-26	60	-02	-37	-25		
D. flexibility		05	06	-11	-21	-08	-09	-09	

Note: — indicates convergent validities.

served data was provided by a model of two uncorrelated method factors and four correlated trait factors. It therefore confirmed the conclusions based on the Campbell and Fiske criteria discussed earlier, in generally supporting the convergent and discriminant validities of the Watkins (1978) and Fitzgerald and Cole (1976) measuring instruments. However, this further analysis has provided a much more rigorous test of the adequacy of these instruments than that possible from the Campbell and Fiske criteria alone. By separating out the influence of trait and method factors evidence was found both of questionnaire and rating scale factors which are uncorrelated and also of correlated trait factors. Thus significant additional information about the structure underlying the obtained MTMM matrix was provided by this method of analysis. It is to be hoped that future investigators of the construct validity of psychological instruments will appreciate the advantages of the confirmatory factor analytic approach.

APPENDIX

Descriptions and Rating Scales for NEPQ Variables

- (a) The typical extravert is sociable, likes parties, has many friends, needs to have people to talk to, and does not like reading or studying

by himself. He craves excitement, takes chances, often sticks his neck out, acts on the spur of the moment and is generally an impulsive individual. He is fond of practical jokes, always has a ready answer, and generally likes change; he is carefree, easy-going, optimistic, and likes to 'laugh and be merry'. He prefers to keep moving and doing things, tends to be aggressive and lose his temper quickly; altogether his feelings are not kept under tight control, and he is not always a reliable person. The typical introvert is a quiet, retiring sort of person, introspective, fond of books rather than people; he is reserved and distant except to intimate friends. He tends to plan ahead, 'looks before he leaps', and distrusts the impulse of the moment. He does not like excitement, takes matters of everyday life with proper seriousness, and likes a well-ordered mode of life. He keeps his feelings under close control, seldom behaves in an aggressive manner, and does not lose his temper easily. He is reliable, somewhat pessimistic, and places great value on ethical standards.

(from Eysenck & Eysenck, 1964)

Please rate yourself on the degree to which you are introverted or extraverted using the following scale.

introverted Co
0 1 2 3 4 extr

- (b) An anxious person is or could be characterized as a someone who worries a good deal about his grades, tests, his personal problems. A person who is low on anxiety is someone for whom nothing seems to bother; a person who doesn't worry much is easily upset and would be generally considered a high anxiety person.

Please rate yourself on the amount of anxiety you feel using the following scale.

low anxiety high
0 1 2 3 4

- (c) A highly flexible person is a person for whom the existence of a different set of customs, values and approaches to life which differ from his own is not a problem. A person who is low on flexibility tends to maintain narrow circles and not to consider or tolerate people with different values and life styles different from his own.

Please rate yourself on the degree to which you are flexible using the following scale.

low flexibility high flex
0 1 2 3 4

TABLE 2

Descriptions of Models Tested and Indices of Factor Model Adequacy

Model	No. and type of hypothesized factors	Indices of model adequacy				
		χ^2	df	z	No. of residuals > .10	No. of Heywood cases
I	2 methods factors	391.11	20	21.72	12	0
II	1 general, 2 method factors	133.36	12	11.54	6	1
III	4 trait factors (correlated)	63.82	6	6.10	2	0
IV	1 general, 4 trait factors (correlated)	20.13	2	4.61	1	1
V	2 method, 4 trait factors (all uncorrelated)	166.44	12	13.45	13	0
VI	2 method (uncorrelated) 4 trait (correlated) factors	16.23	6	2.38	0	0

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self. He craves excitement, chances, often sticks his neck out on the spur of the moment and is generally an impulsive dual. He is fond of practical jokes, always has a ready answer, generally likes change; he is easy-going, optimistic, likes to 'laugh and be merry', prefers to keep moving and things, tends to be aggressive, loses his temper quickly; other his feelings are not kept tight control, and he is not a reliable person. The introvert is a quiet, retiring sort of person, introspective, fond of rather than people; he is reserved and distant except to intimates. He tends to plan, 'looks before he leaps', and lacks the impulse of the moment. He does not like excitement, matters of everyday life with seriousness, and likes a ordered mode of life. He keeps his feelings under close control, seldom behaves in an aggressive manner, and does not lose temper easily. He is reliable, somewhat pessimistic, and places value on ethical standards. (Eysenck & Eysenck, 1964)

Please rate yourself on the degree to which you are introverted or extraverted using the following scale.

introverted extraverted
0 1 2 3 4 5

- (b) An anxious person is one who could be characterized as a worrier; someone who worries a good deal about his grades, tests, his job, and personal problems. A person who is low on anxiety is someone that nothing seems to bother; a person who doesn't worry much, isn't easily upset and would not be generally considered a nervous person.

Please rate yourself on the amount of anxiety you feel using the following scale.

low anxiety high anxiety
0 1 2 3 4 5

- (c) A highly flexible person is aware of the existence of a range of customs, values and approaches to life which differ from his own and is tolerant of them. A person with low flexibility tends to move in narrow circles and not to consider or tolerate people with customs, values and life styles different to his own.

Please rate yourself on the degree to which you are flexible using the following scale.

low flexibility high flexibility
0 1 2 3 4 5

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Factor Model Adequacy

Indices of model adequacy

df	z	No. of residuals > .10	No. of Heywood cases
20	21.72	12	0
12	11.54	6	1
6	6.10	2	0
2	4.61	1	1
12	13.45	13	0
6	2.38	0	0

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THE EFFECTS OF ENVIRONMENTAL PLEASANTNESS ON HELPING BEHAVIOUR

James Cook

Pedestrians in four different field settings (a pleasant environment; a simple, pleasant environment; a complex, pleasant environment; and a complex, unpleasant environment) were asked for help in finding an address. The results showed that people were more helpful in the pleasant environments than in the unpleasant environments. However, females were more helpful in the simple environments than in the complex environments. The results are discussed in terms of environmental complexity and density.

A number of recent studies have investigated the effects of the physical and social environment on helping behaviour. Some of these studies have compared rates of helping in urban and rural environments (Korte & Milgram, 1975; Merrens, 1973; Milgram, 1974). While the results have not always been consistent, there does seem to be a general trend for higher rates of helping to occur in rural than in urban environments (Korte, 1978). Studies by Milgram and McCauley (1977) in the United States and by Amato (in press) in Australia have also indicated that urbanites are less likely to return a lost object or return a friendly greeting to a stranger than are people in rural areas. Most explanations for these phenomena refer to cognitive overload theory. First put forward by Ogburn (1950), this theory has more recently been articulated by Milgram (1974) and further refined by Cohen (1977). Briefly, cognitive overload theory

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FACULTY AND STUDENT ORIENTATIONS TO TERTIARY EDUCATION: A CASE STUDY OF A FILIPINO UNIVERSITY

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ABSTRACT

This paper compares the attitudes towards the methods and purposes of tertiary education of 104 faculty and 240 students at a Filipino university. Some major areas of disagreement were found but the degree of congruence showed little relationship to performance in tertiary examinations. The implications of these findings are discussed and the Filipino results are contrasted with the results of US and Australian investigations.

Introduction

The Philippines like most other third world countries has placed great emphasis on the role of education in the development of its human resources. Thanks in large part to the aid given by earlier U.S. administrations, the Philippines has been quite successful in its quest for national literacy (estimated at 83.4%, second only to Japan in the Asian region; Overseas Employment Development Board, 1978) and universal schooling (it is estimated that 98% of 7-12 year old Filipinos will attend elementary school in the 1980s; National Economic Development Authority (NEDA), 1976). Tertiary education is seen as the only realistic means of social and economic advancement and most Filipino parents, regardless of their own educational attainment, are prepared to suffer personal hardships in order to send their children to college (Licuanan, 1979). Consequently the Philippines government has placed great store in the tertiary sector and has achieved one of the highest rates of college education attendance per population

size in the world (Marcos, 1977). Thus UNESCO reported that there were 997 tertiary institutions in the Philippines and it is estimated that 20% of 17-21 year olds will attend college in the 1980s (NEDA, 1976).

From data such as those presented above the outside observer could easily come to the conclusion that the Philippines has developed a very adequate education system. Yet recent years have seen growing concern that Filipino institutions of higher education were admitting too many students who lacked the ability necessary for college work and who subsequently dropped out or entered occupational fields which were already overcrowded (Dohm, 1976). This perceived wastage of manpower resources led to the development of the National College Entrance Examination (NCEE), first administered in 1973. It was hoped that requiring all school leavers wishing to embark on tertiary education to demonstrate their capability in the NCEE would lead to an upgrading of the quality of college students. Unfortunately recent research has questioned the value of the NCEE as a predictor of tertiary achievement (Watkins and Astilla, 1980).

This paper examines another possible explanation of the apparent failure of Filipino universities to fulfill their potential. U.S. research has suggested that the relationship between the curricular-instructional environment of a university as perceived by its faculty and by its students may have major academic consequences (Wilson et al., 1975). Congruence of student and faculty views of the aims and methods of tertiary education have been found to be related to student satisfaction with their academic programme (Morstain, 1977a), student attrition and early transfer from college (Stark, 1975), and student evaluation of courses and instructors (Morstain, 1977b). Thus it seems important for an institution to assess the educational orientations of its faculty and students and to utilise this information.

If the predilections of faculty members and of groups of students can be matched reasonably well, diversity even in a small program can be vitalizing. And when disparate purpose or approaches do not seem capable of a satisfactory accommodation, making these disparities known can head off much frustration (Warren, 1973, p. 38).

The attitudes of Filipino faculty are perhaps especially important when one considers their conditions of employment. Although the status of college professors in the Filipino community is considerable (Voth, 1970), their salaries are low and their workloads often very demanding. These dissatisfactions are particularly evident in the privately run colleges which constitute 90% of Filipino tertiary institutions (Baumgartner, 1978). Economic stringencies have forced many of these colleges to effectively reduce their faculty's salaries while increasing their teaching load. Little opportunity or incentive is given faculty for research. In addition, the low salaries offered

have forced many faculty to take other full- or part-time employment. Thus they can enjoy the prestige of being college teachers but support their families from other sources. However, it would seem reasonable to suggest that such conditions may well colour their attitudes towards tertiary teaching.

This article attempts to assess and compare the educational orientations of faculty and students at the University of San Carlos (USC), a major private university in the central Philippines. USC enrolls over 10,000 students who are taught by about 400 faculty, 40% of whom are part-time. The investigation was restricted to faculty and students involved in the six undergraduate colleges: Arts and Sciences, Commerce, Education, Engineering, Pharmacy, and Nursing. The survey instruments utilised were two recently developed inventories, the Student Orientations Survey (SOS) (Morstain, 1973) and its counterpart, the Faculty Orientations Survey (FOS) (Morstain and Smart, 1978). These questionnaires assess attitudes about the purposes of a college education; preferences for different modes of learning; views on student and faculty roles in decision making related to the instructional process. The advantages of these inventories is that they directly assess faculty and student views about tertiary education rather than try to infer such opinions from personality measures or demographic variables which have been commonly used in this area. As the Filipino educational system is based on that of the U.S. the questions in this inventory were relevant to the Filipino situation.

Amongst the issues raised in this article are the following:

How do these Filipino lecturers perceive the aims and methods of tertiary education?

Do their views differ according to subject area and whether they are part- or full-time staff?

Do their views differ markedly from those of their students and is there a relationship between congruity in views and academic performance?

Do college faculty and students of a developing country such as the Philippines perceive tertiary education in a different light to their American and Australian counterparts?

A limited study such as this cannot, of course, claim to answer such questions definitively but at least it can throw some interesting light on these topics.

The Instruments

The SOS is an attitudinal instrument which has been used at over 45 U.S. colleges and contains eighty items each to be answered on 4-point Likert-type scales (from 1 = strongly disagree to 4 = strongly agree). Factor analysis of the SOS has shown that the items cluster into ten scales with eight items per scale, ranging in internal reliability from 0.70 to 0.88 (coefficient alpha). Only the six SOS scales directly related to the aims and teaching methods of tertiary education are considered in this paper. Two scales relate to each of three broad educational dimensions as outlined below.

Three of these scales (Achievement, Assignment Learning, and Assessment) are interpreted as representing a general "preparatory" orientation to college — in terms of acquiring useful knowledge, skills, vocations, and social roles — while the other three scales (Inquiry, Independent Study and Interaction) are related to a general "exploratory" orientation to college — that is, for the opportunities it affords for exploring one's interests, ideas, and personal identity.

Brief descriptions of these scales are presented below:

Achievement (Ach): taps a practical, vocational-oriented outlook regarding the purpose of education, a view that gauges various aspects

TABLE I

Educational Dimensions Tapped by Scales of Orientation Inventories

Preparatory SOS/FOS scales		Exploratory SOS/FOS scales
Achievement (Ach)	1. Purpose (attitudes regarding the purpose(s) of a college or university education)	Inquiry (Inq)
Assignment Learning (AL)	2. Process (preference for different modes of teaching and learning)	Independent Study (IS)
Assessment (As)	3. Power (attitudes regarding decision- making and student-faculty roles)	Interaction (Int)

of the college experience in terms of their future usefulness.

Assignment Learning (AL): relates to a preference for structured teaching-learning arrangements that emphasise formal courses with specific, clear-cut assignments.

Assessment (As): relates to student-staff power relationships that emphasise the importance of formal evaluations by staff of student work; grades are valued because they provide a measure of a student's abilities as well as some incentive for using those abilities.

Inquiry (Inq): stresses the value of studying the relationships between various fields, and the view that learning is valuable for its own sake irrespective of vocational concerns; learning how to learn is also important to high scorers.

Independent Study (IS): taps a preference for informal, less structured courses in which students set their own goals and standards and pursue their own interests with faculty supervision.

Interaction (Int): reflects a desire that faculty and students share in the planning of courses, programmes, and academic requirements.

The FOS scales are composed of the same items as found in the corresponding SOS scales but are worded in such a way that faculty respond from their point of view. A pilot study indicated that no changes in wording of FOS and SOS items were required to make them easily understood by the Filipino respondents.

Survey Results and Discussion

FILIPINO FACULTY

The FOS was completed by 104 faculty, representative of all six USC undergraduate colleges and part/full-time teachers. The means and standard deviations of the obtained FOS scale scores are shown in Table II. It should be remembered that the possible range of scores on each of these summated scales is from 8 to 32 and a score of 20 represents the mid-point of the scale. Scores above 20 then tend to support the views represented in the scales described above while scores below 20 tend to disagree with these opinions. Thus the majority of USC staff tended to agree with the views on all scales except Interaction with which they were marginally in disagreement.

The views of these Filipino faculty can be better understood by examination of their responses to individual inventory items discussed below:

TABLE II

Means, Standard Deviations, and Significance of F Tests for USC Faculty and Student Orientation Scores

Orientation scale	Faculty (N=104)	High achieving students (N=44)	Average achieving students (N=160)	Low achieving students (N=36)
Achievement $\bar{X}$	24.35	22.00	22.36	21.89**
S.D.	2.90	2.18	2.38	1.55
Assignment Learning $\bar{X}$	24.96	22.88	22.38	22.00**
S.D.	2.18	2.17	2.16	2.11
Assessment $\bar{X}$	22.87	23.50	23.16	23.22
S.D.	2.95	1.95	2.34	1.85
Inquiry $\bar{X}$	24.54	23.59	23.06	24.14**
S.D.	2.90	2.74	2.76	3.14
Independent Study $\bar{X}$	22.53	24.59	24.84	23.44**
S.D.	2.60	2.66	2.72	2.50
Interaction $\bar{X}$	19.52	24.05	23.17	23.36**
S.D.	2.71	2.49	2.91	2.47

**Indicates F test is significant at 0.01 level

Achievement Scale: The desire for tertiary education to be vocationally oriented that one would anticipate in a developing country was reflected in the responses to this scale. Thus the great majority of faculty agreed that students should study as much as possible in order to learn a great deal about their major or career field (99%); that a high grade point average is worth the hard work (95%) and that more college courses should be geared to the kind of job a student wants after college (91%). They also tended to agree that there is nothing like the mastery of particular skills in college to assure students of a rewarding career (84%); that students should decide early on a college major in order to concentrate on taking the courses needed to complete requirements (81%) and that students should be primarily interested in a specialised area of learning that relates directly to their intended career (77%). However, that they were not convinced of the "degree factor" view of university is clear as 62% felt that obtaining a degree should be one of the least important reasons for going to college while only 58% considered that learning to make a good living is sufficient reason for attending college.

Assignment Learning: The Filipino faculty strongly expressed preference for clearly structured, highly organised course presentations. Thus

they were in agreement that generally speaking students learn best when a subject is presented in a neat, orderly sequence (99%); that students do their best work when they know what they are supposed to do (99%); that students learn best when lectures closely follow the assigned readings (93%); that they usually give explicit assignments and instructions in the courses they teach (92%); that a student's academic programme is best organised into formal courses, with regular class assignments and examinations (91%) and that college students need a lot of academic guidance so that they get started on the right foot (89%). They were less convinced that completing course assignments and doing the required readings is the best way for students to learn (75% in agreement) while only 38% felt that lectures are the best way for students to learn because they pinpoint what is important to know.

Assessment: Strong preference (96%) was shown for courses where a number of different grades can be awarded rather than just pass or fail. USC faculty also valued grades for their informational and motivational properties — 97% agreeing that grades are helpful because they let students know where they stand, 81% agreeing both that without grades students would find it hard to assess their intellectual abilities and that if there were no pressure on students to get good grades they might slack off in their courses. Presumably it was considerations such as these that lead only 17% to agree that in the ideal university there would be no grades. They seemed less convinced of the validity of examinations as a measure of learning. While 68% agreed that a grade is a pretty good indication of what a student has got out of a course, the majority (72%) claimed that final examinations are not a very adequate measure of the learning which has taken place in a course. Disagreement (69%) was also expressed for the view that teachers are the only ones who should critically judge a student's work.

Inquiry: The great majority of faculty (96%) agreed that students should be encouraged both to consider many viewpoints and to study a given theory or "new" discovery and consider what implications it may have for the future. Strong support was also found for the following points of view: that students should be encouraged to discuss various philosophical and theoretical issues with each other and with their lecturer (91%); that when students come across a subject that is interesting to them, they should take the time to follow it up at great length (89%); that the main reason students should be in college is to acquire broad insight into the nature of various fields and ideas (83%); and that students should spend more time studying the relationships between various disciplines and fields, rather than learning many facts about just one area (82%). Slightly less support was expressed for the views that students should be expected to start with a topic and dig into every conceivable phase or aspect of that

topic (77%) and that students should be encouraged to spend a lot of time just thinking about how things they have learned go together (68%).

Independent Study: Support was expressed for the views that courses should be offered where students can do independent projects and original research (96%), that independent study experiences involving off-campus study should be arranged (85%); that a teacher who wants students to do their best should allow them to pursue their own interests (78%); and that an academic programme is best carried out through an independent study programme with some faculty supervision. However, the faculty clearly felt that it was necessary to limit the student's independence. This was reflected in both the only 40% supporting individually tailored "learning contracts" with a faculty member rather than a regular course and the 46% of faculty showing preference for course assignments where topic and approach is left up to the student.

Interaction: The USC faculty were happy to allow students some say in decision-making. Thus they supported students participating significantly in determining the nature and format of their academic programme (78%); in proposing and developing courses (76%) and in establishing degree and graduation requirements (70%). They also tended to agree that students have the interest and ability to plan undergraduate programmes in co-operation with faculty. However, it was obvious that they considered that the faculty should have the final say. Thus only 39% felt that faculty and students should be equals in designing courses. While 89% agreed faculty should determine how courses are to be organised; 88% considered the faculty is more competent than the student to direct the students' course of study and 65% felt that faculty should decide what subjects are important to know.

Summarising these results it would appear that, as expected, the majority of USC faculty considered tertiary education should be in large part vocationally oriented. Yet they were somewhat reluctant to agree that the only goal of a college student should be to obtain a degree which would enable him or her to enter a profitable occupation. Learning for its own sake was still important to them. They also were generally in favour of highly structured formally evaluated courses. On the other hand, many did question the validity of grades as an indicator of learning while strong support was given for the student having opportunities for independent study. The Filipino lecturers were also willing to allow their students a limited voice in decision-making.

No significant differences were found between the USC faculty orientation scale means in the different colleges or between part- and full-time teachers. These findings are contrary to the findings of surveys of U.S. university students' and teachers' perceptions of the purposes and processes of tertiary education which have demonstrated consistent differences

according to the major courses in which they are involved (Morstain, 1973; Wilson et al., 1975; Stark and Morstain, 1977). Due to this result the responses of all faculty will be combined in the remainder of this paper.

FACULTY VERSUS STUDENT VIEWS

The SOS was completed by 240 Liberal Arts and Science students in their first year at USC. These students were later classified as high (N=44), average (N=160), or low (N=36) achievers according to their performance in the first year examinations. Table II shows the mean responses of these student groups to the SOS scales. Analysis of variance indicated that the null hypotheses that no significant ($p < 0.01$) differences existed between

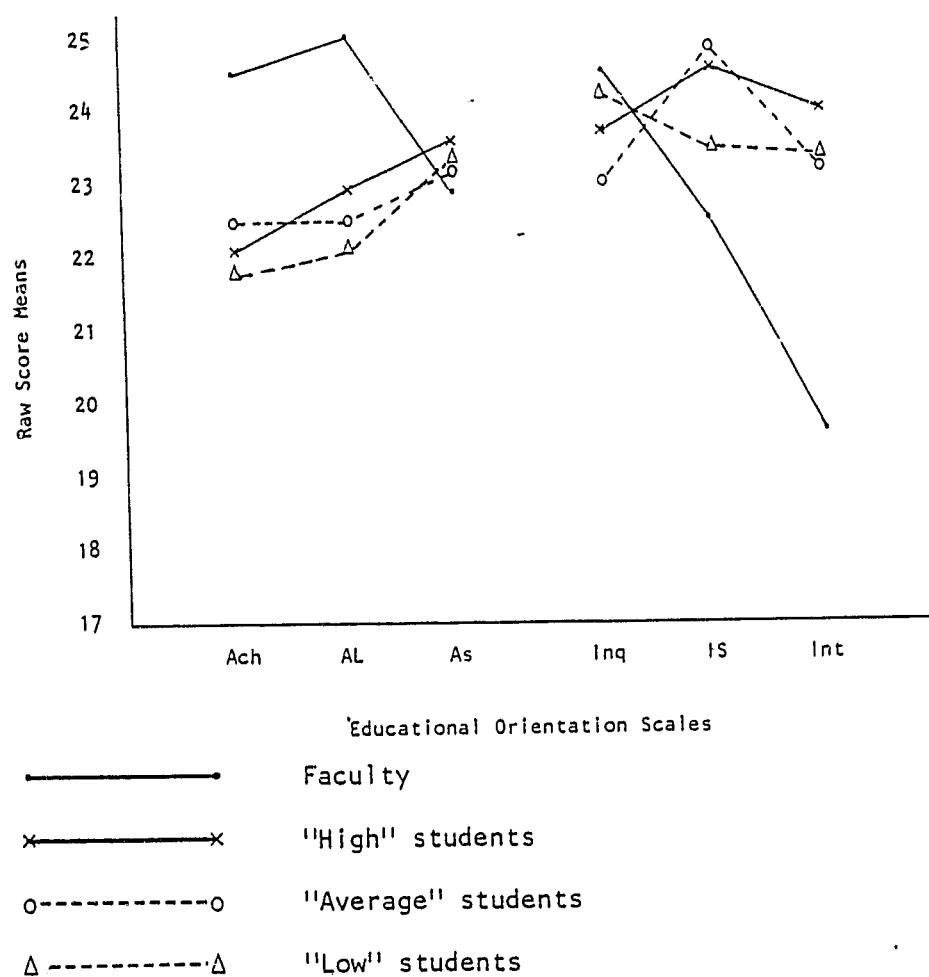


Fig. 1 Orientation profile for USC staff and student groups

the means of the three student groups and the faculty had to be rejected on all but the Assessment scale. Scheffe analysis showed that significant ($p < 0.01$) differences were found between the following pairs of means:

Achievement Scale: Faculty v "high" students; faculty v "average" students; faculty v "low" students; "average" v "low" students;
 Assignment Learning Scale: Faculty v "high" students; faculty v "average" students; faculty v "low" students; "high" v "average" students; "high" v "low" students;
 Inquiry Scale: Faculty v "high" students; faculty v "average" students; "high" v "average" students; "high" v "low" students; "average" v "low" students;
 Independent Study Scale: Faculty v "high" students; faculty v "average" students; faculty v "low" students; "high" v "low" students; "average" v "low" students;
 Interaction Scale: Faculty v "high" students; faculty v "average" students; faculty v "low" students; "high" v "average" students; "high" v "low" students.

