BIGGS’S 3P MODEL OF LEARNING: THE ROLE OF PERSONAL CHARACTERISTICS AND ENVIRONMENTAL INFLUENCES ON APPROACHES TO LEARNING.

Catherine Jones
B. A., B. Beh. Sc. (Hons)

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ABSTRACT

The aim of this research programme was to examine the 3P model of learning (Biggs, 1987a, 1999). The first stage necessarily involved an examination of the Study Process Questionnaire (SPQ) (Biggs, 1987a), an instrument developed to measure the process component of the model. The structure of the SPQ was examined utilising exploratory and confirmatory factor analysis of undergraduate responses (n= 260). The results indicated the higher-order factor structure of deep-achieving and surface-achieving-motive provided the most reliability and a better model fit than either the subscales or scales of the SPQ.

The construct validity of the two constructs deep and surface was assessed next using a multitrait-multimethod matrix (MTMM) constructed from the three measures of the self-report questionnaire, interview ratings and written assessments from first-year students (n = 50). The results indicated good convergent validity between the deep scale of the SPQ and the interview ratings on the deep scale, between the deep scale on the SPQ and the written assessment ratings, and between the interview ratings and written assessment ratings. The results indicated good convergent validity between the surface scale on the SPQ and the interview ratings on the surface scale, but not between the surface scale on the SPQ and the written assessment ratings, and between the interview ratings and written assessment ratings. The discriminant validity between deep and surface was good for the SPQ, but not for either the interview or the written assessment. The findings indicate the deep and surface scales of the SPQ adequately measure the underlying deep and surface constructs.

The retest reliability of the SPQ was then examined utilising Spearman’s Rho to assess the rank-order correlations with a sample of third-year students (n=87). Over a period of three months there were significant correlations for the surface motive, surface strategy, deep strategy, achieving motive and achieving strategy subscales of the SPQ, suggesting good reliability for these subscales. The results at the scale level of the SPQ result in similar conclusions. There was a moderate significant correlation for the surface, deep and achieving scales of the SPQ, suggesting the scales have good reliability over a period of three months. There was also a moderate significant correlation for the surface-achieving-motive and deep-
achieving scales over a period of three months. The stability of SPQ scores was also assessed utilising a series of one-way repeated measures MANOVA’s with a sample of third-year undergraduates (n = 64). The results suggest some change occurs in self-reported use of approaches to learning between the first and third-years of an undergraduate degree programme.

The role of the teaching-learning environment was next examined. Utilising a within-subjects design, undergraduate students (n=48) concurrently enrolled in traditional (viz. lecture and tutorial) and non-traditional (viz. workshops and group projects) subjects completed the SPQ to describe their approaches to learning in each subject. A series of 2x2 repeated measures MANOVA’s were undertaken. The results indicated students were likely to change their approach to learning based on their perceptions of the learning environment (traditional or non-traditional subject). However, those students identified as predominantly surface learners significantly increased their deep scale scores in the non-traditional subject when compared to deep learners.

The next study examined a range of personality (locus of control, sensing function, thinking function, intelligence) and demographic variables (age, gender, year of study) to assess which were good predictors of deep and surface approaches to learning. A series of regression analyses identified age, sensing function and locus of control as significant predictors of the surface, surface-achieving-motive, and deep approaches to learning. Locus of control was found to be a significant predictor of the deep-achieving approach to learning.

The final study examined the 3P model of learning. Based on the results of earlier studies in the research programme the situational component of the presage factors was not included. The model was examined using structural equation modelling (n= 394). Two initial models were tested using both the three (deep, surface, achieving) and two (surface-achieving-motive and deep-achieving) process factor models. The three process factor model provided the better model fit. The results suggest deep and surface approaches to learning do not mediate between personal characteristics and learning outcomes (i.e. GPA).
The results of this series of studies suggest the need for further research into the SPQ and the 3P model of learning. The implications of the research programme are also discussed.
# TABLE OF CONTENTS

**CHAPTER 1: INTRODUCTION**

*Overview*  
*Measurement of Approaches to Learning*  
*Examining the 3P Model of Learning*  

**Aims**

*Validation of the Study Process Questionnaire*  
*Examination of the 3P Model of Learning*  

**Structure**

SECTION 1

**CHAPTER 2: DEVELOPMENT AND MEASUREMENT OF APPROACHES TO LEARNING**

*Overview*  
*Approaches to Learning*  

**Importance of Approaches to Learning**  
*Conceptions of Deep and Surface Learning*  

*Marton and Saljo*  
*Biggs's Methodology*  
*Comparing Definitions of Approaches to Learning*  
*Entwistle: Four Constructs of Learning*  
*Comparing Entwistle and Biggs*  
*The Influence of Cognitive Psychology*  