The relative views of the faculty and student groups are also illustrated in Fig. 1. It is clear that the major differences found were between the views of faculty and students, irrespective of achievement level. The faculty scored markedly higher than all three student groups on the Achievement and Assignment Learning Scales and much lower in the Independent Study and Interaction Scales. The faculty also scored slightly higher than both the high and average achieving student groups on the Inquiry Scale while only on the Assessment Scale was there little difference between the views of the USC teachers and their students. Within the student groups the high achievers scored more highly than both the other student groups on the Assignment Learning and Interaction Scales. The low achievers' means on the other hand were significantly below the other two student groups on the Independent Study Scale but above on the Inquiry Scale. The "low" group was also significantly above the "average" group on the Achievement Scale.

To sum up it would appear that there was a considerable divergence in the views of the USC faculty and their students on all topics raised but assessment — an issue on which the majority of both approved of formally evaluated, grade oriented courses. The teachers tended to place more value than did the students on the acquisition of vocationally useful skills by means of a highly structured learning environment. The students were somewhat more disposed than their teachers to less structured courses in which students pursue their own interests and were more likely to advocate students having a greater say in the planning of courses, programmes, and degree requirements. On the other hand the faculty tended to be more

enquiry oriented, that is stressing the value of learning for its own sake irrespective of vocational relevance. In general the staff, in Morstain's terminology, tended to be more "preparatory" and less "exploratory" oriented than the students.

There was little evidence obtained in support of the hypothesis that there is a relationship between degree of congruence between the educational orientations of faculty and students and the academic performance of the students. However, there was some evidence that the more successful students were more disposed towards highly structured learning environments but desired more of a say in decision-making than their less successful peers. The weaker performers academically were less in favour of independent study opportunities and were more likely to advocate learning for its own sake rather than for vocational purposes.

COMPARISONS WITH U.S. AND AUSTRALIAN DATA

The FOS and SOS have been used in a number of investigations with U.S. college faculty and students (Morstain, 1973; Stark, 1975; Morstain and Smart, 1978; Morstain 1977a and 1977b) and more recently in a study with their counterparts at an Australian university (Watkins and Morstain, 1980). While there are major problems trying to validly relate this U.S. and Australian data with the results of the Filipino research, the writers would argue that the present comparisons are of sufficient interest to warrant an informal inspection. Because of the speculative nature of this approach no statistical tests were carried out on the data which is summarised in Table III.

TABLE III

Means of Filipino, U.S. and Australian Faculty and Student Responses to Orientation Inventories

Orientation Scales	Faculty			Students		
	Filipino (N=104)	U.S. (N=424)	Australian (N=151)	Filipino (N=240)	U.S. (N=3,806)	Australian (N=513)
Achievement	24.35	19.38	19.69	22.22	23.29	22.62
Assignment Learning	24.96	22.30	23.00	22.41	23.33	23.44
Assessment	22.87	19.82	22.64	23.23	18.58	21.28
Inquiry	24.54	25.45	23.49	23.32	23.29	22.00
Independent Study	22.53	21.65	19.82	24.58	22.60	20.54
Interaction	19.52	19.83	17.64	23.36	23.22	20.35

Undoubtedly the most striking aspect of this Table is the far greater emphasis placed on the vocational aspects of tertiary education by the Filipino compared with the Australian and U.S. faculty. This is, of course, what one would expect in a developing country in which tertiary education is seen as a pragmatic necessity for nation building. However, the Filipino students are, if anything, slightly less vocationally oriented than their U.S. and Australian counterparts. Like their U.S. peers, the Filipino faculty and students appear much more favourably disposed towards independent study programmes and allowing students a role in decision-making than do the Australians. The U.S. academics and their students are somewhat opposed to formal grading procedures unlike the Australian and Filipino staff.

Conclusions

This study has revealed some major disagreements between USC faculty and students in the areas of the role of students in decision-making, the vocational relevance of courses, the importance of learning for its own sake, the value of independent study and the need for highly structured courses. If the views of a wider sampling of USC students and staff were obtained, there may well be implications for programme development and course advising. For example, it may be possible to match students with teaching staff who hold similar educational preferences. There would also be the potential to identify students who, on the basis of their educational preferences, might be expected to be dissatisfied with their programme and to provide counselling support to help them resolve their problems. An understanding of the educational philosophies of the teaching staff of various Filipino tertiary institutions and disciplines would also be useful information to enable intending students to choose the institution and course which would most suit their own preferences. There are also possible practical implications of this kind of information for the teaching staff. Should staff with different views be expected to work together? Which staff have so little confidence in the abilities of students in designing their own projects that they should not be asked to participate in self-directed programmes? Are interdisciplinary courses possible between staff from subject areas with widely differing educational orientations? Knowledge of student preferences would also be useful to staff debating teaching and curricula issues (see also Stark and Morstain, 1977 for further discussion of applications of this type of information).

The finding of little relationship between the degree of congruity of the student and faculty views of tertiary education and the students' performance in tertiary examinations while disappointing is not totally

unexpected. On the one hand it can be argued that a limited amount of diversity in views is stimulating and may have a beneficial effect. On the other hand, this study has not matched students' views with those of their own lecturers. Such an analysis may well be necessary to uncover any relationship with achievement.

This research has indicated some interesting possible differences between the views of Filipino, U.S. and Australian faculty and students. However, far more intensive investigation is required before it is possible to make valid cross-cultural comparisons. It is hoped that this paper may serve as a spur for future research in this area.

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TESTING THE VALIDITY OF A MODEL OF STUDENT PROGRESS AT AN AUSTRALIAN UNIVERSITY

DAVID WATKINS
Australian National University

An extension of Tinto's model of the college dropout process was proposed and tested with a sample of 332 freshmen at an Australian university. The college entrance examination was found to be a relatively valid predictor of whether students will pass, achieve honours, or strike trouble in the form of failure or withdrawal. Non-intellective factors were found to be lacking as valid predictors of academic progress. None of the potential predictors was effective in differentiating between failure and withdrawal outcomes. This study casts doubts on the applicability of Tinto's model to tertiary outcomes other than withdrawal.

TINTO (1975) developed a theoretical model of the college dropout phenomenon which emphasises the longitudinal process of interactions between the students' characteristics and the academic and social systems of the institution. He proposed that the degree of integration of the individual student into those systems continually modifies his goals and institutional commitments in ways which lead to persistence or to varying forms of dropout. Recent empirical investigations have tended to support the applicability of this model to the withdrawal process in United States colleges (Pascarella and Terenzini, 1979; Munro, 1981).

In the American studies just cited, freshman grade point average was included as a major component of academic integration, as Tinto suggested. In the present research Tinto's model is modified to try to account for the academic progress of freshmen at an Australian university. It is proposed that the background characteristics of students and their later integration (in terms of salience and

satisfaction) into the college academic and social systems influence their institutional and goal commitment, which in turn determines whether the students voluntarily withdraw during their first year, or whether they sit for their end-of-year examinations, and what the quality of their academic performance will be. The purpose of this paper was to report upon an empirical investigation of the validity of this model in the prediction of academic progress.

Method

Subjects

The subjects were 332 first-year internal students at the University of New England (UNE). Mail questionnaires were distributed half-way through these students' first year at UNE; subsequently 25 members of this sample of 332 students voluntarily withdrew before the annual examinations, whereas 46, 178, and 83 performed at honours, pass, or fail level respectively. These percentages are representative of the total UNE freshman population at that time.

Measures

The following three classifications of variables were proposed to account for academic progress.

1. *Entry characteristics*: sex; Higher School Certificate (HSC) aggregate; level of intrinsic motivation on entry to UNE; importance of family pressure; and importance of a scholarship offer, as reasons for coming to UNE.
2. *Academic integration*: importance of academic life; satisfaction with academic life; course difficulty (expectation versus reality).
3. *Social integration*: importance of social life; satisfaction with social life.

All but the first two of these 10 variables listed within the classifications were factor scores derived from analysis of the original 60 questionnaire items (Watkins, 1978).

Results

When multiple discriminant analysis was used to determine the manner and extent to which the 10 potential predictors could differentiate between the four student outcome categories, two of the three possible roots were statistically significant. These first two

roots accounted for 86.2% and 11.0% of the variance, respectively.

On the first discriminant axis, honours standard students were widely separated from the pass students, who in turn were separated from the failed and withdrawn students. The latter two groups were quite close together. The HSC aggregates correlated 0.86 with the first discriminant function. This correlation indicated that performance at that examination is the major determinant of this group differentiation. Finding the course more difficult than expected and the importance of social life were also significantly related to the group separation.

The second discriminant axis showed a very slight but quite different separation among the categories. In this instance, honours and failed students were close together, with the withdrawn group being the next closest. The two factors most highly correlated with the second discriminant function were two commitment variables: coming to university, and attending UNE in particular, *not* because of a scholarship offer or because of family pressure.

Multivariate analysis of variance showed that there was a significant multivariate difference between the four student outcome categories with respect to the group means of the 10 predictor variables (Wilks' Lambda = 0.60; $df = 30,937$; $F = 5.91$; $p < .001$). The generalised correlation ratio η^2 , which was found to be 0.63, indicated that about 40% of the criterion variance was explainable by the predictor variance.

The Scheffé multiple comparison test showed that significant differences ($p < .05$) were found between the variable means of the following student categories:

1. *HSC aggregate*: withdrawn and pass; withdrawn and honours; fail and pass; fail and honours; pass and honours.
2. *Family pressure*: fail and pass; fail and honours.
3. *Scholarship*: withdrawn and pass; withdrawn and honours; fail and pass; fail and honours.
4. *Course difficulty*: withdrawn and pass; withdrawn and honours; fail and pass; fail and honours; pass and honours.
5. *Social importance*: withdrawn and honours; fail and honours; pass and honours.

It was clear that those students who achieved honours level passes did have a much higher mean HSC aggregate (589.5) than did the pass students (mean = 518.9). The pass students, in turn, had performed, on average, at a higher level than had the failed and withdrawn students (whose HSC mean aggregates were 477.7 and 472.1 respectively). There was no significant difference between the mean HSC aggregates of the failed and withdrawn groups. Relative

to the other students, the honours students also considered their tertiary courses to be easier than they had expected. The honours level students were also less likely to consider their social life to be important than were the other groups.

There was some evidence that the level of extrinsic motivation had some degree of relationship to progress at UNE. The students who failed were more likely to have been influenced to enter UNE by family pressure than those who passed or achieved honours level. Withdrawn and failed students were much less likely than pass and honours students to have come to UNE mainly because they had been offered a scholarship specifically tenable there.

Conclusions

The major finding of this study was that the HSC, the major public college entrance examination, was a reasonably valid predictor of whether students will pass, achieve honours, or strike trouble in the form of failure or withdrawal in their first year at this Australian university. Non-intellective factors appeared to be relatively invalid predictors of academic progress. Neither the HSC nor the non-intellective variables served to distinguish between failure and withdrawal outcomes. There was no evidence that lack of integration into the social and academic aspects of university was related to withdrawal. Extrinsic motivators, such as family pressure and the offer of a scholarship, appeared to bear a significant but minor relationship to progress at UNE.

Thus little support was provided for the modification proposed in this study of the Tinto model of academic progress. This research, of course, can in no way be considered as disconfirming the Tinto model of the dropout process; but it may cast doubt on its applicability to other tertiary outcomes.

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FACTORS INFLUENCING THE STUDY METHODS OF AUSTRALIAN TERTIARY STUDENTS

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ABSTRACT

Two studies are reported which examine factors influencing the approach to study of Australian tertiary students from a traditional, psychometric perspective (supported by student comments). Study I, with 199 first year students as subjects, indicates that being interested in the subject, seeking an honours grade, and being assessed by essay rather than multiple choice examinations are factors which independently encourage the student to adopt a deep level approach to study. Student comments suggest that the lecturer's enthusiasm and teaching ability has a significant impact on student interest level. Lack of time for study is another factor seen as leading to a surface level approach. Tertiary study was often seen as requiring a deeper approach and harder work. Comments of mature age entrants showed that in general they had thought more about the learning process and had not wandered into tertiary education like some of the recent school leavers. Study II was a conceptual replication of the work of Ramsden and Entwistle, which appeared in the 1981 volume of the *British Journal of Educational Psychology*. The responses of 292 senior year students indicated that students adopting a deep level approach to study were more likely to perceive their courses as encouraging independence in both attitudes and approach to learning and as being challenging but not over burdening. These results were discussed in terms of the need for students and lecturers to think more about the learning process itself and the need for more to be done to assist the transition to tertiary learning of recent school leavers.

Introduction

Tertiary teachers are fond of claiming that a major purpose of tertiary education is the development of critical thinking and of the capacity to understand (Robbins, 1966; Watkins and Morstain, 1980). Therefore it is somewhat surprising that research has indicated that good grades can be obtained at this level of education either by students who have gained insight

into the subject or by students who have worked hard and relied on rote learning of the course content (Biggs, 1973).

Recent research has indicated some aspects of the context of learning which are likely to encourage students to adopt a deep level approach to study (with an emphasis on understanding) rather than a surface level approach (with an emphasis on memorisation). Such factors include the students' level of interest in the task (Fransson, 1977; Laurillard, 1979; Ramsden, 1979; Säljö, 1979); what they hope to get out of it (Laurillard, 1979); their background knowledge of the field (Ramsden, 1979); and the type of assessment (Biggs, 1973; Säljö, 1979; Thomas and Bain, 1981). Such findings have led researchers like Säljö, Marton, Elton, and Laurillard to emphasise the variability of students' approaches to study, and to claim that traditional psychometric methods may be inappropriate to investigate this phenomenon.

However, other researchers, using highly structured inventories and statistical techniques, have been able to distinguish characteristic approaches to study which imply at least some degree of consistency on the students' behalf (Biggs, 1976; Ramsden and Entwistle, 1981; Watkins and Hattie, 1981). These researchers have also found a consistent tendency for a deep level approach to be adopted by Arts rather than Science students. To what extent this finding is due to cognitive style dispositions of students entering these courses (Witkin et al., 1977) or to a rational decision to adopt a particular style of learning given the nature and context of the academic task has yet to be determined. There is also evidence of differences in approach to study according to age (Watkins and Hattie, 1981; Watkins, 1982) and sex (Biggs, 1976; Watkins and Hattie, 1981; Watkins, 1982).

The writer would agree with Ramsden and Entwistle (1981) that it is necessary to accommodate both consistency and variability in any adequate model of student learning. However, several studies have now shown that it is possible to explore these dual tendencies through appropriate psychometric methods (preferably supported by interview data to clarify the meaning of the quantitative data). Thus the research of Ramsden and Entwistle indicates that students' perceptions of the teaching and assessment contexts of an academic department influence their approaches to study. Thomas and Bain (1981) have used a brief questionnaire to explore the learning strategies adopted by the same students across several courses and assessment tasks.

The two studies reported in this paper are also designed to further explore the consistency/variability question, again from a basically traditional, quantitative perspective. The purpose of the first study was twofold: (1) to explore in a systematic fashion the relative influence of *interest*, *grade sought*, and *assessment method* on the depth of processing a student would adopt; and (2) to investigate whether the course area, age, and sex differences discussed above are still related to depth of processing when factors

such as interest, grade sought, and type of assessment are equated. The students were also asked to comment on how they normally went about their study, the factors which influenced their approach, and whether their approach had changed since coming to university. The second study was essentially a conceptual replication of Ramsden and Entwistle's (1981) research linking students' perceptions of their learning environments to the approaches to study they would adopt.

Study I

METHOD

The subjects were 199 Arts and Science students half way through their first year at the Australian National University (ANU). Each subject was presented with eight situations and asked to rate the depth of processing a student like themselves (i.e. the same age, sex, and faculty) was likely to adopt in each case, on a five-point scale from 1 = essentially surface level to 5 = essentially deep level. These situations systematically varied level of interest (really interested or not interested), grade sought (an honours grade or a pass grade), and type of assessment (essay type examination or multiple choice examination). Sex, faculty (Arts or Science), and age (over or under 21 years) information was also obtained [1].

Order effects were minimised by randomly selecting the order of presentation of questions within a page and alternating the order of presentation of the two pages.

RESULTS AND DISCUSSION

The means of the depth of processing ratings under each condition according to sex, faculty, and age are presented in Table I. As indicated by the graphical representation of the data (see Fig. 1), and verified by Multivariate Analysis of Variance, significant ($p < 0.01$) main effects were found for interest, type of assessment, and grade sought. None of the main effects of sex, faculty or age, nor any of the interactions were significant, however.

It is clear that, as expected, lack of interest was seen as the major factor encouraging a surface level approach to study. However, this study also shows that (while it may be true, as Thomas and Bain (1981) argue, that students adopting a deep level approach do better in multiple-choice tests) the very fact of setting such a test may well encourage a student to adopt a surface level study strategy. In a similar vein, while it appears to be true, as Elton and Laurillard (1979) claim, that the student's strategy depends more on interest than on marks, the results of this study indicate that striving for

TABLE I

Means of Depth of Processing Ratings Classified According to Course Area, Sex and Age

			Interested				Not interested			
			Pass		Hons		Pass		Hons	
			Essay	Multi	Essay	Multi	Essay	Multi	Essay	Multi
<i>Arts</i>										
Male	≤ 21		3.50	3.36	4.21	3.79	2.21	1.64	2.93	1.93
Female	≤ 21		3.58	3.12	4.04	3.42	1.96	1.31	2.81	1.96
Male	> 21		3.88	3.46	4.12	4.00	1.92	1.42	3.00	2.73
Female	> 21		3.67	3.11	4.05	3.40	2.02	1.56	3.05	2.31
<i>Science</i>										
Male	≤ 21		3.81	3.22	4.16	3.38	2.00	1.35	2.89	2.19
Female	≤ 21		3.89	3.33	3.89	3.56	2.06	1.61	2.50	2.00
Male	> 21		3.79	3.43	4.64	4.14	2.21	1.50	3.29	2.79
Female	> 21		4.00	3.40	4.10	3.40	2.10	1.60	2.90	1.90
Total			3.75	3.25	4.12	3.57	2.03	1.48	2.94	2.26

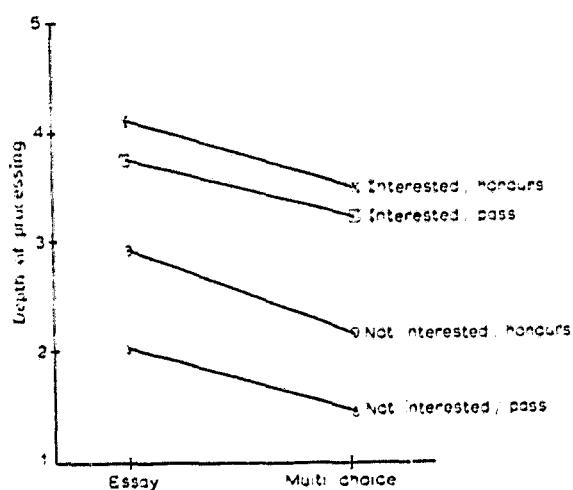


Fig. 1. Means of depth of processing ratings.

honours is seen as a not insignificant factor in choice of study method. Thus, at least for these Australian students, it may well be advisable to retain a grading system with a wider range than just pass/fail [2].

How do students normally study?

In answering this question the respondents' comments tended to focus on the way they organised their study. About two-thirds of those respondents whose replies could be categorised reported using a highly organised approach, i.e., studying consistently every night, carefully planning what they were to study, and being able to cope with the quantity of work required. Most of the remainder appeared to lack organisation; i.e., they spoke of usually leaving their work to the last minute, of being unable to use their time effectively, and having difficulty in coping with the quantity of work.

Factors influencing their approach to study

The replies to this question clearly supported the findings that interest level was the major factor in their approach to study. Being interested influenced both qualitative and quantitative aspects of studying: that is, the students commented that when they were interested in a course they were more likely to adopt a deep level approach and study harder.

Many of the respondents indicated that the lecturers'/tutors' enthusiasm and teaching ability were major determinants of their interest level:

[my approach] depends on the level of interest aroused by the lecturer . . . it is not so much the type of assessment or anything that determines my approach, rather whether the *lecturer* makes the subject interesting. (Arts, female, 21 years.)

If the subject, whether basically interesting or not, is taught badly, and there is little help from the lecturer and tutor, it is very difficult to find any interest or motivation for the subject. (Science, male, 25 years.)

The students also recognised that the assessment procedures adopted sometimes did not encourage understanding:

The fewer the assignments per semester, the more likely a deep level approach will be followed. (Science, male, 20 years.)

I may have good marks for essays but have learnt nothing. (Arts, female, 19 years.)

I study to learn and swotting for exams does not teach me anything. (Arts, male, 32 years.)

Time constraints was one influential factor mentioned by about 20 per cent of the respondents that was not included in the earlier part of the questionnaire. For the Science students the heavy workload restricted the time

they could devote to study. For the mature-age Arts students, who usually had full-time commitments elsewhere, finding the time for study was a real problem — affecting both the quantity and the quality of their study.

Changes since coming to university

Over half the respondents reported that their approach to study had changed significantly since coming to university. Once again, both qualitative and quantitative changes were reported — that is, university was found to require either a deeper approach, or harder work, or both. The following comment sums up the feelings commonly expressed by the recent school leavers:

I find myself doing more background reading on subjects, whether it be general (recommended in a lecture as back-up material), or specific (for a tute or essay). My system of dividing up time (not always successful) hasn't changed much — I did much the same thing while at school. I feel more reliant on myself to go ahead and do some research or background reading, as opposed to a school system where a teacher stood and made sure that everything was done to his/her satisfaction. In other words, individual research and independent learning, has become more important. (Arts, female, 19 years.)

The comments of the older students in this regard tended to show two main characteristics, firstly, that their outside commitments had forced them to become highly organised in their approach to study; and secondly, that they were usually studying out of interest, and valued learning for its own sake. Such students had clearly thought more about the learning process, and had not wandered into tertiary education like some of the recent school leavers. The following were typical comments of mature-age students:

I first attended university 1971–1975 as a full-time student straight from school. My attitude then was totally different — I wanted to pass, but had no real interest in striving to do my best. I used to study very much on a surface level in most cases as that left a large part of my time free for socialising, which was more important to me.

Since returning to studying this year, I feel very committed to do as well as I can, and therefore keep up to date always. (I used to work really hard for 2–3 hours when assignments etc. were due, then do virtually nothing until the next batch of assignments).

I am finding my study now interesting and enjoyable . . . I'm sure I didn't find it that when I was first at university. (Arts, female, 28 years.)

[My approach:] is changing, and is different for each unit. e.g. Philosophy I hope to notch up as a pass unit — I understand very little and apply myself only to specific areas required for assessment. I am not "involved" in the unit. Sociology to date I understand and my interest level is high — I do feel involved and willingly complete all required reading and written work. (Arts, female, 36 years.)

Study II

METHOD

The subjects were 292 ANU students enrolled in seven of the largest senior courses in the faculties of Arts, Science, and Economics. This represents a 70 per cent response, which was unusually good for a postal survey at this institution.

The subjects were asked to complete the "approaches to studying" inventory (Ramsden and Entwistle, 1981), and to describe their particular course on a five-point scale according to the eight departmental characteristics described by Ramsden and Entwistle (1981); see Table II for a listing of the inventory and departmental characteristic scales. It was emphasised to the students that they were to respond to the inventory according to the way they studied in the particular course specified, not to the way they usually studied or studied in other courses.

RESULTS AND DISCUSSION

As Ramsden and Entwistle had reported, this study also found clear differences in the students' perceptions of the different departments. In general, the Economics and (with one exception) the Science courses were perceived as being more formally taught and vocationally relevant, but less open to the views of students, and allowing less choice of ways to learn than the Arts courses.

The subjects' inventory scale scores and perceptions of their department were then related by means of canonical analysis (see Table II). It would seem that a deep approach to study (together with positive attitudes but a lack of organisation) was more likely to be reported in courses perceived as being well but informally taught; offering choice of ways to learn; open to the views of students, a heavyish workload but unclear goals and standards. On the other hand, a surface level approach (together with negative attitudes but good organisation) was more likely to be reported by students who characterised their courses as having a heavy workload; a poor quality of teaching; formal teaching methods; and not being open to the views of students.

These findings, which seem to have clear implications for tertiary teaching styles, are generally in accord with those reported by Ramsden (1979) and Ramsden and Entwistle (1981). It would seem likely that improving the quality of teaching and encouraging independence in both attitudes and approaches to learning, and challenging but not over-burdening students, may well lead students to adopt a deep level approach to study and thus help to improve, at least, the quality of what is being learnt.

TABLE II

Results of Canonical Analysis Relating "Approaches to Studying" Inventory Scales to Perceptions of Departmental Characteristics (N = 292)

	Canonical variates ¹	
	I	II
<i>Inventory scales</i>		
Deep approach	0.49	0.37
Relating ideas		-0.22
Use evidence		
Intrinsic motivation		0.35
Surface approach		-0.67
Syllabus bound		-0.21
Fear of failure		0.21
Extrinsic motivation	-0.36	
Disorganised study	0.42	-0.36
Strategic approach	-0.25	
Achievement motivation	-0.27	
Negative attitudes	-0.47	0.35
Comprehension learning		0.28
Globetrotting	0.29	
Operation learning		
Improvvidence		
<i>Departmental characteristics</i>		
Formal teaching methods	-0.28	-0.28
Clear goals and standards	-0.21	
Vocationally relevant		
Quality of teaching	0.49	0.49
Choice of ways to learn	0.25	
Openness to views of students	0.41	0.31
Heavy course workload	0.25	-0.86
Good social climate		

¹ Only canonical loadings above |0.20| are listed. The respective canonical correlations were 0.50 and 0.41 both significant at 0.01 level.

Conclusions

The results of the first study suggest that the age and course area differences in depth of processing reported in the literature may well be due to different perceptions of the context of learning of such students. Thus the finding that mature-age students are more likely to adopt a deep level approach than are school leavers may well be due to the higher interest level

of the former [3]. Additionally, this study and that of Säljö (1979) suggest that mature students are more likely to have thought about their own learning processes and thus to have considered the significance of factors such as motivation and assessment. Säljö argues that people who are aware of their learning in different respects are more likely to adopt a deep level approach in the learning experiences of their everyday life and in studying.

Study I has also shown that recent school leaver entrants to ANU often recognise that tertiary study places a great emphasis on independent study and self-motivation. Unfortunately the traditional school system all too often has poorly prepared such students for this new learning environment. It will require further research to determine if the advocacy of school leavers' deferring tertiary study, and the recent introduction of senior colleges in some areas of Australia (designed for the final two years of secondary school study) can assist in the transition to independent learning at the tertiary level.

Furthermore, Study I has confirmed the way different assessment methods can influence a student to adopt a particular approach to study. The students' comments also indicate that a heavy course workload or limited study time can force a student to utilise a superficial study strategy. This latter finding is supported by Study II, which also clearly indicates that a deep level approach is encouraged in an academic environment where the quality of teaching is high and where students are allowed freedom in their approach to learning.

How then can we try to improve student study strategies? Firstly, we can try to assist transition to university study — particularly of recent school leavers. The development of a "core curriculum" such as at Harvard is seen by some as the best way to prepare "educated men and women", while bridging courses are another common way of easing the transition to tertiary study (though the latter are usually "content" rather than "process" oriented).

It would certainly seem sensible to help new tertiary students to gradually accept greater responsibility for their study, rather than simply assume that the transition from dependence to independence has already taken place. Mathias (1981) points out that university lecturers and tutors all too frequently are unaware of this problem. If they are aware, they usually do not know how to handle this situation — some lecturers, in fact, arguing that the students' problems are not their concern (Bowden and Anwyl, 1980). Some way of quickly and accurately assessing the prospective student's current view of learning would assist the tertiary teacher to handle this situation.

Brew (1981) suggests that this transition can be aided by making an explicit aim of the usual topics of study methods teaching (essay writing, notetaking, etc.) the development of the students' awareness that tertiary study activities rely on creating, discovering, or applying underlying frameworks or structures. At the University of Essex, study methods courses designed around student-based activities and small group discussion, using

group tutors (rather than study methods experts) as learning facilitators, have been shown to develop this awareness of structure, with a consequent improvement in study strategies and student performance.

Melton (1981) analyses a number of individualised approaches to teaching according to the degree of freedom of choice each allows students and the extent to which each reflects recognised principles of learning. Perhaps using his results it would be possible to carefully select an approach to suit the needs of particular students, and thus to assist students in the transition from dependence to independence. Certainly more such comparative analyses of different teaching methods would make this suggestion more feasible.

It should be possible for all university teachers of first and second year students, once they accept their own responsibility for assisting students to learn how to learn, to develop a learning environment more conducive for this to occur. As this study has shown, students are more likely to want to try to understand what they are learning about if they perceive their teachers as enthusiastic and interested in teaching; if assessment methods are selected with a view to the level of understanding that they will evoke in the students, and if course requirements are challenging but not too much of a burden — students need time to think about the nature of the course content and their own learning processes if they are to adopt a deep level approach. Being open to the views of students and allowing them a say in the assessment and teaching process is also conducive to the development of a deep level approach to study. Unfortunately, Australian tertiary lecturers are often opposed to these latter propositions (Watkins and Morstain, 1980).

It would seem to the writer that tertiary teaching as it is presently conducted in Australia needs two changes in emphasis:

- (1) University teachers, as well as university students, have to be encouraged to think about the *processes of teaching and learning* themselves and to consider how they can assist their students to utilise a deeper level approach to their studies. How likely this is to occur given the apparent disdain of some lecturers towards the study of the education process as an intellectual pursuit and the low priority placed on teaching in the promotion system is difficult to answer.
- (2) Most Australian tertiary institutions in recent years have developed worthwhile programs to assist the transition to tertiary study of the increasing numbers of mature-age entrants. However, it may be time to consider whether *they are doing enough to meet the needs of their school leaver entrants*. The latter group's problems are usually in the areas of motivation and inappropriate learning strategies, and not so much thought seems to have been given to assisting them in these areas.

Finally, the writer would argue that the studies reported in this paper, like those of Ramsden and Entwistle (1981) and Thomas and Bain (1981) have demonstrated that traditional quantitative research methods can be successfully used to explore the variations and consistencies of the study process complex.

Notes

- 1 The writer decided to utilise this research strategy after seeing it used in several studies of factors influencing causal attribution (cf., Rogers, 1980; Frieze and Bar-Tal, 1981). The approach assumes that the subjects will respond as they would themselves if faced with the situation in question. The study reported here was described in a paper presented at the Annual Conference of the Australian Association for Research in Education, Adelaide, 1981. The writer would like to thank Dr. John Hattie for statistical advice and computational assistance.
- 2 A recent study of the educational orientations of Australian and United States lecturers and students (Watkins and Malimas, 1980) indicated the far greater support for pass/fail grades in America.
- 3 An ANU research report (Watkins, Slee and Mortimore, 1981) found that 52 per cent of school leaver entrants persisting with their courses at ANU reported motivational difficulties as against 32 per cent of other entrants.

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THE DIMENSIONALITY, ANTECEDENTS, AND STUDY METHOD CORRELATES
OF THE CAUSAL ATTRIBUTIONS OF FILIPINO CHILDREN

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SUMMARY

This study of attributions for performance in a forthcoming major examination of 261 Filipino secondary school children indicates that Weiner et al's (1971) two dimensional/four category model of causal attribution was too restrictive. However, it does lend some support to Weiner's (1979) reconceptualisation of this process. Investigation of the antecedent and study method correlates showed that both are linked to attributions in systematic ways consistent with attribution theory but differing for males and females.

A. INTRODUCTION

The study of the beliefs that individuals have about successes and failures in achievement situations has constituted a most active field of research in recent years. The impetus for this work was the formulation of an attributional model of achievement motivation by Weiner and his associates (29). They categorised attributions about achievement outcomes along two dimensions, locus of control and stability, and further suggested that individuals view such outcomes as principally due to their ability (internal-stable), effort (internal-unstable), task difficulty (external-stable), and luck (external-unstable). Weiner et al. were able to establish affective and behavioural consequences of such attributions of success and failure, e.g., more pride would be experienced if a success were ascribed to an internal rather than an external cause.

Weiner et al.'s initial model was based mainly on their own intuitions, and was supported by data from largely artificial laboratory-based achievement tasks. More recent studies have tried to identify empirically the reasons people actually use to explain successes and failures in their daily lives. The results of investigations of open-ended explanations used by students for their performances in school and college examinations (2, 10, 11), and in newspaper accounts of sporting events (17) have demonstrated that Weiner's original two-dimension, four-category model was far too restrictive. Weiner, of course, was well aware of this himself, and has been developing a taxonomy of the virtually infinite list of the conceivable causes of success and failure (27). He now claims that there are three primary dimensions of causality: stability, locus, and control. These

dimensions are linked, respectively, to expectancy changes, self-esteem related affects, and interpersonal judgements, and are further associated with other psychological effects such as depression (27, 28).

Investigations using several multivariate techniques have lent some support to Weiner's latest conceptualisation of the dimensions of causality (2, 18, 21). Ellig and Frieze (10) point out, however, that such dimensions should be conceived as continuums rather than as bi-polar. One of the major aims of this paper is to examine the validity of Weiner's present model with Filipino children.

1. Antecedents

Comparatively little research has focussed on the manner in which causal attributions are formed. Such factors as a consistent record of success or failure would probably lead to ascription to stable factors (14). A tendency to attribute successes to ability and effort, and failure to lack of effort has been associated with high self-esteem (13), high achievement motivation (16), and an internal locus of control, in Rotter's sense of the term (15). Females of all ages appear to be more likely than males to attribute their successes to unstable, external factors such as luck and ease of task (14). In this research, canonical analysis will be used to identify patterns of possible antecedents and attributions for academic performance at a forthcoming examination. The investigation of Bernstein, Stephan, and Davis (4) has indicated that while similar dimensions are utilised in attributions pre- and post-task performance, the role of effort may emerge more strongly from the former.

2. *Approach to Study*

It would seem reasonable to suggest that the degree to which students see themselves responsible for their own successes and failures may well influence their approach to learning. Indeed, it has been shown that internal subjects tend to see themselves as effective, assertive, and independent; spend more time on academic pursuits; and exhibit more achievement motivation (9, 22, 23). However, there is some doubt whether these relationships hold for both males and females (22). The work of Biggs (5) would suggest that students who ascribe major importance to unstable, uncontrollable factors such as luck, with the inevitable anxiety-evoking consequences, would be liable to adopt a superficial, rote-learning approach to their study in an attempt to avoid failure. The relationships between attributions and approaches to study for both males and females will be further examined in this study.

3. *The Filipino Setting*

There is a good deal of evidence that black Americans in general make more external attributions for success and failure than do whites (14). This is particularly important, since the Coleman Report (7) indicated that, at least for minority groups in the United States, student perceptions of their own abilities and their perceptions of personal control were related to academic achievement. The few cross-cultural studies of the association between locus of control and achievement have found similar results in Israel (3), Sri Lanka (12) and India (20).

Previous research in the Philippines has not only confirmed this association (24) but has also demonstrated that the concepts of 'success and failure' and 'intrusion' are dominant features of Filipino social behaviour (6). The latter term refers to the desire to understand the reasons underlying behaviour which is thought to be an essential aspect of perception of personal control (14). Both Bonifacio (6) and Angeles (1) point out that Filipinos, if successful, typically claim to be suwerte (lucky), while failure is usually attributed to malas (bad luck). Such 'luck' attributions pervade all aspects of Filipino life, but they are especially plentiful when students are explaining their examination performances. Angeles (1) and Watkins (24) argue that the Filipinos' attitude is not so much one of resignation to their fate but rather of 'optimistic fatalism'. This latter attitude allows them to accept their own lot without grumbling, because they believe through hard work and education they and their families will come to a better future.

Several studies of causal attribution for examination success with Filipino students have also indicated the validity of these concepts in the Philippines setting. Thus a study with students from a major private university, found that internal success attribution correlated significantly with satisfaction with success in three out of four cases, and that effort attribution correlated significantly with the students' ratings of how hard they had tried (26). These young Filipinos generally possessed adaptive patterns of attribution, ascribing possible examination success somewhat more to internal than external sources but possible failure almost equally to these factors - consistent with the self-serving bias hypothesis. Luck was rated as

being of relatively minor importance by these students but was still attributed more significance than usually reported with Western subjects. Very similar results were found for a sample of rural Filipino children (1). Both these Filipino studies indicated that, contrary to Western studies, females may, if anything, be more internal than males.

Both these studies, however, were restricted to Weiner's original four causes: ability, effort, task difficulty, and luck. Thus another aim of this study will be to determine if Filipino school children will consider a wider range of possible causes as being important factors in examination achievement. The list of possible causes utilised in this study was based on those used by Bar-Tal and Darom (2) and several others (namely, fate and luck) mentioned in interviews with Filipino students during earlier research (26).

B. METHOD

The subjects of this study were 143 male and 118 female fourth and final year students at a major private secondary school in the central Philippines. Testing took place during normal class hours.

They were asked to rate the likely importance of each of the ten factors in Table I as the causes of their overall result in their forthcoming college entrance examination on the scale 1 (not important) to 4 (very important). The classification of these causes according to Weiner's three dimensions is shown in Table II. Scores were also obtained for the Coopersmith Self-Esteem Inventory (8), internal locus of control for success and failure using Crandall et al.'s scale (9),

self-academic rating, socio-economic status, *IQ* using the Otis-Lennon Mental Abilities Test (19), and school grades. Watkins (25) provides further information concerning the instruments involved, including reliability and validity data. The study methods of these students were assessed by Biggs' Study Process Questionnaire (5) which provides scores on three dimensions: utilising (characterised by rote learning and fear of failure); internalising (characterised by intrinsic motivation and a deep level approach); and achieving (associated with high need for achievement and a highly organised approach to study).

C. RESULTS AND DISCUSSION

The mean scores on each of the ten possible attribution causes are presented in Table I. While it is clear that some causes (e.g., ability, effort in exam and preparation, teacher's explanation) were considered to be of more importance than others, all ten causes were rated as of

(Insert Table I about here)

some importance by the majority of respondents. Although the females rated all but one of the factors more highly than did the males (at 5% level of significance), there was a similar ordering of the relative importance of the causes by the males and females ($\rho = .84$).

Factor analysis of the ten attribution ratings by the Principal Factor method followed by Varimax rotation gave the following four largest eigenvalues: 3.17, 1.44, 1.10, and 0.93. Inspection of two, three and four factor Varimax solutions showed that the best fit to Weiner's model (27) was provided by the two-factor solution shown in

Table II. These two factors accounted for 46.1% of the variance.

(Insert Table II about here)

As can be seen, the variables with the five highest factor loadings on factor I all came from the 'controllable' end of Weiner's control dimension. Factor II, on the other hand, had its six highest factor loadings on the six external causes. Thus our factor analysis does provide support for Weiner's internal/external and control dimensions. Separate factor analyses of the male and female responses provided no evidence of sex differences in this regard.

The ten attribution scales were entered as one set of variables in a canonical analysis - the other ('antecedents') set being scores on sex, age, IQ, grades, self-esteem, internal locus of control for success and failure, self-academic rating, and socio-economic status. Two significant ($p < .05$) canonical correlations were obtained. The first variate ($R_c = .55$) linked a pattern of variables characterised by being female (.61) and achieving high grades (.57) with a pattern of causal attributions characterised by more emphasis on ability (.63), home conditions (.41), exam difficulty (.26), and interest in subject, but less emphasis on fate (-.31) and luck (-.22) attributions. This pattern of causal attributions clearly is related to Weiner's stability dimension. Thus it would appear that high achieving females tend to use stable causes to explain their examination performances. They would thus be confident about future continuing academic success.

The second canonical variate ($R_c = .50$) linked a pattern of variables characterised by more emphasis on being female (.59) and

internalising success (.27), but less emphasis on *IQ* (-.48), internalising failure (-.32), and academic self-rating (-.31) with a pattern of causal attributions characterised by more emphasis on luck (.75), exam difficulty (.44), and home conditions (.32), but less emphasis on exam effort (-.24). This pattern of attribution seems to refer to the external dimension. Thus it would appear that females with low *IQ*, low academic self-rating and who internalise success and externalise failure are likely to externalise causes for examination performance. This is consistent with the self-serving bias hypothesis and would serve to protect their self-esteem.

Finally, the ten attribution ratings were correlated, separately for males and females, with Biggs' three study process dimensions described earlier. The results in Table I indicate quite different results for the males and females. It would appear that for the females higher attributions to external, uncontrollable factors such as luck, fate, exam and material difficulty lead to the adoption of a rote learning approach out of fear of failure. For the males, on the other hand, attribution to internal factors such as ability, effort in exam and preparation, interest in subjects would lead to an emphasis on internalising and achieving approaches to study. Thus of the hypotheses linking attributions and approaches to study discussed earlier, one is satisfied for the males and the other for the females.

D. CONCLUSIONS

This study of the attributions for performance in a forthcoming college entrance examination by Filipino secondary school children has provided some support for Weiner's (27) conceptualisation of causal

attributions. It has shown that Weiner et al.'s two-dimensional/four causes model (29) was far too restrictive, and factor analysis has provided evidence for two of Weiner's (27) three dimensions.

Investigations of the antecedents and study method correlates of the attribution ratings have indicated that patterns of attribution are linked with both in systematic ways - consistent with attribution theory, but differing for males and females. Thus this study suggests that the development of, and behavioural consequences of, causal attributions may be different for male and female Filipinos. More research with a wider sampling of Filipino subjects would be necessary to confirm this tentative finding and to allow further generalisation of these results. Such studies are significant for all developing countries wishing to maximise their human resources, as it has been shown that, with the aid of training programs well within the capabilities of classroom teachers, it is possible to modify maladaptive attributions which, in turn, may help improve the approach to study and thence academic achievement.

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TABLE I

MEANS AND STUDY METHOD CORRELATES OF ATTRIBUTION SCORES FOR MALES (N = 143) AND FEMALES (N = 118)

Attribution sources	MEANS		STUDY METHOD CORRELATES					
	Males	Females	Utilising		Internalising		Achieving	
			Males	Females	Males	Females	Males	Females
your ability	3.35	3.60	.14	.12	.24*	.20	.26*	.18
how hard you try in the exam	3.36	3.54	.20	.09	.30*	.14	.38*	.12
how much you prepare for the exam	3.26	3.55	.14	.18	.26*	.09	.24*	.18
how difficult the exam items are	2.74	3.05	.13	.24*	.08	-.06	.08	.10
how difficult the material being tested is	2.78	2.94	.04	.28*	.13	.11	.03	.19
your interest in the subject being tested	3.22	3.42	.08	.16	.29*	.13	.29*	.16
your teachers' explanation of the material in the exam	3.27	3.51	.24*	.22	.22*	-.06	.20	.04
your conditions at home being suitable for study	3.06	3.50	.12	.11	.22*	.01	.26*	.06
luck	2.62	2.92	.05	.41*	-.03	.02	.01	.04
fate or destiny	3.00	2.88	.03	.39*	.05	.04	.08	.12

* $p < .05$

TABLE II

ATTRIBUTION RATINGS FACTOR ANALYSED AND CLASSIFIED

ACCORDING TO WEINER'S THREE DIMENSIONS:

INTERNAL (I) OR EXTERNAL (E);

STABLE (S) OR UNSTABLE (U);

CONTROLLABLE (C) OR NOT CONTROLLABLE (N)

Attribution sources	Factors		Classification		
	I	II			
your ability	.35	-.02	I	S	N
how hard you try in the exam	.61	.15	I	U	C
how much you prepare for the exam	.65	.13	I	U	C
how difficult the exam items are	.24	.37	E	S	N
how difficult the material being tested is	.29	.39	E	S	N
your interest in the subjects being tested	.40	.18	I	S	C
your teachers' explanation of the material in the exam	.54	.27	E	S	C
your conditions at home being suitable for study	.56	.23	E	U	C
luck	.07	.76	E	U	N
fate or destiny	.07	.71	E	U	N

DEPTH OF PROCESSING AND THE QUALITY OF LEARNING OUTCOMES

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ABSTRACT

Problems associated with earlier research on the relationship between depth of processing and quality of learning outcomes are first discussed. Then I present an interview study with 60 second year tertiary students which supports the hypothesis that depth of processing is related to the quality of learning outcomes.

Introduction

Investigations of tertiary students' learning processes, using both basically psychometric and intensive interview methodologies, have indicated that most students when undertaking a learning task can be classified as adopting a *deep* or a *surface* level of processing (Marton and Säljö, 1976 a,b; Entwistle, 1981). A student using *deep level processing* concentrates on the underlying meaning of the material being learnt. *Surface level processing* is identified when the student directs his attention to specific facts or pieces of disconnected information which are typically learned off by heart.

There seems to be general agreement among workers in this area that a deep level of processing is a necessary but not a sufficient condition for a student to achieve true understanding. However, the empirical evidence of the importance of depth of processing for the quality of learning outcomes is not very impressive. Investigations have been conducted both in the laboratory and the natural college setting. Studies in the latter tradition have typically used university grades as the criterion of learning and learning process inventories to assess depth of processing. Thus investigations by Ramsden and Entwistle (1981) and Watkins (1982) using Entwistle's "Approaches to Studying" Inventory both found that the factor most strongly (negatively) associated with academic

achievement was dominated by loadings from subscales designed to measure "fear of failure," "disorganised study methods," "negative attitudes to study," as well as "surface approach" and two pathologies of learning. There was a much weaker relationship between indicators of a deep approach and grades. Schmeck and Grove (1979) and Watkins and Hattie (1981), using Schmeck's "Inventory of Learning Processes" (ILP) did indeed find significant correlations between grades and the Deep Processing scale of the ILP – which were of the impressive order of 0.50 for Australian Science, Rural Science, and Economics students in the latter study but considerably lower in the former investigation. The evidence from studies using Biggs' "Study Process Questionnaire" indicates only a slight relationship between grades and depth of processing (Biggs, 1978; Watkins and Hattie, 1981).

There is doubt, however, about the validity both of these learning process inventories and, more particularly, of grades to assess quality of learning outcomes. For example, a recent survey showed that at one Australian university only half the lecturer and even fewer of the student respondents agreed that a student's grade is a reliable indicator of what they have got out of the course and that final examinations are an adequate measure of the learning which has taken place (Watkins and Morstain, 1980).

These and other related considerations influenced researchers based at Gothenburg University in Sweden, under the leadership of Ference Marton, to adopt a quite different approach to research in this area. The Gothenburg studies have followed a pattern of asking a small (usually 30–40) sample of student volunteers to read and answer questions about a set text – perhaps a newspaper article or a book chapter. The students study the text individually in front of the experimenter and then answer oral or written questions about their understanding of the text and give an introspective account of how they went about their reading. In most of their research the students' answers were classified independently according to level of outcome by the experimenter and a colleague, while their approach to reading was classified independently as indicating deep or surface level processing (c.f. Marton and Säljö, 1976 a,b). These researchers found that it was usually possible to identify different conceptions of the intentional content of a particular passage in the student's recall of the text. Thus Marton and Säljö (1976b) classified the quality of students' recall of a chapter on the individual and social consequences of school "drop-outs" as follows:

Category A subjects were *conclusion-oriented* and commented on the causes and consequences of the problem.

Category B subjects *described* what the author said without including causes, consequences, or conclusions.

Category C subjects treated the topic only very superficially and merely *mentioned* the topic that the author had discussed.

The Gothenburg studies have consistently shown a clear relationship between deep level processing and quality of learning outcome. However, as Entwistle (1981) has pointed out, their research has relied on small samples of mainly female Swedish social science students and thus there must be doubts about the generality of their findings. In addition, their methods of analysis are subjective, of doubtful reliability, and are in need of replication by researchers less committed to their view of the learning process.

A significant advance in qualitative evaluation, which seems to minimise the problem of subjectivity, has been the development of the SOLO taxonomy (Biggs and Collis, 1982). The term SCLO is an acronym for "structure of the observed learning outcome" and reflects the contention of Biggs and Collis that *structural complexity* is a major component of learning quality. The taxonomy itself is based on a hierarchical structuring of the components which a learner utilises in forming his response to a complex learning task. The SOLO taxonomy identifies five possible levels of response:

- 1 *prestructural*, which comprises a non-relevant or inadequate component;
 - 2 *unistructural*, where only one out of a range of several possible components is utilised;
 - 3 *multistructural*, which is based on several relevant components, but they are not integrated or orchestrated to achieve maximal effect;
 - 4 *rational*, where several components are interrelated;
 5. *extended abstract*, where a pattern of interrelated components is seen as an instance of a more general case, and is extended to new contexts.
- (Biggs and Collis, 1982, p. 61)

This taxonomy which resembles a generalised (and standardised) version of Marton's levels of outcome, has already been used in two studies of tertiary students' learning outcomes. Thus Biggs (1979) administered his Study Process Questionnaire (SPQ) to a class of 60 Education undergraduates together with two learning tasks (short abstracts from *Psychology Today*). Half the subjects were asked to read the first reading for factual detail and the second for meaning while for the other half the order of instructions was reversed. The students were asked both highly factual questions and a general question about the ideas underlying the passages. The latter was designed to elicit a response for SOLO classification to assess the *quality* of learning while the former, was a measure of the *quantity* of learning (in terms of the number of facts recalled). The SPQ dimensions (split at the median) and the instructions (meaningful/factual) were independent variables in a series of analyses of variance. Although there were some differences between the results for the two tasks, the results were generally in accord with expectations, e.g., the instructions did tend to affect the quality of learning and a deep approach (an "internalising orientation" in Biggs' terminology) was related rather weakly to higher levels of SOLO, i.e., to a higher quality of learning. Biggs suggested that the effects may well have been stronger had

"natural" rather than experimental learning conditions been utilised.

The second study was by Schmeck and Phillips (1983). These researchers gave their Inventory of Learning Processes and the Iowa Silent Reading Test to 71 Psychology I student volunteers. The subjects were set two broad essay questions on the last passage of the reading test and these were assessed to SOLO level by two independent judges. The SOLO ratings were found to have acceptable reliability ($r = 0.88$) and other evidence was presented of its validity as a measure of quality of learning. The correlation between the SOLO ratings and their measure of depth of learning was 0.37 ($p < .01$) – statistically significant but a lower value than the researchers had expected.

It should be noted that both the Biggs (1979) and Schmeck and Phillips (1983) studies used a general learning process inventory to measure the depth of learning each student utilised. However, there is much evidence that an individual's learning process may differ depending on the context and content of learning (Laurillard, 1979). Thus there must be doubt whether, at least for some students, the actual depth of processing used in the particular artificial laboratory task was accurately assessed by the general questionnaire.

The research reported in this paper attempted to utilise the best features and overcome the deficiencies of the Gothenburg, Biggs, and Schmeck and Phillips studies. Thus it (1) used actual tasks the students were recently working on in their tertiary studies; (2) sampled subjects from three different university faculties; (3) classified depth of processing according to the way each student approached the particular task mentioned in (1); and (4) utilised the SOLO taxonomy (Biggs, 1979) to assess the quality of the outcome of the learning task rather than a task-specific classification such as used by the Gothenburg researchers.

Method

Sixty students who had completed Entwistle's "Approaches to Studying" inventory during the third term of their first year at the Australian National University (ANU) were interviewed during the middle of their second year at ANU. These subjects were chosen to represent the ten highest scorers on the "meaning orientation" scale and the ten highest scorers on the "reproducing orientation" scale from each of the Faculties of Arts, Science, and Economics who would agree to be interviewed (each of these Ss scored at least one standard deviation above that Faculty's mean score on one of these orientations – none of the Ss were high scorers on both orientations).

The interview was loosely structured so that information was obtained on one particular learning task; how they studied in general; what sort of factors affected their approach to study (e.g., subject area, topic, assessment method).

grade desired, time constraints, interest level, quality or method of teaching); whether their approach had changed both since leaving school and since their first year at university; and whether their own opinions played any part in their studies.

The indicators of deep and surface processing suggested by Laurillard (1979) and Marton and S  ij   (1976) were utilised to classify the interviewees' approach to their learning task. Thus a student who generally tended "to focus attention on the content as a whole," "to try to see the connection between different parts," "to think about the structure as a whole" would be classed as utilising deep level processing. On the other hand, students who usually "focused only on the elements of the content," "saw their tasks primarily as memory tasks," "approached the task unthinkingly" would be rated as surface level processors. If a subject could not be classified as preferring one or other level of processing on the basis of these indicators or the other interview questions, he or she was placed into an intermediate category. Each subject was classified as to their depth of processing on the particular task and in general both by their interviewer and a judge who studied the interview protocol. Neither was aware of the subject's "Approaches to Studying" scale scores. Further details of the interview and classification procedure are given in Watkins (1983).

The SOLO taxonomy was used to assess the quality of learning outcome as judged from the students' explanations of a learning task they had been working on recently in their classes. The question actually asked by the interviewer was "Can you give me a brief account of the topic itself so I know something about it?" The students were encouraged to talk for about five minutes on their topic. Where available written reports, essays, etc., related to this task were evaluated to supplement the interview information.

The SOLO judge was not aware of the subjects' scores on the "Approaches to Studying" inventory or the depth of processing classification. The reliability of the SOLO ratings was checked by having a second judge use the same taxonomy to rate the quality of the learning outcomes of twenty of the respondents.

Results and Discussion

SOLO RATINGS

Both the original and second judge of the SOLO ratings found it too difficult to distinguish between the higher quality categories, 4 and 5, of the SOLO scale (perhaps because of the heterogeneous nature of the learning tasks). Very high inter-judge agreement was obtained, however, when the quality of the learning outcomes was classed as high (SOLO levels 4 or 5) or low (SOLO levels 3 or below). Biggs (1979) himself predicts that a deep level strategy, if it works

properly, should produce a level 4 or 5 SOLO outcome – i.e., at least relational and at best extended abstract responding.

One of the problems with interview studies is that it is difficult to convey to the reader the basis on which judgements are made. The following (paired) interview extracts are designed to illustrate the kinds of qualitative differences in learning outcome which were found during the interviews.

Computer Science Assignments

The first extract illustrates limited understanding and a general lack of thought about the problem. It was classified as *low* in terms of SOLO:

The program was simulating the population of martians. That was basically what it was about. It was quite a large program. In fact, it was a lot of work. I had to get extensions for it into the holidays. That was due around about when our mid-semester exams were on. As with most programs, I find I'm spending about 70% possibly 80% of my time on computing which is – I suppose I shouldn't but it's the only way I can get these programs done. It was like 2 different methods of – like storing information in memory and that. There were two separate sections of the program. One was – the first section was quite different and the second one was just changing around the first one to adapt it to this other method. It was quite a long program as our tutor told us it was one that sorted out the sheep from the goats. I got that one done all right. I passed it!

The second extract based on a similar assignment is in marked contrast with its frequent use of analogies and richness of conceptualisations and was consequently given a *high* SOLO rating.

Basically what [the assignment consists of] is to play John Horton Conway's game of Life on the computer. Life attempts to create an analogy with the rise and fall in alternatives of a society of living organisms. It's a simulation game. It tries to resemble real life processes. That's about it. There's rules governing the life and death cycles of these particles. We start off with an initial configuration and by these certain rules of life and death we can see how the colony progresses over a time period. The computer was used to simulate these things.

It's a very long process. First you had to understand what the thing was going on about. I always try and work out what's happening first of all, to get it clear in my mind. Then I try to approach it thinking about such things as data structure. The data structure involved is that we have a lattice, like a chess board but of a larger extent. And each of these cells can contain one life cell and it's these things which are either alive or dead. So I had to choose a suitable data structure on the computer, going through all different reasons for different data structure and stuff eventually coming up with one particular data structure. Having chosen that data structure then you have to try and work out a way of implementing these rules of life and death on these particular cells which involved working out the way to which – the order in which you were supposed to do things. You treated birth first or death first – all these sort of things which required quite a lot of thought. You got different answers if you did it different ways. You had to think of which was the correct way of doing it. Then you had to think of order of just doing things. I came up with the way of initialising everything to start off with; compute each generation separately and you just did that until you come to where the person wanted it to stop. It was a user interactive program.

Mathematics Assignments

When discussing straightforward problems in basic calculus relying on correct application of formulae it might seem difficult to show more than a superficial comprehension.

The first extract illustrates the lack of impact such an assignment had on one student (the learning outcome was given a *low* SOLO rating):

I had a Pure Maths assignment to hand in yesterday. It was sort of - I worked on it, did as much as I could and any problems I had I went and saw other students to see if they could do them. That seems to be the best way to do assignments.

It was calculus. It was just four questions on different subjects we covered in lectures the week before. I think - I can't even remember.

That it is possible to gain a much deeper level of understanding (and thus a *high* SOLO rating) from the same assignment is shown by a second student:

The task involved is to complete 3 questions within a week - This counts toward 2½% of your final mark - so it can be a lot of work for very little return but doing it, of course, gives you the practice of mathematical manipulation, so that doing the exam - although it's 'open book' - it's no help to you unless you can get through the questions quickly. This type of work helps you better your manipulation of mathematical principles. It's a progression of what we've learnt earlier in the more recent lectures, so for the first part here all you have to do is take the first and second derivatives - that'll give what you are looking for: the first derivative will give you the turning point and the second will tell you whether it's a maximum or minimum. They all involve the same sort of thing - you've just got to get both derivatives. The second question is more recent. It's a function of two variables so you have to take a function, a partial derivative of x and of z which isn't much of a leap from normal derivatives but you have to be careful of what you're doing.

An equation e.g. $2x^3 + 3x^2 - 12x + 10$ describes some sort of curve and a derivative of that will tell you what the slope of that curve is at a particular point on the curve. When you get that second equation that gives you the slope of the curve at that particular point - that's its first derivative. There is a formula for it but it's complicated but you recognise patterns after a while. It's not just a matter of plugging in values in an equation. If you don't know what you're doing you'll get an answer and you don't know whether it's right or not. But if you understand it you can come up with an answer and say that looks pretty right. So you have to understand what you're doing otherwise you'll just get lost.

Art Essays

A 3,000 word essay in an Arts subject might be expected to show some depth and originality of thinking. The following brief summary of a forthcoming History essay on a controversial former premier of New South Wales clearly demonstrates these qualities and was thus given a *high* SOLO rating:

I'm taking the theme of Lang the Legend. After thinking of a number of others and sort of rejecting them - you could do 'Lang the Demagogue', but I rather feel that people have

walked around that one. So I thought I'd work up on the sort of larrikin legend/theme. I think it will work up from Lang's experiences during the 1900s and his fall from grace when his father went out of business – they were more or less put down on the poverty line. And his development, selling newspapers on the streets of Sydney, and his movement into local politics. And I'll probably do the attitude he got from his early childhood where he became an aggressive domineering type, and people liked him that way so I think he kept it. It comes back very like Phar Lap and Les Darcy, and all the Australian folk heroes really. In a matter of a 2 – what 4 – years in power he established a reputation which everyone still talks about. People who were in power for a lot longer you never hear mentioned.

However, that a much shallower essay is sometimes encountered is illustrated by the following SOLO judge's comments in the course of reading an essay about *Oliver Twist* (consequently given a low SOLO rating):

"no apparent relationship between paragraphs"

"conclusion based on only 2 concrete details – no attempt to understand Oliver's terror in the broader context"

"attempt to explore meaning – though not relevant to task"

"does not show appreciation of Oliver's experience in terms of Oliver's perception"

"tends to draw conclusions on superficial and limited evidence"

"does not consider other possible explanations"

"does not develop conjecture beyond mere statement of the facts"

"relates description to real life situation but this is another example of V's tendency to emphasise superficial (as well as irrelevant) facts"

"in sticking so closely to text and using superficial analysis fails to respond fully and so gain deeper understanding"

DEPTH OF PROCESSING

The judges of the depth of processing also were in close agreement, but in seven cases the depth used in tackling the task was judged not to be representative of their usual approach to learning – emphasising the need for a specific not a general measure of study processes in such research. To illustrate this point the following were the comments from an Economics I student who was classified as using deep level processing in her essay (the task investigated) but as adopting a surface level approach when preparing for examinations:

[Essays seem] not to be a matter of research but a matter of thinking about the effects and things . . . [to prepare for exams] I always summarise everything. Go over the summary and try to learn it off by heart . . . mostly I reread the text book.

Other students agreed with the following comments from an Arts I student:

Different departments require a different sort of essay and a different sort of approach .- . . that took me a while to get used to . . . in Prehistory they want you to analyse it . . . in history they (want you) to create something new - a new approach.

The judges could agree on all but four of the depth and SOLO ratings. When the SOLO and depth categories were cross-classified it was clear that a strong relationship was found between depth of processing and the quality of learning outcomes (see Table I). This degree of relationship applied to students from all three faculties sampled.

Conclusions

This research, which has attempted to overcome some of the criticisms levelled at earlier, similar studies, lends strong support to the hypothesis that depth of processing is related to the quality of learning outcomes. It also supports the use of the SOLO taxonomy as a device to assess learning quality and the need for specific rather than general indicators of depth of processing when research is being conducted in this area.

However, like all research with a limited number of subjects and utilising measures involving subjective judgements, there is a need to replicate the findings of this study. Moreover, there are other basic issues in the study process domain which research has not adequately explored to date - for instance, whether surface and deep level processing constitute a continuum, a dichotomy or orthogonal or non-orthogonal dimensions (Brumby, 1982); whether "deep"

TABLE I

Depth of Processing and SOLO Ratings of Quality of Learning Outcome

		Depth of Processing	
		Deep	Surface
SOLO Rating	High	25	6
	Low	2	23
$\chi^2 = 28.9, p < .01$		$\Phi = 0.72$	

and "surface" mean different things in different subjects (Ramsden and Entwistle, 1981); and the degree to which approaches to studying are a relatively stable attribute of the individual subject or are context and content dependent (Entwistle, 1981). Considerable research is currently focussing on such issues and I doubt whether much further theoretical or applied progress can be made in this area until such fundamental questions are answered satisfactorily.

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Antecedents of self-esteem, locus of control,
and academic achievement:
A path analytic investigation
with Filipino children

Over the past decade many educators have shown an increasing interest in the affective domain (Prawat, 1976). Such factors as attitudes about the self and beliefs about locus of control are thought to be educationally important variables. They are considered both to be central educational objectives in themselves and to be factors which affect educational outcomes — perhaps because they interact with teaching style and method of instruction to influence the course of learning (Messick, 1979). In this paper a study is reported which tests, with a sample of Filipino children, a structural model linking (a) family and personal background variables, (b) self-esteem and locus of control, and (c) academic achievement.

Self-esteem and academic achievement

A recent meta-analysis (Hattie and Hansford, 1980) has provided the most definitive summation to date of the relationship between measures of self and performance/achievement. After analysis of 1136 effect sizes based on 68,756 unique persons from 128 studies, Hattie and Hansford concluded that the mean correlation between such measures was 0.21. They contend that they have established the existence of a low positive correlation and that 'self' may be

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as strongly linked with performance/achievement as any other personological variable' (Hattie and Hansford, 1980, p. 187).

Wylie (1979) considers it methodologically most defensible to offer interpretations based on studies where both IQ and achievement data are utilized and some attempt is made to control one of these variables when the relationship of the other with self-esteem is examined. After consideration of 29 studies (most of which she feels are, to some extent, methodologically flawed) she concludes that her results 'give little support to the widely accepted lore that there is a psychologically important relationship between achievement and overall self-regard' (Wylie, 1979, p. 393). However, she did find sufficient positive trends to suggest further research should be encouraged which incorporates methodological improvements — these would include use of measuring instruments for which adequate psychometric information is available together with investigation of possible non-linear trends and of possible interactions with variables such as socio-economic status.

Locus of control and academic achievement

A number of studies have demonstrated that individuals who perceive themselves as responsible for their own behaviour (internals) tend to outperform academically those who attribute responsibility to forces outside their control (Crandall, Katkovsky and Crandall, 1965; Clifford and Cleary, 1972; Bar-Tal, Kfir, Bar-Zohar and Chen, 1980). The importance of controlling for factors such as socio-economic status and sex when investigating this relationship has been emphasized by Bar-Tal et al. (1980) and Gordon (1977), respectively, while Brown (1980) contends that locus of control is a function of intelligence rather than achievement.

The major educational importance of the control dimension is thought to be its implication for self-motivation (de Charms, 1976; Fanelli, 1977). The belief that success is due to external factors does not encourage effort to succeed on future occasions.

Antecedents of self-esteem and locus of control

A number of studies have examined the influence of child rearing

patterns on locus of control. Consistently it has been found that an internal child is more likely to come from a warm, protective, nurturant home environment than is an external child (Katzovsky, Crandall and Good, 1967; Nowicki and Segal, 1974; Loeb, 1975). Given the relationship between socio-economic class and child-rearing patterns found by Sears, Maccoby and Lewin (1957), differences in perceptions of locus of control according to socio-economic class would be expected. In fact, research does indicate a definite association between low social class and externality (Phares, 1978). There are also data that suggest sex differences in locus of control — females are apparently more likely to perceive external sources of control than are males (Bar-Tal, 1978). High intellectual capacity is also likely to lead to success in achievement situations and consequent internal perceptions of control (Bar-Tal, 1978).

These same antecedents (having warm, nurturant parents; being of high social class; being male rather than female; having high intellectual capacity) have also often been postulated as leading to high self-esteem (cf. Coopersmith, 1967). However, the supporting research evidence is by no means clearcut — perhaps once again because of methodological problems (Wylie, 1979).

These same antecedents have also been postulated as influencing educational outcomes and there is some evidence to support this contention (Coleman, Campbell, Hobson, McPartland, Mood, Weinfall and York, 1966; Heyneman, 1976).

From the above discussion it would be expected that self-esteem, locus of control and academic achievement and their antecedents are intertwined in a complex way. Any study which hopes to reach valid conclusions in this area must employ statistical techniques capable of handling the complexities — path analysis is one such method.

Cross-cultural studies

The Coleman report (Coleman et al., 1966) indicated that, at least for minority groups, student perceptions of their own abilities and their perceptions of personal control were related to academic achievement.

The few cross-cultural studies of the association between locus of control and achievement have found similar results in Israel (Bar-

Tal et al., 1980), Sri Lanka (Faustman and Mathews, 1980), and the Philippines (Watkins, 1980). Only the Bar-Tel et al. study attempted to control for factors such as socio-economic status, however.

Pugh (1976) has questioned the applicability of a structural model linking (a) IQ, teacher and parental aspirations, to (b) self-concept of ability and educational aspirations, and, in turn, to achievement developed by Gordon (1977) for use with black children. However, Heyneman (1976) in Uganda and Youngblood (1976) and Watkins and Astilla (1980a) all found evidence for significant relationships between self-esteem and achievement, even after some other variables such as IQ and socio-economic status were controlled.

The antecedents of self-esteem or locus of control have also seldom been studied cross-culturally. Factors in Filipino society which might be expected to influence these personality variables and results of some Filipino investigations are discussed below.

The Philippines setting

Third World psychologists are now more than ever questioning the appropriateness of Western psychological concepts in cross-cultural settings (Enriquez, 1977). Thus the relevance of the concepts of 'locus of control' and 'self-esteem' in the Filipino context will first be examined.

Bonifacio (1977) considers 'intrusion' and 'the concept of success and failure' to be dominant features of Filipino social behaviour. The term 'intrusion' refers to the way Filipino friends try to discover the reasons for each other's actions, which may range from everyday activities such as walking down the street to major life decisions. By intruding into another's personal affairs they demonstrate the deep concern they have for each other. This desire to understand the reasons underlying behaviour is thought to be an essential aspect of perception of personal control (Frieze, 1979).

The emphasis placed on 'the concept of success and failure' in Filipino society is also clearly relevant to this discussion. Bonifacio explains that if a Filipino is successful at some endeavour he or she is likely to claim to have been *suwerte* (lucky) while failure is usually ascribed to *malus* (bad luck). Anyone who has spent any length

of time in the Philippines will find examples of 'luck' attributions in all aspects of Filipino life, but they are especially plentiful when students are explaining their examination performance.

Both Bonifacio (1977) and Angeles (1977) consider that *suwerte* and *malas* play such a dominant role in Filipino behaviour because the belief that life is determined by forces outside man's control is a dominant value-orientation of the Philippines. Angeles, however, sees a positive aspect in this apparent attitude of fatalistic resignation, which itself is often based on strong Christian conviction. She argues that rather than being resigned to his fate the Filipino espouses an 'optimistic fatalism'. This latter attitude allows the Filipino to accept his own lot without grumbling, because he believes that by hard work and endeavour he and his family will come to a better future. Guthrie (1977) lent empirical support to this proposition by finding that most of his respondents emphasized the need for education, hard work, and saving rather than relying on forces outside their control to improve their lot in life. The Filipino's belief in the value of education is borne out in that nation's impressive statistics on national literacy, universal schooling, and proportion of Filipinos entering into tertiary study (currently estimated at 20 percent of 17-21 year olds, National Economic Development Authority, 1976).

Several studies of causal attribution for examination success with Filipino students have also indicated the validity of these concepts in the Philippines setting. Thus Watkins and Astilla (1980b), in a study with students from a major private university, found that internal success attribution correlated significantly with satisfaction with success in three out of four cases and that effort attribution correlated significantly with the students' ratings of how hard they had tried. These young Filipinos generally possessed adaptive patterns of attribution ascribing possible examination success somewhat more to internal than external sources but possible failure almost equally to these factors — consistent with the self-serving bias hypothesis. Luck was rated as being of relatively minor importance by these students but was still attributed more significance than usually reported with Western subjects. Very similar results were found for a sample of rural Filipino children (Watkins, 1980). Both these Filipino studies indicated that, contrary to Western studies, females may, if anything, be more internal than males.

There have been a number of recent studies which have supported the usefulness of Western self-esteem measuring instruments and theories in the Philippines. Thus Youngblood (1976) and Watkins and Astilla (1980c), using samples of Filipino children, reported moderate internal consistency reliability coefficients and some validity data for the Self-Esteem Scale (Rosenberg, 1965) and Self-Esteem Inventory (Coopersmith, 1967), respectively. As would be expected in a society where great store is placed in the quality of family relationships, social standing, and academic achievement, these factors have been found to be significantly related to Filipino self-esteem (Watkins and Astilla, 1979; Youngblood, 1976). These factors resemble the antecedents of self-esteem reported by Coopersmith (1967) in the United States, discussed earlier.

Two concepts related to self-esteem are given prominence in accounts of Filipino personality, *amor propio* and *hiya*. The term *amor propio* refers to self-pride and is reflected in sensitivity to criticism (Youngblood, 1978). Visitors to the Philippines have sometimes been surprised to find the usually courteous and hospitable Filipino people can react angrily to remarks which to Western eyes would seem only mild rebukes. Vigorous actions to defend one's *amor propio* have long been a tradition in Filipino society. Injury to self-esteem remains the cause of many of the violent altercations in Filipino society to this day.

Self-esteem in the Philippines is also closely related to the indigenous notion of shame (*hiya*). Bulatao (1964, p. 428) defines *hiya* as a 'painful emotion arising from a relationship with an authority figure or with society, inhibiting self-assertion in a situation which is perceived as dangerous to one's ego. It is a kind of anxiety, a fear of being left exposed, unprotected, and unaccepted'. The concept of *hiya* touches the very core of the ego (Youngblood, 1976) and acts as a potent social control of a Filipino's actions (Angeles, 1977). The term *walanghiya* (without *hiya*) is a terrible insult which most Filipinos would fight against, even with their lives.

Because of the basic insecurity engendered by *hiya* Filipinos tend to be shy, retiring, and lacking in self-confidence. They also tend to brush off compliments for fear of being thought immodest. This also leads to an inability to tolerate negative evaluations from others in everyday situations (Guthrie and Jacobs, 1966). Such experiences are deeply painful to Filipinos and they will go to great lengths to avoid them. Thus school children may run away from

school if criticized by their teacher; a teacher may be unwilling to fail a pupil because of fear of reaction to *hiya*; employees resign because they have been reprimanded, etc. Considerable attention is paid to developing socially approved mechanisms for avoiding the dangers arising from slights to self-esteem. Filipinos have built up a system of nonverbal communication, enhanced by euphemistic and indirect expressions and the use of go-betweens, to ensure smooth interpersonal relations (Lynch, 1964).

It would appear then that the Filipino concept of self-esteem involves the internalization of shame to a degree not present in Western societies: 'By the process of learning the Filipino child develops the capacity to experience intense feelings of inferiority, humiliation, and loss of self-esteem' (Guthrie and Jacobs, 1966, p. 160). *Hiya* apparently develops from early childhood mainly through the extensive use of teasing by parents, siblings, and other relatives to which Filipino children are subjected — 'one is teased about something about which one is known to be vulnerable, about which one is believed to be touchy' (Guthrie and Jacobs, 1966, p. 159). Another difference in child-rearing practice between American and Filipino mothers that may be of significance in this regard is that the latter seldom praise or reward their children although bribes are extensively used, as is physical punishment or scolding (Guthrie and Jacobs, 1966). Thus it would appear that Filipino socialization practices may well lead to internalization of failure but perhaps not success.

Given an understanding of the socialization processes and ensuing typical personality characteristics of Filipinos it would seem reasonable to suggest that the relationships among self-esteem, locus of control, and achievement in the Philippines may be different from the results of Western studies — at least in terms of degree. Similarly, although the literature discussed above would suggest Filipino antecedents of the personality variables and achievement to be similar to those found in Western studies, there may well be differences in strength of associations. One difference that may be anticipated is that internality in the Philippines may well be higher for females than males.

The structural model proposed in this study

In this study a block recursive path analytic model (cf. Woffle,

1980), based on the literature discussed, is proposed (see Figure 1). It can be seen that IQ, sex, socio-economic status, and quality of family relationships are postulated as causal antecedents of both self-esteem and locus of control. No causal link is assumed between self-esteem and locus of control. All background and personality variables are then considered as possible causes of achievement. This model then allows us to investigate:

- (a) causal antecedents of self-esteem;
- (b) causal antecedents of locus of control;
- (c) causal antecedents of academic achievement.

It will allow us to determine to what extent the personality variables account for the relationship between the background variables and achievement and the extent to which relationships between the personality variables and achievement are accounted for by the background variables. Gordon's (1977) hypothesis that self-esteem and locus of control are independently associated with achievement can also be evaluated.

Of course, I do not claim that the variables considered here are the only possible causes of academic achievement — factors such as pupil attitudes to school, pupil study methods, methods of instruction, teaching ability, pupil-teacher relationships and other personality variables may well influence educational outcomes.

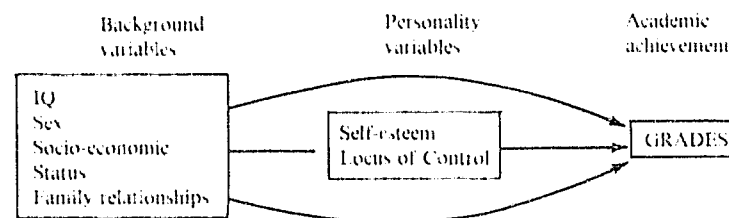
As in any cross-cultural setting there is a need to establish the reliability and validity of even standard psychological tests for use with Filipino children and this was a prime concern in this study. The possibility of curvilinear relationships was also investigated.

Method

Subjects

The subjects were 136 male and 101 female (and final year) students attending a prestigious, private secondary school in the central Philippines. Average age of the subjects was 15 years and they were from upper class or professional backgrounds.

FIGURE 1
Structural model proposed in this investigation



Instruments

The 26 item general self subscale of the Coopersmith Self-Esteem Inventory (SEI) was chosen to measure self-esteem. Previous research had supported the internal consistency and test-retest reliability and construct validity of the full Coopersmith questionnaire at the same secondary school (Watkins and Astilla, 1980c). On this occasion coefficient α was found to be 0.66.

The Crandall, Katkovsky and Crandall (1965) Intellectual Achievement Responsibility (IAR) Scale was used as the attribution measure. The IAR Scale attempts to assess the readiness to attribute successful or unsuccessful outcomes in a number of everyday childhood performance situations to internal factors (one's ability or effort) rather than to external sources. In this study coefficient α was 0.69. Evidence for the construct validity of the IAR came from the finding of significant ($p < .05$) correlations with the subject's independent ratings of internal attribution factors.

The possible influence of social desirability on self-esteem (Wells and Marwell, 1976) and locus of control (Schreiber, 1980) was examined by including in the test battery the Young Children's Social Desirability Scale (Ford and Rubin, 1970) which two Filipino educationalists considered relevant for use with Filipino children.

As this social desirability scale correlated only .08 and .06 with the SEI and IAR scores respectively, no evidence was found of the confounding influence of this response set.

The tests were administered during normal class time by trainee student counsellors, who were carefully instructed in testing procedure.

Other measures

IQ: Scores on the Otis-Lennon Mental Abilities Test (Otis and Lennon, 1967) were obtained from the school files.

Sex: The sex of students was coded male = 1, female = 2.

Socio-Economic Status: The socio-economic status (SES) of each subject was assessed from ratings of the father's occupation (using a four point scale from 1 = low to 4 = high). Earlier research had provided evidence of the validity of this measure. In this study, SES was found to correlate .51 and .38 with independent measures of the extent of the fathers' and mothers' education, respectively.

Grades: School achievement was assessed from scores on a subsequent school examination which were obtained from the school files (expressed in percentages).

Family Relationships: Students' perceptions of the quality of their family relationships were assessed by a questionnaire based on the work of Cervantes (1965) and included items on their satisfaction with and acceptance of their family. This inventory had been found suitable for research with Filipino students (Watkins and Astilla, 1980d).

Results and discussion

The intercorrelations, means, and standard deviations of the subjects' scores on the variables described above are shown in Table 1. As can be seen, socio-economic status was found not to correlate significantly with any of the other variables in the model. It was then dropped from subsequent analyses. The relationships between the other variables are better understood from the path analysis diagram and the results of the multiple regression presented in

TABLE 1
Intercorrelations, means, and standard deviations of background, personality and achievement variables (n = 237)

	IQ	Sex	SES	FR	SEI	IAR	Grades
IQ							
Sex	.16*						
Socio-economic status (SES)	.12	.03					
Family Relationships (FR)	.03	.04	.12				
Self-esteem (SEI)	.16*	-.13	.06	.29*			
Locus of Control (IAR)	.25*	.33*	-.01	.12	.15*		
Grades	.60*	.06	.02	.13	.23*	.32*	
$\bar{x}$	88.2	1.4	3.1	25.2	16.1	25.7	83.3
S.D.	9.3	.50	.80	6.4	3.9	4.0	3.7

* $p < .05$.

TABLE 2
Results of multiple correlations (R) with self-esteem, locus of control, and academic achievement as dependent variables

Dependent Variable	Independent Variables	R	R ²
Self-esteem	IQ*, sex*, family relationships*	.37**	13.7%
Locus of control	IQ*, sex*, family relationships	.40**	16.0%
Academic achievement	IQ*, sex, family relationships, self-esteem, locus of control*	.64**	41.0%

* Regression coefficient of variable more than twice its standard error.

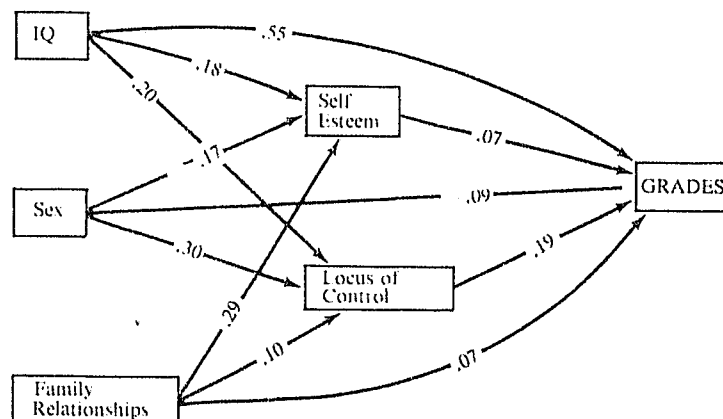
** Corresponding F statistic significant at .01 level.

Figure 2 and Table 2 respectively. Further analysis revealed no evidence of curvilinear relationships.

Antecedents of self-esteem

It would seem that, as predicted, higher levels of self-esteem were

FIGURE 2
Results of path analysis (n = 237)



more likely to be reported by Filipino subjects who perceived their family relationships to be satisfactory and (to a lesser extent) had higher IQ's and were males. However, these three antecedents could only account for 13.7 percent of the variance of self-esteem scores.

Antecedents of locus of control

Being female rather than male was the best predictor of internal locus of control. As discussed earlier, this finding is consistent with other Filipino studies but is contrary to the results of Western research. IQ, as hypothesized, was positively related to internal locus of control while the association of the latter with the quality of family relationships did not reach significance. These three antecedents accounted for 16.0 percent of the variance of locus of control scores.

Antecedents of academic achievement

Of the possible antecedents considered in this study, IQ was found to be by far the major influence on academic achievement. Both sex and quality of family relationships had little impact on achievement. Although self-esteem was found to correlate .23 (significant at .05 level) with grades — a value remarkably similar to the meta-analysis conclusions of Hattie and Hansford (1980) — it would appear that other antecedents, particularly IQ, could account for all but one third of this association. Thus self-esteem had little independent influence on achievement. Internal locus of control correlated .32 with grades and 60 percent of this association (.19 in magnitude) could not be accounted for by other variables in the model. Locus of control thus had a smallish but not insignificant association with achievement independently of the other antecedents. Our results do not support Brown's (1980) contention that locus of control is related to IQ rather than achievement but do lend some support to Gordon's (1977) hypothesis that self-esteem and locus of control are independently related to achievement. All five antecedents of academic achievement explained 41 percent of the variance of achievement scores.

Conclusions

This study has once again illustrated the value of path-analysis as a technique for analysing complex interrelationships. It has also attempted to cope with the methodological issues raised by Wylie (1979). In general our results were in line with the findings of Western research. Yet it would appear that the relationship between sex and locus of control is different in the Philippines and there may well be a stronger relationship between self-esteem and quality of family relationships in the Philippines relative to that found in Western society. This latter suggestion, of course, is in keeping with the intensely family-oriented nature of Filipino life. Our findings also support the contention of Wylie (1979) that when associations such as that between self-esteem and achievement are being investigated, there is a need to control for variables such as IQ; otherwise spurious conclusions may be reached. However, the results of this investigation need to be cross-validated. In addition, a study with Filipino children from a wider range of social

backgrounds may well lead to the conclusion that socio-economic status has a greater impact on personality and achievement than is indicated in this report.

Clearly the large percentage of variance of the dependent variables not accounted for in this study suggests that there may be a need to uncover other possible antecedents of both personality and achievement. In cross-cultural settings such as the Philippines, this may well involve variables not even considered by Western-inspired psychologists.

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L'origine du self-estime, du locus of control et des résultats scolaires: le cas des enfants Philippines

Un modèle mettant en relation des variables sociales (QI, sexe, statut socio-économique et qualité des relations familiales), des traits de personnalité (self-estime, locus of control), et les résultats scolaires a été construit et testé sur un échantillon de 237 enfants Philippines d'une école secondaire. Comme aucune corrélation significative n'a été observée entre le statut socio-économique et les autres variables, celui-ci a été éliminé du modèle. Les trois variables gardées corrélaient significativement avec le self-estime, et toutes les autres variables sauf les relations familiales corrélaient avec le locus of control. Cependant, contrairement aux résultats observés dans

les pays occidentaux, le locus of control des femmes est plus souvent interne que celui des hommes. On observe que le QI est de loin le facteur le plus déterminant des résultats scolaires et qu'il est responsable de la relation constatée entre cette variable et le self-esteem. Une relation faible mais non négligeable a été observée entre le locus of control et les résultats scolaires lorsque toutes les autres variables sont contrôlées par ailleurs. Ces résultats sont commentés dans le cadre de la situation des Philippines.

THE LEARNING PROCESSES OF AUSTRALIAN UNIVERSITY STUDENTS: INVESTIGATIONS OF CONTEXTUAL AND PERSONOLOGICAL FACTORS

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SUMMARY. Two studies are reported which investigate sex, faculty, and age (academic year) differences in the study methods of students at an Australian university. Significant main effects were found, but there was little evidence of any interactions. Correlations with grade point average indicated that success in Science-based faculties was related to using a deep-level approach to study relatively infrequently adopted by these students. It would seem that it was the young students, the male students, and the students enrolled in Science-based faculties who were most in need of study methods counselling.

INTRODUCTION

THE last few years have seen a revival of research interest into the study methods of tertiary students. This has come about partly through the apparent inability of non-intellective variables (such as motivation, attitudes and personality) to improve prediction of tertiary performance much beyond the level provided by intellective variables (such as IQ and college entrance tests) alone. As the latter class of variables typically account for only 20 to 30 per cent of the variance of grade point average there is considerable room for improvement.

Many tertiary institutions provide study skills courses. Until recently most of these courses and much of the research in this area had worked from the attractive but naive assumption that there is such a thing as a 'good' method of study. Such behaviour as taking careful lecture notes, summarising the important points presented in lectures and textbooks, setting regular time aside for study free from distractions, etc., was assumed to characterise the successful scholar. Unfortunately research has found that quite a few successful students do not waste their time with 'good' study habits while failing students often possess apparently ideal study methods (Lafitte, 1963; Maddox, 1963). Reviews of this literature and their own intensive work in this area have forced researchers such as Biggs (1978) and Entwistle *et al.* (1971) to conclude that all proficient students do not follow the same path to success.

Much of the recent research has focused on those factors which predispose a student to adopt a particular approach to study. It would appear that certain psychological characteristics—such as being a 'divergent' or 'convergent' thinker (Hudson, 1968; Parlett, 1970); being tolerant or intolerant of ambiguity (Biggs, 1970a); being highly or not highly anxious (Stringer *et al.*, 1977) predispose the individual to prefer a particular approach to study. There is also some evidence that males and females may benefit from different approaches to study (Biggs, 1976).

Other researchers have emphasised the context in which the learning takes place and the content of the learning task itself (Lavin, 1965). Thus it would appear that different approaches to study might be differentially effective (a) in Arts and Science subjects (Biggs, 1970b; Goldman and Warren, 1973); (b) in objective and essay tests (Biggs, 1973); and (c) depending on the method for combining marks for the final evaluation (Biggs and Braun, 1972).

Ramsden (1979) has demonstrated that students in different departments perceive themselves to be studying in very different contexts and consequently tend to adopt

different study strategies. It would seem logical that the longer such students spend in a department the more they become socialised into the learning environment of that department. In addition a senior student would normally be studying more advanced topics and is more likely to be expected to demonstrate an independent study capacity. Thus it would be expected that a first year and a senior year student may vary considerably in their approach to study.

The realisation of the complexity of this field of study has influenced some researchers to reject the traditional 'quantitative' psychometric approach (exemplified by much of Entwistle's and Biggs' work) with its use of highly structured questionnaires and sophisticated statistical procedures to identify consistencies in students' approaches to learning, in favour of a 'qualitative' approach (Marton and Svensson, 1979). This latter research method essentially involves looking at how students actually learn through intensive interviews and case study techniques (e.g., Laurillard, 1979).

As Entwistle and Hounsell (1979) point out, the 'qualitative' and the 'quantitative' approaches are essentially complementary in nature. The former provides opportunities to explore and probe the study process domain in a relatively unconstrained manner. If such opportunities are grasped a conceptually rich and accurate description of student learning should be forthcoming. However, there is always some doubt as to the validity and generalisability of such findings. The 'quantitative' approach inevitably restricts consideration to a set of inventory items determined by the researcher and forces the students to report a general approach to learning—thus over-emphasising the consistency of their study behaviour. Yet this approach does have the advantage of providing empirically verifiable, quantitative estimates of the strength of relationships between different aspects of the study process complex. The writers would argue that, at this early stage in this field of study, there is considerable room for further investigation from both research perspectives.

THE RESEARCH

It is clear that the relationship between contextual and personological factors and study methods is a complex one, requiring further investigation. Interactions between these factors have rarely been studied in a systematic, research-oriented way. The purpose of the present paper is to report two studies which explore, from a multivariate perspective, the relationships between the approach to study adopted by students at one Australian university and their sex, faculty, and academic year (age in Study II). The second study will also compare the relationships of tertiary achievement, as measured by Grade Point Average (GPA), with the study methods of students in different faculties.

The setting of our research was the University of New England (UNE). The four major UNE undergraduate faculties were the focus of our work: Arts, Science, Rural Science, and Economics. It has been shown elsewhere that students in these different faculties perceived their academic environments differently (Watkins, 1978) and that students of differing personality types were attracted to and satisfied by the different faculties (Watkins, 1977).

The instruments used in our research and which are described later in this paper were, for Study I, the Biggs' (1976) Study Behaviour Questionnaire (SBQ) while, for Study II, the Biggs' (1979) Study Process Questionnaire (SPQ) and the Inventory of Learning Processes (ILP) (Schmeck *et al.*, 1977). These inventories are recently developed examples of the type of multi-faceted instrument required to explore such a complex area, in contrast to earlier inventories such as the widely used Survey of Study Habits and Attitudes (Brown and Holtzman, 1955) which assumed that only one type of 'good' study methods existed.

STUDY I

Method

Biggs developed the SBQ as a means of operationalising the study process domain. Following the Lewinian approach, he conceived tertiary performance to be influenced by personality and institutional factors via the study process complex. The items of the SBQ represent, in the main, attempts to operationalise those personality variables which Biggs' literature survey indicated may influence the student's approach to academic work. The version of the SBQ studied here was developed after much item analysis, factor analysis and validity work. It has 10 unidimensional scales as outlined in Table 1.

TABLE 1
THE SBQ SCALES (BIGGS, 1976 VERSION)

-
- | | |
|--|--|
| 1. <i>Pragmatism</i> (10 items) | Grade oriented; student sees university qualifications as a means to some other end. |
| 2. <i>Academic motivation</i> (10 items) | Intrinsically motivated; sees university study as an end in itself. |
| 3. <i>Academic neuroticism</i> (7 items) | Overwhelmed and confused by demands of course work. |
| 4. <i>Internality</i> (8 items) | Uses internal, self-determined standards of truth not external authority. |
| 5. <i>Study skills</i> (8 items) | Works consistently, reviews regularly, schedules work. |
| 6. <i>Rote learning</i> (8 items) | Centres on facts and details and rote learns them. |
| 7. <i>Meaningful learning</i> (8 items) | Reads widely and relates material to what is already known; oriented to understand all input material. |
| 8. <i>Test anxiety</i> (6 items) | Worries about tests, exams, fear of failure. |
| 9. <i>Openness</i> (8 items) | Student sees university as a place where values are questioned. |
| 10. <i>Class dependence</i> (7 items) | Needs class structure; rarely questions lecturers or texts. |
-

The SBQ was included in the annual postal survey of UNE internal, full-time, undergraduates carried out by the Educational Research Unit at UNE. Survey forms were sent to a one in three sample of the student body and usable responses were received from 562—a 60 per cent response rate. While such a response rate is typical of such research it must be kept in mind when interpreting the findings of the study. Only subjects for whom complete data were available were used in this research. Forty-four students had to be eliminated therefore. The final sample consisted of 518 students (282 males and 236 females). Of these 231 were enrolled in Arts, 132 in Science, 41 in Rural Science, and 114 in Economics while 182 were first years, 141 second years, 137 third years and 58 fourth year undergraduates.

Results

Finn's (1977) program was used to perform a multivariate analysis of variance of the subjects' scores on the 10 SBQ scales with respect to sex, faculty and academic year. The results are presented in Table 2. All three main effects were significant at the one per cent level while none of the interactions reached this level of significance.

Where there were significant differences due to main effects a step-wise discriminant analysis ultimately forcing in all variables was used to determine which variables contributed most to separating the groups. The following differences were found:

TABLE 2
RESULTS OF MANOVA OF BIGGS' SBQ SCALES ACCORDING
TO SEX, FACULTY, AND ACADEMIC YEAR

Source of variation	df	F	P	
Sex	10	478	6.25	0.00
Faculty	30	1404	3.60	0.00
Year	30	1404	1.68	0.01
Sex $\times$ Faculty	30	1404	1.05	0.39
Sex $\times$ Year	30	1404	1.47	0.05
Faculty $\times$ Year	90	3252	1.15	0.16

Sex. Females scored significantly higher on motivation, study skills and openness and males scored higher on pragmatism, neuroticism, and dependence. In Biggs' terminology the females were more internalising and the males more reproducing.

Faculty. Arts students scored highly on the motivation, internalising, meaning, and openness scales, whereas Science students scored highly on the pragmatism and fact-rote scales. Rural Science students were more worried, dependent and had more organised study skills whereas Economics students were more pragmatic, test anxious and dependent.

When only Arts and Science students were compared, Science students were discriminated from Arts students by high scores on fact-rote, pragmatism, neuroticism and study skills. Thus, Biggs' first factor, reproducing, was the discriminant between Arts and Science students with the latter being more oriented towards reproducing strategies. This finding is in accord with Biggs (1978).

Year. As was predicted, our results clearly indicated that the more years of university study the less likely was a student to use a systematic study method, but the more likely to use internalising and open strategies—the deep level approaches to study.

STUDY II

Study I indicated that there were sex, faculty, and academic year differences in the study processes adopted by UNE students. These factors were further explored in this study. One problem with Study I, however, was that it could not be determined if the differences *apparently* due to senior academic years were *in fact* due to maturity (age and academic year having been confounded in that research). Therefore in Study II the sample was restricted to first year students and sex, faculty and age differences were investigated. In addition the relationships between study methods and academic achievement were examined with respect to faculty to investigate the predictive power of the study method inventories and to see if students were adopting the study methods found to be most successful for others of their group. Two more recently developed study process inventories were also utilised in this study.

Method

The subjects were 249 UNE first year internal undergraduates—once again a 60 per cent response rate. Of this number 138 were male and 111 female; 113 were enrolled in Arts, 53 in Science, 22 in Rural Science, and 61 in Economics; 65 were 18 years of age, 97 were 19, 26 were 20, and 61 were 21 or over.

One of the inventories used was the Biggs (1979) Study Process Questionnaire, an updated version of the SBQ. The SPQ is based on the proposition that students tend to have several broad motives for studying and several broad strategies for going

about their work. Based on his earlier research, Biggs considers the three most important motive/strategy dimensions to be the following:

1. *Utilising*

Motive: to undertake further study as a means of obtaining a better job, more money, or some other extrinsic need.

Strategy: overall, simply to avoid failure and specifically to focus on minimal content, primarily factual, as prescribed in class handouts, course outlines, etc., and to rote learn this necessary minimum for reproduction in examinations and/or assignments.

2. *Internalising*

Motive: to work out one's philosophy of life and to develop special interests and abilities; studies are selected therefore that hold maximum intrinsic interest.

Strategy: to read widely and with maximal understanding (independently of course requirements), to integrate various subjects and make them personally meaningful.

3. *Achieving*

Motive: to excel in studies as part of a general competitive approach to life and win high status thereby; more specifically, to study with a view to maximising grades awarded.

Strategy: close orientation to course outlines, work schedule tightly organised, assignments completed on time, etc.

(from Biggs, 1979, p. 2)

The SPQ consists of 42 items each tapping one of the three broad dimensions presented above and each divided into motive and strategy sub-scales of seven items in length.

The other measuring instrument was the Inventory of Learning Processes. Schmeck *et al.* (1977) have developed the Inventory of Learning Processes (ILP) to assess individual differences in some of the information processing habits shown to be important in laboratory studies of human learning. The ILP consists of 62 items divided into four scales: Synthesis-Analysis (which assesses meaningful as opposed to superficial information processing); Fact Retention (which assesses attention to details and specifics as opposed to generalities); Elaborative Processing (which assesses elaborative as opposed to verbatim processing strategies); and Study Methods (which assesses repetitive, drill and practice habits of processing information).

Results

Finn's (1977) MULTIVARIANCE program was used to investigate mean differences according to sex, faculty, and age. The Biggs and the Schmeck *et al.* sub-scales were analysed separately.

As Study I had indicated the sources of variance of most interest, various optional planned contrasts were specified here. The first related to differences between the responses of males and females. The second set related to faculty differences, while the third related to age differences (see Table 3).

Given that a non-orthogonal design was used, the between-group effects were re-ordered to test the main effects of interest first, then interactions of interest; and finally other 2- and 3-way interactions. All 2-way and all 3-way interactions not of interest were pooled. Table 3 presents a summary of the results from the MANOVA and Table 4 presents the means of the scale scores for both inventories according to sex, faculty and age. Because of the number of statistical tests performed, the $\alpha = 0.01$ level was used to establish statistical significance.

TABLE 3
RESULTS OF MANOVA OF BIGGS AND SCHMECK *ET AL.* INVENTORIES ACCORDING TO SEX, FACULTY,
AND AGE

Factor	Contrast	Biggs' SPQ				Schmeck <i>et al.</i> 's ILP			
		df	F	P		df	F	P	
Sex	Male vs Female	6	215	3.84	0.00	4	217	4.24	0.00
Faculty	Science vs Arts	6	215	10.30	0.00	4	217	5.69	0.00
	Science vs ES	6	215	4.13	0.00	4	217	1.02	0.40
	Science vs RS	6	215	2.71	0.01	4	217	1.97	0.10
Age	18 vs 20	6	215	0.65	0.69	4	217	2.00	0.10
	18 vs ≥ 21	6	215	6.64	0.00	4	217	5.05	0.00
	18 vs ≥ 19	6	215	2.39	0.03	4	217	4.08	0.00
Interactions	Sex vs Arts/ Science	6	215	0.62	0.71	4	217	4.84	0.00
	Sex vs 18/ ≥ 19	6	215	0.70	0.65	4	217	0.75	0.56
	Other 2-way	78	1192	0.84	0.83	52	843	0.81	0.82
	Other 3-way	36	947	1.33	0.09	24	758	2.20	0.00

It can be seen that there were significant differences in the mean vectors on sex, Arts vs Science, 18 vs ≥ 21 for both sets of tests, and Science vs Economic Studies for the Biggs subset, and for 18 vs ≥ 19 on the Schmeck *et al.* subset. Two interactions were also significant on the latter inventory.

It has been recommended often that if the tests for interaction are significant then no tests of main effects are appropriate (Cramer and Appelbaum, 1980). Yet it may be meaningful to investigate certain contrasts in the cell means to aid in interpretation of results. If there are no interactions then one method we can use to investigate differences is by looking at the univariate F tests.

There were three significant variables on the Biggs' subset that discriminated between males and females. Males were higher on utilising strategy and females higher on internalising motivation and internalising strategy. Comparing Arts and Science students, Science students tended to use utilising strategies whereas Arts students were more likely to report internalising motives and strategies. Rural Science students were more motivated by utilitarian reasons than Science students, and Economics students were significantly less internalising than Science students. Those students 21 years of age and over were less utilitarian motivated and more internalising (with respect to both motive and strategy).

For the Schmeck *et al.* inventory, females used organised study methods more than males. Students in Arts were more inclined than those in Science to deep-level processing, scoring more highly on both the Synthesis-Analysis and Elaborative Processing scales. There was an overall trend for older students to depend relatively more on elaborative processing and synthesis-analysis—the deep level approaches.

No significant 2-way interactions were found. There were 3-way significant interactions among contrasts on the Schmeck *et al.* inventory. The MANOVA program was re-run specifying single degree of freedom contrasts on the 3-way interactions. As this violates assumptions regarding the independence of significance tests this tactic must be regarded as exploratory. The results were difficult to interpret intelligibly.

Academic achievement. The correlations found between academic achievement (as measured by GPA) and the study process inventory scales for each faculty are presented in Table 5. With GPA as the dependent variable and the Biggs and Schmeck

TABLE 4
MEANS OF SPQ AND ILP SCALES ACCORDING TO SEX, FACULTY AND AGE

Inventory Scales	Sex		Faculty				Age			
	Male	Female	Arts	Science	Rural Science	Economics	18	19	20	≥21
Utilitarian Motivation	23.87	23.10	23.06	22.38	25.07	24.41	24.72	23.75	23.15	22.05
Utilitarian Strategy	22.76	21.32	20.18	23.60	23.48	24.73	22.88	22.72	21.73	20.51
Internalising Motivation	21.62	23.69	23.67	22.87	21.69	18.36	21.79	21.76	21.89	24.89
Internalising Strategy	22.80	23.92	24.50	22.98	22.67	19.68	22.32	23.49	23.04	25.75
Achievement Motivation	21.38	20.50	20.57	20.76	22.24	20.41	21.17	21.18	20.85	20.62
Achievement Strategy	21.50	21.71	21.17	22.45	21.71	21.41	21.39	21.71	22.04	21.44
Synthesis-Analysis	10.09	10.80	11.25	10.00	9.26	10.27	9.46	10.67	11.50	10.54
Elaborative Processing	9.58	10.13	10.35	9.77	9.23	8.86	9.38	9.70	9.85	10.46
Fact Rote	4.75	5.02	4.79	5.42	4.38	5.32	4.97	5.41	4.42	4.08
Study Methods	11.31	13.22	13.04	11.43	11.53	11.14	11.48	12.18	12.66	12.66

et al. inventory scales as the independent variables, the following multiple Rs were obtained: 0.60 for Arts, 0.75 for Science, 0.72 for Rural Science, and 0.65 for Economics. Thus these instruments were quite useful predictors of academic achievement. This conclusion may be of particular importance given earlier research at UNE which indicated that study methods were not related to college entrance scores.

However, it is evident that there were faculty differences in the relationship with GPA. To have an intrinsic interest in the subjects being studied and to use deep-level processing methods as exemplified by the Schmeck *et al.* Synthesis-Analysis and Elaborative Processing scales is apparently a factor in the success of students in all faculties. Yet the Biggs' Internalising Strategy scale was only significantly related to achievement in Arts students. This situation may simply reflect differences between the Biggs and Schmeck *et al.* scales. However, the much larger correlations with academic success found in the Science-based faculties (but not Arts) for the

TABLE 5
CORRELATIONS OF BIGGS AND SCHMECK ET AL. SCALES WITH GPA ACCORDING TO FACULTY

Inventory Scales	Arts (N = 113)	Science (N = 53)	Rural Science (N = 22)	Economics (N = 61)
Utilitarian Motivation	-0.17	-0.39*	-0.46*	-0.01
Utilitarian Strategy	-0.08	-0.40*	-0.52*	-0.14
Internalising Motivation	0.40*	0.26	0.38	0.30*
Internalising Strategy	0.24*	0.07	0.15	0.00
Achievement Motivation	0.15	-0.05	-0.13	0.09
Achievement Strategy	0.31*	0.09	0.11	0.17
Synthesis-Analysis	0.28*	0.61*	0.56*	0.47*
Elaborative Processing	0.24*	0.25	0.27	0.28*
Fact Rote	0.12	0.30*	0.07	0.25*
Study Methods	0.42*	0.09	0.13	0.43*

* $P < 0.05$

Schmeck *et al.* Synthesis-Analysis relative to the Elaborative Processing scale tend to support Marton and Säljö's (1976) argument that the meaning of the concepts of deep and surface levels of study may differ in different contexts, such as different subject areas.

Organised study methods were particularly beneficial to Arts and Economics students, while scores on Biggs' Utilising Motivation and Strategy scales correlated significantly negatively with achievement in the Science-based faculties—suggesting that the 'minimax' reproductive study methods are not likely to be sufficient for academic success in these faculties (though they may well be a necessary condition fulfilled by virtually all Science students).

CONCLUSIONS

The two studies reported here have tried to explore in a systematic way the relationship between the study methods adopted by students at one Australian university and various contextual and personological factors. By using a multivariate approach it was possible to examine interactions between these variables in a way not attempted in most earlier research. The results have pointed to the existence of main order effects of sex, faculty, and age rather than to high order interactions. In particular, evidence for differences between the study processes of students was found according to the factors set out below:

Sex. Regardless of faculty, academic year or age the females were more likely than the males to show interest in their courses and to adopt a deep-level approach to their work. At the same time the females also generally seemed to possess more organised study methods than the males. The males were more likely to have a pragmatic approach to tertiary study, to be more worried about their work, and to adopt reproducing strategies which would allow them to scrape through their examinations. On the basis of these findings it would be expected that females would have better academic results than males. Indeed studies of academic progress at UNE have shown females to have higher average marks and higher graduation rates than males.

Faculty. Regardless of sex, academic year or age Arts students were the most likely to show intrinsic interest in their courses and to adopt a deep-level approach to their work. Science students tended to be relatively more motivated by vocational concerns and to adopt surface-level reproductive study methods. Rural Science and Economics students, too, were more likely to adopt surface-level strategies and were apparently more anxious and dependent. That such students also tended to have stronger utilitarian motives is not of course surprising given the professional relevance of their courses.

Age. Regardless of sex, faculty, or indeed academic year, the more mature students tended to be less motivated by pragmatic concerns and to be more liable to adopt a deep-level approach to their work. This result may be of significance given the increasing number of mature-age students enrolling at Australian universities and supports the contention that this new clientele may require different teaching methods to those students straight from school (Hore, 1978). However, it would appear that it is the older students who are more likely to use study methods most conducive to academic success. To what extent this result is due to intellectual maturation or to changes in school teaching methods in recent years would require further research to determine.

In general, our results are consistent with those reported in the literature discussed earlier. However, our findings would indicate that in all faculties males (irrespective of age or academic year) and younger students (irrespective of sex or academic year) are more inclined to be pragmatically motivated and to adopt reproductive study methods—approaches to study which are negatively correlated with academic success, especially in Science-based subjects in which the majority of such students are enrolled. This would indicate that much more is involved in the choice of study methods adopted by students than simply the context of learning. Students are not adopting the study methods most likely to lead to academic success in the particular courses they are studying. A detailed analysis of the academic tasks facing students in different courses and the appropriateness of the teaching methods adopted (both at school and at university) may lead to a fuller understanding of this finding.

The tendency of personality factors to be related to study methods also suggests the importance of personological as well as contextual factors. Of course, however, we did find evidence for the relationship of faculty and the study method adopted by students, independently of sex or age, and there are other contextual variables which may be of importance not considered in this research (e.g., methods of instruction, type of assessment).

Clearly there is a need for far more research in this area, from both a 'quantitative' and 'qualitative' perspective, before we can feel confident that we understand why students adopt a particular approach to their studies. While there must always be some doubt about the generalisability of findings from one institution (and with response rates of 60 per cent at that), our results would suggest that it is the young and the male students, particularly in Science-based faculties, who tend to be most in need of study methods counselling.

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Identifying the Study Process Dimensions of Australian University Students

DAVID WATKINS

This investigation of 540 first year university students using the 'approaches to studying' inventory casts doubt on the validity of the meaning/reproducing/achieving model of the study process domain espoused by Entwistle and Biggs. Rather it suggests that the reproducing dimension can be broken down into surface/confusion and operation learning components. Little evidence was found of the role of achievement motivation in the study methods adopted by these students. The surface/confusion factor was the only factor consistently significantly correlated with tertiary grades. This study supports earlier findings with students at another Australian university that arts students and mature students are more likely to adopt deep-level approaches to study. However there was no agreement as to whether males or females were more inclined to adopt such an approach.

The learning processes of tertiary students constitute the focus of this study. While artificial laboratory settings have traditionally been favoured by experimental psychologists, it is now thought that ecologically valid models of the learning processes of tertiary students are more likely to be produced from research within the natural university setting (Entwistle and Hounsell, 1979). Recent years have seen considerable research from this 'natural' perspective, much of it from either one of two contrasting methodologies.

The more traditional 'quantitative' approach involves the development of study method inventories and uses psychometric techniques such as factor analysis, cluster analysis, and multivariate analysis of variance to identify consistencies in study behaviour, their personological correlates, and their educational consequences in terms of academic achievement (see, for example, Biggs, 1976, 1978; Entwistle, Hanley, and Hounsell, 1979). The alternative 'qualitative' approach (exemplified by the work of Marton and Säljö, 1976; Svensson, 1977; Laurillard, 1979) explores the way that students' study methods tend to vary according to the context and content of learning. It favours the use of intensive interviews and case study techniques to look at how students actually go about their learning.

Perhaps surprisingly these two apparently disparate research methodologies have (virtually independently) identified very similar dimensions of student learning. Thus Marton and Säljö (1976), from the analysis of interview protocols in which Swedish students described how they went about a learning task, were able to classify the great majority of their subjects according to whether they were adopting a *deep* or *surface* level of processing.

'Deep level processing' refers to those occasions when students take an active approach to the learning task—focusing attention on the content as a whole,

trying to see the culture as a whole. Contrast this with a mechanical approach to the elements rather than the elements themselves (surface level processing). (Entwistle, 1979), and Entwistle (1979), and Entwistle (1979) with Australian and other analytic studies identified as an approach to the organized approach to the support for the existence of the study process. However, the latter study, tertiary students, alternative Study Process Questionnaire at a Filipino some doubts about the results.

The factor analysis used to identify the study process dimensions of tertiary students. However, the study process dimensions of tertiary students are more likely to be produced from research within the natural university setting (Entwistle and Hounsell, 1979). Recent years have seen considerable research from this 'natural' perspective, much of it from either one of two contrasting methodologies.

THE 'APPROACHES TO STUDYING' INVENTORY

The 'approaches to studying' inventory is a 64-item, 16 sub-scales pilot study and is based on the work of Biggs (1976), Marton and Säljö (1976), Entwistle et al. (1979), Entwistle (1981), and the parallel work of Biggs and Entwistle (1981) on the principal orientations to learning: meaning and reproduction, surface levels of

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trying to see the connections between different parts, thinking about the structure as a whole. On the other hand, a student whose approach is characterized by a mechanical unthinking approach, involving rote learning and focusing on the elements rather than the task as a whole, would be referred to as utilizing 'surface level processing'. These two contrasting learning process orientations closely resemble two of the second order factors obtained by Biggs (1978, 1979), and Entwistle et al. (1979) from factor analysis of their own inventories with Australian and British students respectively. However, each of these factor analytic studies also found evidence for a third major study dimension, identified as an achievement orientation, which was characterized by a highly organized approach to study and high achievement motivation. Further support for the existence of these three study orientations for Australian students was provided by Watkins and Hattie (1980) and Hattie and Watkins (1981). However, the latter study failed to identify these dimensions for Filipino tertiary students, although there was evidence that the scales of the Biggs (1979) Study Process Questionnaire did correlate significantly with academic achievement at a Filipino secondary school (Watkins and Astilla, 1982). This raises some doubts about the cross-cultural validity of these study process dimensions.

The factor analytic studies discussed above showed that inventories could be used to identify characteristic approaches to studying. This implies a considerable degree of consistency in the students' orientations to their learning tasks. However, other researchers have emphasized the variability of student learning depending on the context and content of the task. For instance, Laurillard (1979) conceives the learning process to be a decision-making process in which students choose their study method according to their perception of the task itself and the style of teaching and their own orientation to the task. Ramsden (1979) showed that students in different departments perceived themselves to be in very different contexts and consequently tended to adopt different study strategies. The teaching and assessment methods utilized by some departments seemed to encourage a deep-level approach while other methods would lead students into using surface-level approaches. Thus there is evidence for both the *consistency* and *variability* of students' learning processes. Entwistle et al. (1979) argue that, at this early stage of research in this area, it is legitimate for researchers to concentrate on either consistency or variability provided that in focusing on one of these aspects they do not overlook the other.

THE 'APPROACHES TO STUDYING' QUESTIONNAIRE

The 'approaches to studying' inventory (Ramsden and Entwistle, 1981) is a 64-item, 16 sub-scale questionnaire which was developed after considerable pilot study and is based on the theorizing and research of Entwistle (1975), Biggs (1976), Marton (1976), Pask (1976), Entwistle and Wilson (1977), Entwistle et al. (1979), and Ramsden (1979). According to Ramsden and Entwistle (1981), repeated factor analyses of this inventory together with the parallel work of Biggs (1978, 1979) clearly indicate the existence of two principal orientations to studying. These two dimensions, which they refer to as meaning and reproducing orientations, resemble closely Marton's deep and surface levels of processing respectively. Ramsden and Entwistle also found

Table 1 Means and Four Factor Varimax Solution Loadings >0.25 of Approaches to Studying Sub-scales (N = 540)

Sub-scales	Means	Factors			
		I	II	III	IV
<i>Meaning orientation</i>					
Deep approach	11.31	0.66			
Inter-relating ideas	10.74	0.67			
Use of evidence	9.84	0.51			
Intrinsic motivation	9.48	0.70			- 0.33
<i>Reproducing orientation</i>					
Surface approach	12.31		0.64	0.37	
Syllabus-boundness	7.81	- 0.35	0.35	0.30	
Fear of failure	5.76		0.61		
Extrinsic motivation	6.39	- 0.38			0.75
<i>Achieving orientation</i>					
Strategic approach	10.19			0.43	
Disorganized study methods	9.61		0.57		
Negative attitudes to studying	5.70		0.54		
Achievement motivation	7.85				0.33
<i>Holistic orientation</i>					
Comprehension learning	9.23	0.62	0.25	- 0.29	
Globetrotting	7.33		0.59		
Operation learning	10.15			0.73	
Improvvidence	7.01		0.53	0.42	

some evidence for an achieving dimension similar to that reported by Biggs and for a fourth factor involving disorganized study methods and negative attitudes to study. This latter dimension, which has been found on several occasions to have a relatively strong association with academic progress (Ramsden and Entwistle, 1981), had minor loadings on some aspects of the reproducing orientation. The first three of these dimensions are each represented in the 'approaches to studying' inventory by four sub-scales while the remaining four sub-scales refer to a 'holistic' orientation (see Table 1).

This latter dimension is derived from the work of Pask (1976) and is included in an attempt to maintain a conceptual distinction between styles and strategies of learning. The term 'style' refers to the student's preferred way of tackling learning tasks in general while 'strategy' concerns the way a student elects to tackle a particular learning task. Pask's work focused on probing the way a student goes about understanding a learning task. He found some students used a *holist* strategy involving building up, right from the start, a broad overall view of the learning task. Other students had a narrow focus of interest, attempting to build understanding out of the components, details, and logical steps in the argument—this Pask called a *serialist* strategy. Behind these strategies, Pask argues, lie distinct learning styles. Students who show a consistent preference for *holist* and *serialist* strategies were designated by Pask as utilizing *comprehension* and *operation* learning respectively. Most learning tasks at tertiary level re-

quire both learning styles to be consistently used. Some students carrying a *serialist* learning style will learn by rote but a neglecting' view but a neglecting' view that is failing to use analogies. Entwistle's such stylistic differences in reproducing, and

THE PRESENT STUDY

The aims of the study were to process dimensions of 'studying' inventory and the academic achievement answers to the following questions:

- 1 Do the students' learning styles, evidenced by secondary, resemble tertiary?
- 2 Do these styles differ between the two groups?
- 3 Is there evidence of a relationship between learning style and academic performance?
- 4 Is the 'approaches to studying' inventory a valid measure of learning style?

METHOD

The approaches to studying inventory was administered to 540 students enrolled in the Faculty of Education at the University of Western Australia in 1980 annual examination. The inventory consisted of a 60 item scale calculated from a 100 item scale. fail = 0; pass = 1.

The SPSS program was used for the factor analysis.

RESULTS

The responses to the approaches to studying inventory principal factor analysis. Four eigen values were extracted by the varimax method and the most interpretable factor was identified for all subjects.

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quire both learning procedures to reach a full understanding and this can only consistently be achieved by those students with a versatile style of learning. Some students cannot achieve this and their over-reliance on a particular learning style will lead them into characteristic learning pathologies. Comprehension learning when used exclusively, with a consequent search for a broad overview but a neglect of supporting evidence, is described by Pask as 'globetrotting'. In like vein, over-reliance on operation learning leads to 'improvidence', that is failing to see the learning task in a wider context or to utilize valid analogies. Entwistle et al. (1979) consider that it may be important to include such stylistic differences in study processes in addition to the meaning, reproducing, and achieving dimensions.

THE PRESENT STUDY

The aims of the research described in this paper were to probe the study process dimensions of Australian university students, using the 'approaches to studying' inventory, and to investigate individual differences in these processes and the academic consequences of such differences. To be more specific, answers to the following questions were sought:

- 1 Do the study process dimensions of these Australian students, as evidenced by second-order factor analysis of the approaches to studying inventory, resemble those proposed by Ramsden and Entwistle (1981)?
- 2 Do these factors appear consistently in different subject areas?
- 3 Is there evidence of age, sex, and faculty differences in study behaviour?
- 4 Is the 'approaches to studying' inventory effective in predicting academic performance?

METHOD

The approaches to studying inventory was mailed to all first year students enrolled in the Faculties of Arts, Science, and Economics at the Australian National University in third term, 1980. Only those respondents who sat for the 1980 annual examinations were included in the final sample of 540, which constituted a 60 per cent response rate. Grade point averages (GPAs) were calculated from each subject's examination performance using the weighting: fail = 0; pass = 1; credit = 2; distinction = 3; high distinction = 4.

The SPSS program (Nie, Hull, Jenkins, Steinbrenner, and Bent, 1975) was used for the factor analyses and analyses of variance.

RESULTS

The responses to the approaches to studying inventory were first subjected to principal factor analysis using iteration to provide communality estimates. Four eigen values greater than 1.0 were obtained and three, four, and five factor varimax and oblimax solutions were then examined in order to determine the most interpretable. The sub-scale means and four factor varimax solutions for all subjects are shown in Table 1.

It must be kept in mind that all sub-scales consist of four items (each five-point Likert-type ratings from 4 = Definitely agree to 0 = Definitely disagree)

except for surface approach (six items), syllabus bound and fear of failure (each three items). Thus the range of possible scores on the three, four, and six item sub-scales were 0-12, 0-16, and 0-24, respectively. It can be seen that the clear majority (a mean of at least 60 per cent of the possible total) of students would appear to support the views expressed in each of the sub-scales of the meaning orientation and the syllabus bound, strategic approach, disorganized study methods, and operation learning sub-scales.

The four factor solution shown in Table 1 accounted for 57.7 per cent of the variance. Factor I clearly represents a deep-level approach to study and will be referred to here as a 'meaning' factor. Although the stylistic component of comprehension learning loads highly on this factor, there is little evidence of the presence of the corresponding pathology, globetrotting. However, it is Factors II and III which are particularly interesting. Factor II in many ways resembles Biggs's (1979) utilizing factor with its emphasis on fear of failing, negative attitudes to the course, and preference for a surface approach to learning. However, it also has significant loadings from sub-scales indicating a disorganized approach to study, both learning pathologies, and even a small loading on comprehension learning—Factor II will be referred to as a 'surface/confusion' factor. Factor III has its major loading on operation learning with smaller loadings on improvidence, strategic approach, surface approach, syllabus bound, and (negatively) comprehension learning—it will henceforward be referred to as an 'operation learning' factor.

The fourth factor is clearly dominated by a loading on 'extrinsic motivation'. The implications of this factor analysis will be discussed further in later sections.

When separate factor analyses were conducted for each faculty, a slightly different picture emerged. For both economics and science students, the dominant factor corresponded to the surface/confusion factor described above. However, in both these faculties significant loadings were provided by intrinsic motivation (negatively) and extrinsic motivation. In arts, the surface/confusion factor had substantial loadings on comprehension learning and both learning pathologies. The operation learning factor was much more in evidence for arts and science rather than economics students. In economics, comprehension learning loaded more highly on a separate factor with achievement motivation and globetrotting than it did on the meaning orientation factor.

AGE, SEX, AND FACULTY DIFFERENCES IN STUDY BEHAVIOUR

Owing to some differences between the factor structure of the approaches to studying inventory found in this research and that proposed by Ramsden and Entwistle (1981) the analyses reported here were conducted both on the inventory sub-scales and on factor scores based on the four factor solution presented in Table 1. Both sets of data were subjected to age $\times$ sex $\times$ faculty analyses of variance.

Because of the large number of ANOVAs conducted, the 0.005 level of significance was adopted for hypothesis testing. No evidence of any second or higher order interactions was found. On all four 'meaning orientation' sub-scales and on Factor I (meaning), both main effects of Faculty and Age were

Table 2 Correlation Scores

Sub-scales
Deep approach
Inter-relating ideas
Use of evidence
Intrinsic motivation
Surface approach
Syllabus-boundness
Fear of failure
Extrinsic motivation
Strategic approach
Disorganized study methods
Negative attitudes to study
Achievement motivation
Comprehension learning
Globetrotting
Operation learning
Improvidence
Multiple correlations
Factor I (meaning)
Factor II (surface/confusion)
Factor III (operation learning)
Factor IV (extrinsic motivation)

* $p < 0.01$

** $p < 0.05$

significant—examined students were more following significant differences are indicated.

Age on the extent of the youngest highest and lowest.

Sex on the fear of failure and Factors II (surface/confusion) were higher in each.

Faculty on the syllabus bound, comprehension learning (operation learning) highest and arts lowest the trend was revealed.

CORRELATION

The correlations between the students' grade

Table 2 Correlations of Approaches to Studying Sub-scales and Factor Scores with First Year Grades

	Arts (N = 295)	Economics (N = 89)	Science (N = 156)
<i>Sub-scales</i>			
Deep approach	0.11	0.11	0.15
Inter-relating ideas	0.07	0.12	-0.08
Use of evidence	0.07	0.12	0.02
Intrinsic motivation	0.21*	0.16	0.13
Surface approach	-0.22*	-0.27*	-0.23*
Syllabus-boundness	-0.17*	-0.06	-0.07
Fear of failure	-0.10	-0.14	-0.12
Extrinsic motivation	-0.22*	-0.07	-0.04
Strategic approach	0.02	0.09	0.05
Disorganized study methods	-0.18*	-0.27*	-0.34*
Negative attitudes to studying	-0.25*	-0.23*	-0.30*
Achievement motivation	0.04	0.18	0.28*
Comprehension learning	0.03	0.16	0.00
Globetrotting	-0.25*	-0.03	-0.19*
Operation learning	-0.09	-0.03	-0.12
Improvvidence	-0.10	-0.18	-0.27*
Multiple correlations	0.41*	0.47*	0.54*
Factor I (meaning)	0.14**	0.19	0.07
Factor II (surface/confusion)	-0.26*	-0.25*	-0.36*
Factor III (operation learning)	-0.02	-0.06	-0.05
Factor IV (extrinsic motivation)	-0.13**	0.09	0.10

* $p < 0.01$ ** $p < 0.05$

significant—examination of the relevant means indicated that arts and older students were more likely to have a deep level approach to their study. The following significant main effects were also found (the directions of the differences are indicated in parentheses):

Age on the extrinsic motivation, and negative attitudes sub-scales (the youngest highest in both cases)

Sex on the fear of failure, operation learning, and improvvidence sub-scales and Factors II (surface/confusion) and III (operation learning) (The females were higher in each case.)

Faculty on the syllabus bound, extrinsic motivation, achievement motivation, comprehension learning, and operation learning sub-scales and Factors III (operation learning) and IV (extrinsic motivation) (Economics tended to be highest and arts lowest on all but the comprehension learning sub-scales where the trend was reversed.).

CORRELATION WITH TERTIARY ACADEMIC PERFORMANCE

The correlations between both the inventory sub-scales and factor scores and the students' grade point averages are shown in Table 2 for each faculty.

It is clear that it is Factor II (surface/confusion) which is the only factor substantially and consistently related to achievement. This is also reflected in the consistently significant negative correlations between each of the surface approach, the disorganized approach, and negative attitude sub-scales and grades. There is some evidence of faculty differences in the relationship between study processes and grades in that the influence of the learning pathologies is less evident in economics and that arts students may be more favourably affected by intrinsic rather than extrinsic motivation and a syllabus-free approach.

DISCUSSION

The results of this study would seem to cast some doubt on the earlier findings in this area. Certainly there is clear evidence for a study process dimension representing a deep/meaning orientation to learning—a dimension apparently not contaminated by the pathology of globetrotting. However the inclusion of the stylistic sub-scales (operation learning, globetrotting, and improvidence) does seem to have split Entwistle's (and Biggs's) reproducing and achievement orientations into a surface/confusion dimension and an operation learning dimension.

The reproducing orientation sub-scales such as surface approach and fear of failure are linked not so much to operation learning but rather to a disorganized negative attitude to study, to *both* learning pathologies and even (to a lesser extent) to comprehension learning. It is not surprising that such a confused fearful approach to study should show the highest (negative) correlations with grades across all three university faculties. Operation learning was found not to be associated with this factor but rather with a strategic, presumably organized, surface level approach to study. Neither the operation learning nor the deep-level approach was found to have a strong relationship with grades, which would tend to indicate that, at least in first year courses at this Australian university, either approach to learning is acceptable.

The surface/confusion factor which is evidenced in this research resembles the disorganized/negative attitude factor reported by Ramsden and Entwistle (1981). They showed this factor to have the highest loading on self-rating of academic achievement. However, the reproducing orientation off-loadings that they found to be present but relatively minor were far more pronounced in this study. This factor was also reported in an earlier study of motivation and study methods (Entwistle, 1975) and it may well be time to accord it a place in the list of established study process dimensions—especially in view of its apparent association with academic performance.

There is some indication that these factors may have slightly different meanings according to faculty but considerable further investigation would need to be carried out before one could make any claims from the results reported here.

It would seem that the majority of these students expressed approval for a deep-level approach to learning but also tended to be disorganized and syllabus-bound, and to have utilized operation learning styles on occasions. The analysis of variance results indicated that there is little interaction between approach to learning and age, sex, and faculty. Arts students and more mature

students were counterparts in economics studies approach and were in strong accord. samples of University and economics of students choose academic tasks research, probably more mature study approach to study increasing number and the dearth (1980). Their view those of the teachers Morstain, 1981 majority of older (1980).

There is one England by Wainwright that the males, lack of interest in Yet in this study more highly on learning pathologies Subsequent research conflicting findings to other more future two institutions

CONCLUSION

The results of the differences in studying/reproducing Entwistle and Biggs suggest that the fusion and surface dimension which achievement. It globetrotting and comprehension in the study. The role of tertiary students is if students from been included.

students were more inclined to support a deep-level approach than their counterparts in the other two faculties and younger students, respectively. The economics students were by far the most likely to adopt a surface-level approach and were the most motivated by utilitarian concerns. These findings are in strong accord with those reported by Watkins and Hattie (1981) with two samples of University of New England students. To determine whether these consistent findings of differences between the study processes espoused by arts and economics students are attributable to the different psychological make-up of students choosing to enter these faculties or to factors such as the different academic tasks and teaching methods they encounter would require intensive research, probably of a longitudinal nature. However, the finding that the more mature students at both universities are more likely to adopt a deep-level approach to study, irrespective of sex and faculty, is significant in view of the increasing numbers of mature-age students entering our tertiary institutions and the dearth of knowledge about their learning processes (Hore and West, 1980). Their views of tertiary education would seem to be more in line with those of the teaching staff than are those of their younger peers (Watkins and Morstain, 1981). This may help to explain the apparent relative success of the majority of older students in their tertiary studies reported by Hore and West (1980).

There is one major difference between these results and those found at New England by Watkins and Hattie (1981). In the latter study, it was concluded that the males, with their over-use of surface-level strategies and accompanying lack of interest in their courses, were most in need of study method counselling. Yet in this study, the females, irrespective of age and faculty, are likely to score more highly on the surface/confusion dimension, with its accompanying learning pathologies, which is negatively correlated with examination success. Subsequent research will be needed to investigate whether these apparently conflicting findings are attributable to the idiosyncratic nature of the samples or to other more fundamental factors, such as the type of students entering these two institutions and the teaching methods used at each.

CONCLUSIONS

The results of this study have confirmed earlier findings about faculty and age differences in study processes and have cast doubt on the validity of the meaning/reproducing/achieving model of the study process domain espoused by Entwistle and Biggs. Rather, in line with some of Entwistle's findings, it would suggest that the reproducing dimension can be broken down into surface/confusion and surface/operation learning components. It is the surface/confusion dimension which seems to be most strongly associated (negatively) with tertiary achievement. It is the inclusion of items tapping the learning pathologies of globetrotting and improvidence and the learning styles of operation and comprehension in the Entwistle inventory that allows investigation of this possibility. The role of achievement motivation in the study processes adopted by tertiary students is not evidenced by this study but may well have been supported if students from more professional faculties, such as law and medicine, had been included.

In research currently underway, the author is trying to establish, through the use of intensive interviews probing the everyday learning of students sampled in the present study, (a) the validity of the approaches to learning inventory; (b) the relationship between study processes and the *quality* of learning outcome using Biggs's (1979) SOLO taxonomy; and (c) the influence of the departmental learning environment (including teaching and assessment methods) on the study methods that students adopt. The research of Ramsden and Entwistle (1981) is particularly interesting in this third area as it would seem that changes in teaching method (including improvement in teaching and more freedom to learn) are likely to move students away from surface and towards deep-level approaches to learning and also to improve the quality of what is being learnt. Whether the present academic climate in Australian tertiary institutions is conducive to such change is doubtful, given the lecturers' perceptions of the low priority of teaching in the reward process (Genn, 1980) and their apparent reluctance to give students a say in the tertiary decision-making processes (Watkins and Morstain, 1980).

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A LONGITUDINAL STUDY OF THE
LEARNING PROCESSES OF TERTIARY STUDENTS

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ABSTRACT

A longitudinal study of 540 college students using the Approaches to Studying Inventory provided little evidence that students' learning processes became deeper during the course of their tertiary studies. This is despite many of the most disillusioned of the original sample having withdrawn from their studies or not responding to the follow-up survey. Contrary to predictions, the changes that did occur in approaches to learning were independent of the faculty and the age of the students. No evidence was found for a relationship between depth of processing and an internal locus of control.

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In these days of increased public accountability and restricted government spending on higher education there is a need for tertiary institutions to demonstrate the value of a college education. Although there has been considerable research in this area, the findings are such that some educators have questioned whether there is any evidence that students do benefit from exposure to college teaching (McLeish, 1976).

Many of the U.S. studies into the impact of higher education have focussed on the personality development of the student. Such researchers have typically assumed that during the college years a student should attain a higher level of 'maturation', 'self-actualisation' or 'ego-identity' (Feldman, 1972). Unfortunately, despite some claims to the contrary, the research support for this position has not been strong. This is at least partly because of the difficulty interpreting changes that occur in individual students as unambiguously due to the process of tertiary education (Feldman, 1972). However, a massive longitudinal study involving some 200,000 students from over 300 post secondary institutions has attributed the following effects to a college education: increased social and academic self-esteem; decreased conservatism; increased hedonism; decreased interest in business; and decreased religiousness (Astin, 1977).

Yet, most students and faculty (and probably the population in general) still see the primary aim of college in terms of student

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learning. For example, Percy and Salter (1976) found that U.K. lecturers regarded higher education as providing students with the opportunity to acquire both the specialist competencies of their discipline and the general ability to think critically and independently.

Evidence of the impact of tertiary education on intellectual growth is even less convincing. One method of investigating this phenomenon has been to use cognitive tests such as those developed by the American College Testing Program (ACT) or student grades as evidence of cognitive outcomes. However, both faculty and students tend to see grades as a motivating force rather than as a valid indicator of what the student has learnt from the course (Astin, 1974). The use of admission tests such as the ACT as indicators of cognitive learning outcomes has also been seriously questioned (Dumont & Troelstrup, 1981). But there is little doubt that the weight of evidence using such indicators 'is that, on the average, students make gains in substantive knowledge during the college years' (Bowen, 1977, p.68).

Another problem with these and other tests of cognitive outcomes is that they tend to be based on a quantitative conception of learning - that is, learning is seen in terms of 'how much' or 'how fast'. Yet most academics see a qualitative element such as increased 'rational' and 'critical' thinking as an important outcome of a college education (Percy & Salter, 1976; Keeley, Browne & Kreutzer, 1982). Bowen's (1977) review of the evidence of the

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effect of a college education on rational thinking concluded that students do make gains but that the amount of these gains is modest.

However, most of the studies Bowen reviewed, together with a study by Keeley et al (1982) which reaches a similar conclusion, were cross-sectional in nature. Unfortunately the problems of interpreting cross-sectional studies (e.g., confounding age with generation effects and failure to analyse intra-individual change) are so well documented that there is a clear requirement for longitudinal studies in this area (Feldman, 1972; Brabeck, Note 1).

To date there have been few longitudinal studies of college student intellectual development. Roy Heath, a clinical psychologist at Princeton, in 1954 began a longitudinal study of 36 randomly selected students, matched with controls. He described three types of beginning students: the non-committed; an unpredictable group who were either hyperactive or withdrawn; and the 'hustlers' who were out to make a good impression. Each type of student was capable of developing towards what Heath saw as the ideal student - the 'reasonable adventurer' - who could either critically analyse or be creative when required (Heath, 1964).

William Perry, however, is the researcher who has related the college experience most clearly to qualitative changes in student thinking. Beginning in 1954, Perry conducted several interview studies of small numbers of Harvard and Radcliffe students (Perry, 1970). Perry outlined a developmental scheme which traced the

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students' attitudes to knowledge, to authority, and to their own role as learners. According to Perry, most students, through a Piaget-like process of assimilation and accommodation, come to adopt a more relativistic conception of learning and to accept responsibility for their own learning.

While these two studies are interesting they are based on small numbers of students from elite U.S. colleges conducted about 20 years ago. Both rely heavily on subjective judgements and do not relate their findings to evidence of student achievement. There must be some doubt then about the generality and validity of their findings.

More recent research evidence of the sequentiality of intellectual development during the college years comes from three recently completed longitudinal studies summarised by Brabeck (Note 1). Each of these studies is based on the Reflective Judgement theory of intellectual growth (Kitchener & King, 1981). The Reflective Judgement theory, which has roots in the work of Broughton (1978) and Perry (1970) amongst others, proposes a stage model of intellectual development from stage 1 ('reality is known with certainty') to stage 7 ('knowledge claims can be judged as better or more likely to be correct than others; weight of evidence makes an argument compelling'). The three longitudinal studies referred to by Brabeck (Note 1) all gave some support to the contention that students tend to mature intellectually throughout the college years and that this development followed a sequence predicted by the Reflective Judgement model. While these studies are certainly interesting and the results seem

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impressive it is perhaps too early to judge the adequacy of the model. In particular, there is yet no evidence of contextual or individual factors which might impede or accelerate this growth. Lawson (Note 2) warns that differences between undergraduate and graduate students reported in at least Kitchener and King's (1981) original study may have been due rather to a combination of selection, age, and educational experience.

THE PRESENT STUDY

The research reported in this paper takes a somewhat different approach. It is in essence a longitudinal study of the learning processes of one cohort of students as they progressed from their first to their third year of study at an Australian university. This psychometric investigation was supported by intensive interviews designed both to validate the inventory scales and to find out more about the factors which influence the students' approach to study and the consequences for their learning outcomes.

A structured questionnaire, the 'Approaches to Studying Inventory' (ASI) (Ramsden & Entwistle, 1981), was used to assess the students' learning processes. The sixteen subscales of this inventory which are grouped into four orientations are listed in Table 1.

The first two orientations reflect the ideas of researchers at the University of Gothenburg. Marton and Säljö (1976a, b), from an analysis of the interview protocols of the way Swedish students went

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about reading academic articles, were able to identify two main approaches to this task. The great majority of their subjects could be classified as adopting a 'deep' or 'surface' level of processing. 'Deep level processing' refers to those occasions when students take an active approach to the learning task - focussing attention on the content as a whole, trying to see the connections between different parts, thinking about the structure as a whole. On the other hand, a student whose approach is characterised by a mechanical unthinking approach, involving rote learning and focussing on the elements rather than the task as a whole, would be referred to as utilising 'surface level processing'.

These two contrasting learning process orientations closely resemble two of the second order factors obtained by Biggs (1978, 1979), and Entwistle, Hanley and Hounsell (1979) from factor analyses of their own inventories with Australian and British students respectively. However, each of these factor analytic studies also found evidence for a third major study dimension, identified as an achievement orientation, which was characterised by a highly organised approach to study and high achievement motivation. According to Biggs and Entwistle, each of the 'meaning', 'reproducing' and 'achieving' orientations has a motive and a strategy component e.g., on the 'meaning orientation', increased intrinsic motivation is likely to lead to the student making greater use of inter-relating ideas, of supporting evidence, and a deep approach. Further support for the existence of these three study orientations for Australian students was provided by Watkins and Hattie (1980) and Hattie and Watkins (1981).

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The final four subscales of the ASI reflect the findings of Gordon Pask (1976) and are included in an attempt to maintain a conceptual distinction between styles and strategies of learning. The term 'style' refers to the students' preferred way of tackling learning tasks in general while 'strategy' concerns the way a student elects to tackle a particular learning task. Pask's work focussed on probing the way a student goes about understanding a learning task. He found that some students used a '*holistic strategy*' involving building, right from the start, a broad overall view of the learning task. Other students had a narrow focus of interest, attempting to build understanding out of the components, details, and logical steps in the argument; this Pask called a '*serialist strategy*'. Behind these strategies, Pask argues, lie distinct learning styles. Students who show a consistent preference for holist and serialist strategies were designated by Pask as utilising '*comprehension*' and '*operation*' learning styles, respectively.

Most learning tasks at tertiary level require both learning procedures to reach a full understanding and this can only consistently be achieved by those students with a versatile style of learning. Some students cannot achieve this and their over-reliance on a particular learning style will lead them into characteristic learning pathologies. 'Comprehension learning' when used exclusively, with a consequent search for a broad over-view but a neglect of supporting evidence, is described by Pask as '*globetrotting*'. In like vein, over-reliance on 'operation learning' leads to '*improvidence*', that is failing to see the learning task in a wider context or to utilise valid analogies.

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FIRST STAGE OF STUDY

In the first stage of the study the ASI was given to 540 first year university students (Watkins, 1982). There were significant differences in the students' learning processes according to age, faculty, and sex. Mature age students, who represented about 40 per cent of the sample, were much more likely to adopt deep-level approaches to study than were recent school leavers. Arts students, rather than those enrolled in Economics or Science, were more likely to claim that they utilised a deep-level approach. Few clear trends were found in the sex differences which are discussed later in this paper. Factor analysis cast some doubt on the validity of the model of the study process domain espoused by both Entwistle and Biggs. Rather it suggested that the reproducing dimension could be broken down into surface (pathology) and operation learning components. There was little evidence of the role of achievement motivation in the study methods adopted by these students. Moreover, it was only the surface (pathology) factor which consistently correlated with tertiary grades across disciplines. This latter finding was supported in a second study by Watkins (1983a).

Interviews were conducted with 60 of these subjects. The subjects chosen were the ten highest scorers on the 'meaning orientation' and the ten highest scorers on the 'reproducing orientation' scale from each of the Faculties of Arts, Science and Economics who would agree to be interviewed. Students were asked to describe in their own words the way in which they usually went about their study. It was found

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that the 'blind' interviewers could generally identify the orientation to which the students belonged (Watkins, 1983a). Support was also provided for the validity of the pathology scales of the ASI, 'globetrotting' and 'improvidence'. In addition, each student was asked to talk about a task they had recently been working on in their classes and to describe their approach to the task. It was shown that there was a strong relationship between the quality of the learning outcome on the task as assessed by the SOLO taxonomy (Collis & Biggs, 1982) and the depth of processing the students adopted (Watkins, 1983b). Thus, although depth of processing showed little relationship to the academic grades of these students (Watkins, 1982; 1983a) it was strongly related to the quality of their learning (see also Biggs, 1979; Schmeck & Phillips, 1983).

SECOND STAGE OF STUDY

Research Hypotheses

One of the problems with many previous longitudinal studies in this area has been the failure to consider subjects who do not complete the follow-up survey (Feldman, 1972). This can lead to bias in such studies (c.f. Nielsen, Moos & Lee, 1978). In the present study the follow-up non-respondents can be classified into two groups: those who have withdrawn from study at this University and those who chose not to participate in the second stage of the study. The first two research hypotheses refer to the non-respondents. They are as follows:

Hypothesis 1: There will be a tendency for the students who withdrew to have lower mean scores on the motivation and meaning

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orientation subscales, but higher mean scores on the reproducing orientation, pathology, 'negative attitudes', and 'disorganised study methods subscales' than those who persist in their studies. It is assumed that those who withdraw from their studies are likely to have study methods less appropriate for higher education and/or less motivation to study and subsequently poorer academic performance than those who persist.

Hypothesis 2: There will be no significant differences between the first year learning processes of those persisters who respond or do not respond to the follow-up questionnaire. Investigation of this hypothesis will indicate whether there is any bias in the follow-up sample as predicted by Nielsen et al, (1978).

Research from the 'student learning process' perspective indicates that an adequate model of the study process domain must be able to account for both consistency and variation in the students' approach to study (c.f. the reviews by Ford, 1981 and Wilson, 1981). The remaining hypotheses were proposed to attempt to account for the way the subjects' learning processes would change or remain stable over the course of their tertiary studies. They are as follows:

Hypothesis 3: The students will change, if at all, towards a deeper level of processing. That is, there will be significant increases in scores on the meaning orientation, but significant decreases in those on the reproducing orientation. As students' studies become more complex and their knowledge of the subject matter increased it would be expected that a deeper level of processing would be required.

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As Wilson (1981, p.116) remarks, 'Developing a depth approach may be a condition of academic survival!'.

Hypothesis 4: The students will tend to exhibit fewer pathologies of learning. That is, there will be a significant decrease in 'globetrotting' and 'improvidence' scores. Students who in first year were assessed as displaying learning pathologies would have to correct their faulty learning strategies if they were to survive.

Hypothesis 5: There will be a significant increase in students' scores on the 'strategic approach' subscale. The students over time will become more aware of the academic demands made by their lecturers (Miller & Parlett, 1974).

Hypothesis 6: The students' learning processes will, if anything, become more differentiated by faculty. The differences found in the learning processes of Arts, Science and Economics students in the first stage of this study will be accentuated over the course of their tertiary studies as the students become familiar with the paradigm of their discipline (Kuhn, 1962).

Hypothesis 7: There will be a significant interaction between the ages of the students and any change in their approach to study. The first stage of this study showed that the older students were more likely to have already adopted deep level strategies early in their tertiary studies. It is the younger students who would need to change their approach to study to meet the requirements of senior tertiary courses. Examination of the changes that occur in students

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of different ages should give an indication of the influence of maturation relevant to institutional effects.

Hypothesis 8: Internal attribution of responsibility is a necessary but not sufficient condition for deep level processing.

Acquisition of personal control over one's own learning has been shown to be one of the main transition problems of students progressing straight from school to tertiary study (c.f. Boud, 1981; Mathias, 1981). Deep-level processing is thought, on theoretical grounds, to require the active contribution of the learner (Wilson, 1981) and previous research has, in fact, indicated that internal control is related to depth of processing (Watkins, 1983c; Meier, McCarthy & Schmeck, Note 3). Therefore, it is postulated that it is necessary for the learner to have accepted responsibility for his or her own learning before deep level processing is possible.

Hypothesis 9: There will be a significant relationship between extremity of general information processing style and stability of learning processes. A distinct preference for either simultaneous or successive processing in dealing with the world in general, a preference which may have a neurological basis (Luria, 1975), is likely to be reflected in a consistent approach to study.

Hypothesis 10: Motivation to study will be causally predominant over the corresponding strategy. The motivation/strategy model of the study process complex proposed by both Biggs and Entwistle implies that the reason for studying influences the way the students go about their study.

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Hypothesis 11: The factor structure underlying the ASI will remain invariant over time. The validity of the underlying model will be supported if the factor structure remains stable over time despite changes in the learning process subscales. This is based on Cattell's (1944) contention that if a 'true' underlying factor structure exists, then it should emerge in several studies employing the same variables and in longitudinal studies with these variables.

METHOD

Subjects

Of the first stage sample of 540, 370 were still at this University at the time of the follow-up study in 1982; the students were then nearing the end of their third and, in many cases, final year of tertiary study. The follow-up mail questionnaire was completed by 244 students (a 66 per cent response rate). The great majority of these students were enrolled in the Faculties of Arts (122), Science (75), or Economics (36); of this number, 128 were males and 105 females while 44 were 18 years of age or younger in their first year at ANU, 68 were 19 years, 63 were 20-30 years and 58 were over 30 years of age.

Questionnaires

In the follow-up survey the students were readministered the 'Approaches to Studying Inventory'. At the same time they were asked to complete a 15-item 'cognitive process questionnaire' which was especially designed for this study to assess the students' use of simultaneous and successive processing. Unfortunately this questionnaire

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turned out to have poor psychometric properties and thus only a five-item 'simultaneous processing' scale was utilised in the analysis reported here. In addition, a 24-item tertiary attribution of achievement questionnaire (Perry, Note 4) was included in the survey. This latter questionnaire, which provides separate scores of internal control for success and failure, was found to have satisfactory reliability for research purposes.

In addition, the students were encouraged to comment in their own words on the issues of interest to this research by answering two open-ended questions on the final page of the survey form, namely "Do you feel your approach to study has changed since your first year at ANU?" and "What factors influence your present approach to study?".

Statistical Analysis

The problems of analysing longitudinal data have long been recognised. These include problems with the use of change scores (Cronbach & Furbey, 1970); inferring causality (Rogosa, 1980) and comparing factor analytic models over time (Tucker, 1963; McDonald, 1983). Fortunately recent advances in statistical analysis and availability of computer programs have enabled these difficulties to be largely overcome.

In this research, Finn's (1978) MULTIVARIANCE program was utilised to examine initial differences in the learning process of students who later withdrew, persisting-non-respondents, and persisting-respondents x age x sex x faculty (see Hypotheses 1 and 2) and to test whether faculty x sex x age differences in the learning processes of the

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follow-up sample were similar to those found at the first testing. Finn's program was also used to test Hypotheses 3-7 in an age x sex x faculty covariance analysis with repeated measures over time.

Covariance structure analysis was chosen to test Hypotheses 8-10 using Fraser's (1982) COSAN program, while an improved method of conducting a three mode factor analysis (McDonald, 1983) was used to compare the factor analytic models over time (Hypothesis 11). McDonald's invariant factors multimode model is a simple extension of the classical factor model to repeated measures design. The basic assumption is that the regressions of the measures on a set of common factors are invariant across time. It is possible to specify a factor pattern, and the model can be fitted, with or without a structured mean vector, and with a patterned residual matrix. In the present study covariances were used with the means unconstrained over time and the residual covariance matrices patterned with every submatrix diagonal, to allow for stable specific components (see McDonald, 1983, for details).

The .01 level of significance was adopted for significance testing throughout this study.

RESULTS AND DISCUSSION

The mean learning process subscale scores from the initial testing with withdrawers, persisting-non-respondents and persisting-respondents and from the follow-up session for the latter group are shown in Table I.

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INSERT TABLES I and II ABOUT HERE

When the responses of these three groups from the first testing were subjected to MANOVA all the main effects but none of the interactions were significant (see Table II). That the sex, age, and faculty effects were significant is consistent with the findings when these data were previously analysed by univariate analysis of variance (Watkins, 1982). Further analysis indicated significant differences between the persisting and withdrawing students on the 'disorganised study methods' and 'negative attitudes to studying' subscales. The students who persisted in their studies and responded on both occasions tended to report more organised study methods and less negative attitudes to study than both the withdrawers and persisting non-respondents. This finding indicates that the students who later withdrew from their studies may have had less appropriate study methods and less favourable attitudes towards their work than those who persisted and responded on both occasions, as was predicted. However, by including the persisting non-respondents in the analysis it can be seen that the differences are not simply a persistence vs withdrawal matter. This supports the contention of Nielsen et al (1978) about the existence of bias in the in the follow-up sample; this should be kept in mind when the overall results of the study are being reviewed. Of course, it also raises a strong possibility of bias in the respondents to the original questionnaire.

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The persisting respondents constitute the subjects referred to in the remainder of the results section. When age x faculty x sex MANOVA's were conducted on the responses of this group the results obtained are shown in Table III. It can be seen that sex and faculty main effects were significant in both first and third year testings

INSERT TABLE III ABOUT HERE

but age was significant only in the first year data. No significant interactions were found at either testing.

Further analysis indicated that in both years the females tended to score higher on 'fear of failure' while Arts students had the highest mean scores on 'intrinsic' but the lowest on 'extrinsic motivation'. In the third year sample the females and Arts students tended to score more highly on 'relating ideas' while Economics students tended to have higher scores on the 'syllabus-bound' and 'achievement motivation' subscales. In their first year the over 30 age group had obtained significantly higher mean scores on all strategy subscales of 'meaning orientation' and on 'intrinsic motivation' but by far the lowest mean scores on 'extrinsic motivation'. This suggests that over the course of their tertiary studies, age differences diminished but faculty differences were accentuated. These findings lend support to Hypotheses 6 and 7.

The results of the repeated measures analysis is shown in Table IV. Only the main effect of the means was found to be significant.

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INSERT TABLE IV ABOUT HERE

This indicates that there were significant differences in the learning process subscale scores of these subjects from the first to the third year testing sessions but that these differences were independent of sex, age, and faculty effects or their interactions (thus not supporting Hypotheses 6 and 7).

The mean ASI subscales of the persisting respondents in first and third year can be seen in Table I. Over time there was a significant trend towards 'relating ideas' and 'comprehension learning'. Unfortunately further analysis showed that there were almost significant decreases in the other three meaning orientation subscales causing overall a significant decrease in this orientation over time. This was counter-balanced by an overall significant decrease in the reproducing orientation means which were only found in one of the individual subscales comprising this orientation. There was also a significant overall increase in the number of students expressing negative attitudes towards their studies while there was some apparent decrease in the pathology of globetrotting and in use of the operation learning style. Thus while there was some support for Hypothesis 4, the support for Hypothesis 5 was rather mixed. There was only a minor (non-significant) increase in the overall 'versatility' of the students (in Pask's sense of the term) as measured by combining the 'comprehension' and 'operation learning' subscales.

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Hypotheses 8-10 were quickly assessed without resorting to the COSAN program. This was, in the first case, because no significant relationship was found between internal locus of control and any of the 'meaning orientation' subscales - the indicators of deep level processing. Therefore Hypothesis 8 was not supported. Unfortunately difficulties with the measuring device (see above) ruled out anything but an exploratory look at Hypothesis 9. In fact there was a significant relationship obtained ($r = .15$, $df = 246$, $p < .01$) between the measure of simultaneous processing adopted here and the 'meaning orientation' scale as would be predicted, but a test of Hypothesis 9 will have to await a more adequate method of assessing simultaneous and successive processing. Examination of cross-lagged correlations between each of the three types of motivation and three corresponding strategies indicated no evidence of causal predominance and so Hypothesis 10 was not supported. Reciprocal causation would seem a likely alternative hypothesis.

The results of the three mode factor analyses were then examined to test factor invariance, Hypothesis 11. In the first stage of this analysis it was confirmed (see Table V) that the factor structure advocated by Watkins (1982.) from an analysis of the 540 responses to the ASI from the first testing was indeed a better fit to the data from the persisting-respondents in both their first and third years than that grouping of the ASI proposed by Entwistle and Ramsden (1982). Cross-validation with a subsequent sample of 703 first year students at the same University (Watkins, Note 5) also supported the first

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model rather than that of Entwistle and Ramsden (see also Table V).

INSERT TABLE V ABOUT HERE

An invariant factor model was designed so that the factor pattern (F1) was based on the factor pattern reported above. The means were allowed to alter as a result of changes in mean factor scores and the residual covariance matrices $\underline{U}$ were patterned with every submatrix diagonal. Two models were run with these constraints and (A) with the transformation matrices $\underline{A}_k$ for the factor score covariances lower triangular, and (B) with $\underline{A}_k$ diagonal, (model A allows the variances and covariances of the factor scores to change, whereas model B allows only the variances to change).

Only the 244 persons who completed the ASI in both their first and third years were used in these analyses. A maximum likelihood solution was specified with criterion for convergence of .001.

From an inspection of the covariances in $\underline{A}_k$ it was observed that they were all very close to zero (.01, .06, .12, -.05, -.07). Further as Model B is nested within model A it is possible to use the difference in chi-squared tests to assess the significance of adding the constraints in $\underline{A}_k$ (c.f. Bentler & Bonett, 1980). The difference in chi-squares was 14.61 with 6 degrees of freedom. This is not significant ($p > .01$) thus model B (the more parsimonious) was used in the subsequent interpretation.

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The factor loadings (rescaled by dividing by standard deviations at time 1) are presented in Table VI. All factor loadings are well in excess of their standard errors.

INSERT TABLE VI ABOUT HERE

The change in factor means were $-.03$, $-.08$, $-.00$, and $.18$, for the four factors respectively. The first three means were well within their standard errors ($.04$, $.05$, $.07$), but there is a significant increase in the mean of the fourth factor - extrinsic motivation (standard error = $.05$). There was a slight decrease in the first factor variance ($.86$), the third and fourth had slight increases (1.14 ; 1.10) and the second a negligible change ($.99$).

Therefore this analysis has supported the proposition that the factor structure shown in Table V (Watkins, 1982) was invariant over time. There was a change in the means of the extrinsic motivation factor in the direction of lower extrinsic motivation in third year.

Student Comments

From responses to the open-ended questions it was found that 64 per cent of the students claimed that they had changed their approach to study since first year. The changes most commonly mentioned are set out below.

(a) an improvement in the efficiency of study methods

This was more often reported by Science students as illustrated by the following comments:

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The increased workload has forced me to employ a more efficient time schedule. (Science male)

I don't waste as much time now - I tend to study more efficiently. (Science female)

- (b) increased knowledge of what was wanted influenced the approach of some (often for the worse in terms of understanding):

*Most of all I write what and how 'they' like me to ...
When I get the piece of paper with BA(Hons) then I will write the way I want using MY ideas. This establishment does its utmost to discourage original thought...
(Arts female)*

*I soon learnt to give what the lecturer or tutor wanted ...
my approach to study was conditioned by the need to regurgitate what we were taught. Creative thought is not required for the economics degree. (Economics male)*

- (c) increased cynicism and doubts about the value of tertiary study:

I now see that obtaining a science degree may not be the advantage I once thought in terms of gaining a better job - this gives me a somewhat gloomy outlook. (Science male)

My motivation and curiosity has declined. Nothing is ever thoroughly taught - we sample many dishes but never feed on any ... a good many of the staff no longer believe in what they are teaching. Like most people they are more concerned with material aspects of their jobs. (Arts male)

My keenness has dwindled into cynicism. Don't study unless I have to - rather read comics. (Arts female)

- (d) a change from a surface to a deep level approach:

I tend now to spend more time in trying to understand

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the theory involved in solving problems rather than doing drill sessions. (Science male)

I am conscious of relating my subjects to each other and assessing their consequences and truth in real life than I was in first year. (Arts female)

(e) two other beneficial changes reported by a few students were increased confidence and overcoming of previous learning pathologies:

I feel more confident in my own ability to work well (Science male)

I do not tend to go off on tangents that are not relevant to the main part of the topic. (Arts female)

When the students' responses to the question "What factors influence your present approach to study?" were analysed, the most frequent comments could be summarised as follows.

The main factor was the students' interest in the subject. This could be influenced (negatively) by a boring lecturer and was likely to affect how hard the student was prepared to try and whether they wanted to understand what they were learning. Two other important influences were examination requirements (if seen as minimal little work would be done) and time pressure. The latter, whether due to difficulty fitting study in with job and/or family commitments or to overloading of requirements of continuous assessment, was seen by many keen students as encouraging a superficial approach to study.

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CONCLUSION

In this study an attempt has been made, for the first time, to investigate and to predict the way students' learning processes change during the course of their tertiary studies. Some of the most significant recent developments in research on student learning and in statistical techniques have been utilised to construct and test these hypotheses. By comparing the learning processes of mature age entrants and recent school leavers, it was also possible to independently assess institutional and maturational influences to some extent.

Despite the methodological improvements adopted in this study the results are not clear-cut. There was some evidence that the students' approaches to study became more differentiated by faculty and age differences became less pronounced. However, these findings were not supported by the repeated measures analysis which indicated only a significant main effect over time, that is, suggesting that the differences that did occur were independent of age, faculty, and sex. Moreover, these effects were not always those that would please a university chancellor with many students expressing increased disillusionment with their studies. At least there was evidence both of an increase in comprehension learning, particularly in relation to operation learning, and of a decrease in the pathology of globetrotting. Surprisingly there were significant decreases in mean scores on both the meaning and reproducing orientations. These findings were generally supported by the open-ended comments of the

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students - although there was no indication of better organisation or increased cue-consciousness as the comments might suggest. This may indicate a problem with the validity of these subscales of the ASI.

The results of this study supported the warning of Nielsen et al (1978) against possible bias in follow-up-samples. By comparing the responses of those respondents to the first testing who later withdrew with those who persisted but either did or did not respond to the second testing it was shown that apparent 'withdrawing' versus 'persisting' differences (which would have resulted by ignoring the 'persisting non-respondents') were confounded with bias in the follow-up sample. This is a possibility which may effect the validity of follow-up-studies and their design should allow for its investigation.

Analysis using McDonald's invariant factor model both supported the validity of the first author's suggested factor structure for the ASI and the invariance of this factor structure over time. Cross-validation also supported the first author's factor model rather than that proposed by Entwistle and Ramsden. Taken together with the failure to find any evidence of causal predominance of study motivation over study strategy, this throws some doubt on the motivation/strategy model of learning processes espoused by Biggs and Entwistle.

Overall this study provided little evidence that these students' learning processes improved (i.e. became deeper) during the course of tertiary study at this Australian University. This is particularly

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disturbing when it is remembered that many of the most disillusioned had already withdrawn from their studies or did not respond on the second occasion. A reason for this unfavourable outcome may well be the students' perceptions that deep level learning strategies are not required to satisfy examination requirements. This latter attitude is certainly justified by the low correlations between depth of processing and grades at this University reported earlier. Unfortunately superficial learning strategies are likely to lead to a low quality of learning outcome. However, at least there is a suggestion in these results that it may be possible to evoke greater depth of learning if the lecturers can demonstrate to the students that quality of learning will be reflected by the tertiary grades awarded.

This research, like that of Astin (1979), casts doubt on the likelihood that a model which assumes purely sequential development and does not consider individual differences or the content and context of learning will ever be able to adequately account for the variety of students' approaches to learning during the course of their tertiary studies. Just what variables would need to be included in an adequate model is still too early to determine, but this study does at least question whether 'locus of control' has a significant role to play in this regard.

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TABLE I

Mean learning process subscale scores from first testing of withdrawers and persisting-non-respondents and both testings of persisting-respondents.

	Withdrawers (n=179)	Persisting non-respondents (n=116)	Persisting respondents	
			<u>1st year</u> (n=234)	<u>3rd year</u> (n=234)
<u>Approaches to Studying Inventory Subscales</u>				
<u>Meaning Orientation</u>				
Deep approach	11.23	11.12	11.41	11.06
Inter-relating ideas	11.01	10.70	10.50	10.76
Use of evidence	10.11	9.68	9.74	9.67
Intrinsic motivation	9.23	9.32	9.79	9.55
<u>Reproducing Orientation</u>				
Surface approach	12.64	12.47	11.97	11.99
Syllabus-boundedness	7.91	7.70	7.77	7.59
Fear of failure	5.91	6.05	5.47	5.95
Extrinsic motivation	5.84	6.55	6.63	5.64
<u>Achievement Orientation</u>				
Strategic approach	9.68	10.13	10.44	10.90
Disorganised study methods	10.28	10.69	8.61	8.86
Negative attitudes to studying	6.35	5.77	5.18	5.76
Achievement motivation	7.30	7.97	8.13	7.98
<u>Holistic Orientation</u>				
Comprehension learning	9.40	9.76	8.68	8.89
Globetrotting	7.44	7.97	7.04	6.97
Operation learning	9.91	10.21	10.35	10.15
Improvvidence	7.11	6.77	6.91	6.88

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TABLE II

Summary of MANOVA with ASI subscales for persisting respondents, persisting non-respondents and withdrawers by age, sex and faculty.

Effects	F	<u>p</u>
Sex	6.12	<.01
Age	2.23	<.01
Faculty	6.62	<.01
Persistence	2.34	<.01
Sex x age	0.61	ns
Sex x faculty	0.88	ns
Sex x persistence	0.55	ns
Age x faculty	0.77	ns
Age x persistence	0.85	ns
Faculty x persistence	1.01	ns
Sex x age x faculty	0.97	ns
Sex x age x persistence	0.94	ns
Sex x faculty x persistence	0.98	ns

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TABLE III

Summary of MANOVA with ASI subscales for persisting respondents in first and third year

Effects	First Year		Third Year	
	F	p	F	p
Sex	2.15	<.01	2.70	<.01
Age	1.87	<.01	1.35	ns
Faculty	1.97	<.01	2.44	<.01
Sex x age	0.69	ns	0.88	ns
Sex x faculty	1.00	ns	1.07	ns
Age x faculty	0.76	ns	0.88	ns
Sex x age x faculty	0.96	ns	0.70	ns

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TABLE IV

Summary of repeated measures MANOVA on ASI subscales

Effects	F	<i>p</i>
Main effect	4.29	<.01
Sex	1.51	ns
Age	0.94	ns
Faculty	1.12	ns
Sex x age	0.82	ns
Sex x faculty	1.06	ns
Age x faculty	0.90	ns
Sex x age x faculty	0.70	ns

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TABLE V

Summary statistics comparing the goodness fit of Watkins' model with that proposed by Entwistle and Ramsden.

	1st Year		3rd Year		Cross-validation sample	
	χ^2	df	χ^2	df	χ^2	df
Watkins' model	529.12	92	308.96	92	561.69	92
Entwistle & Ramsden's model	1011.14	98	542.98	98	1120.75	98

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TABLE VI

Rescaled factor loadings of the invariant factors
model (standard errors are in parenthesis).

Variable	<u>Factors</u>			
	I	II	III	IV
Deep approach	.76 (.05)	0	0	0
Inter-relating ideas	.69 (.06)	0	0	0
Use of evidence	.60 (.06)	0	0	0
Intrinsic motivation	.44 (.05)	0	0	.36 (.07)
Surface approach	0	.52 (.06)	.46 (.05)	0
Syllabus boundedness	0	.25 (.05)	.37 (.05)	0
Fear of failure	0	.53 (.06)	.28 (.06)	0
Extrinsic motivation	0	0	0	.92 (.14)
Disorganised study methods	0	.46 (.06)	0	0
Strategic approach	.25 (.06)	0	.36 (.06)	0
Negative attitudes to studying	0	.56 (.06)	0	0
Achievement motivation	0	0	0	.20 (.06)
Comprehension learning	.62 (.06)	0	0	0
Globetrotting	0	.63 (.06)	0	0
Operation learning	0	0	.59 (.06)	0
Improvidence	0	.50 (.06)	.48 (.06)	0