**Summary**

*Measurement of Approaches to Learning*  

**Quantitative Measurement of Approaches to Learning**  

*Development of the Study Process Questionnaire*  
*Validation Work Conducted on the Study Process Questionnaire*  

*Exploratory factor analysis of the Study Process Questionnaire*  
*Appropriateness of exploratory factor analysis*  
*Appropriate sample size*  
*Choice of exploratory factor analysis procedure*  
*Extraction of factors*  
*Methods of rotation*  
*Internal reliability*  
*Test-retest reliability*  
*Interpreting factor loadings*  
*Studies analysing the Study Process Questionnaire items*  
*Studies analysing the Study Process Questionnaire Subscales*  

*Further exploratory factor analysis studies analysing the Study Process Questionnaire*  

**Summary**

*Problems with exploratory factor analysis*  
*Confirmatory factor analysis of the Study Process Questionnaire*  
*Cultural specificity of the Study Process Questionnaire*  
*Concurrent validity of the Study Process Questionnaire*  

**Qualitative Measurement of Approaches to Learning**  

*Interview Methodology*  
*SOLO Taxonomy Methodology*  
*Multitrait-Multimethod (MTMM) Methodology*  

**Summary and Purpose of Section 1**
CHAPTER 3: THE CONSTRUCT VALIDITY OF THE STUDY PROCESS QUESTIONNAIRE

Overview

Method

Participants

Materials

Procedure

Results and Discussion

Reliability

Cronbach’s Alpha

Test-retest reliability

Subscale Structure

Exploratory Factor Analysis

Confirmatory Factor Analysis

Scale Structure

Exploratory Factor Analysis

Confirmatory Factor Analysis

Subscale Structure

Exploratory Factor Analysis

Confirmatory Factor Analysis

Summary of Strengths and Limitations of the Present Study

Strengths

Limitations

Conclusions

CHAPTER 4: CONCURRENT VALIDITY OF DEEP AND SURFACE CONSTRUCTS AS MEASURED BY THE STUDY PROCESS QUESTIONNAIRE

Overview

Method

Pilot Study: Stage 1: Development of the Measures for the Deep and Surface Approaches to Learning

Participants

Materials

Procedure

Selection of participants

Focus group methodology

Results

Motives for learning

Development of the Interview Protocol and Rating Scale for the Main Study

Pilot Study: Stage 2: Testing of the Interview Protocol, Rating Scale and Written Tasks

Participants

Materials

Procedure

Experts

Focus group members

Stage 2 participants

Results

Interview

Written task

The Main Study: Validation of the Study Process Questionnaire

Participants

Materials

Procedure
### CHAPTER 6: THE STABILITY OF APPROACHES TO LEARNING

<table>
<thead>
<tr>
<th>Section</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Overview</strong></td>
<td>167</td>
</tr>
<tr>
<td><strong>Method</strong></td>
<td>168</td>
</tr>
<tr>
<td>Participants</td>
<td>168</td>
</tr>
<tr>
<td>Materials</td>
<td>168</td>
</tr>
<tr>
<td>Procedure</td>
<td>169</td>
</tr>
<tr>
<td><strong>Results and Discussion</strong></td>
<td>169</td>
</tr>
<tr>
<td>Internal Consistency – Cronbach’s Alpha</td>
<td>169</td>
</tr>
<tr>
<td>Stability of the Study Process Questionnaire</td>
<td>171</td>
</tr>
<tr>
<td>Stability of the SPQ Subscales</td>
<td>172</td>
</tr>
<tr>
<td>Stability of the SPQ Scales</td>
<td>174</td>
</tr>
<tr>
<td>Stability of the Higher-Order SPQ Scales</td>
<td>174</td>
</tr>
<tr>
<td>Anecdotal Evidence on Changes in Approaches to Learning</td>
<td>176</td>
</tr>
<tr>
<td><strong>Summary of Strengths and Limitations of the Present Study</strong></td>
<td>177</td>
</tr>
</tbody>
</table>

### CHAPTER 7: ENVIRONMENTAL INFLUENCES ON APPROACHES TO LEARNING

<table>
<thead>
<tr>
<th>Section</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Overview</strong></td>
<td>179</td>
</tr>
<tr>
<td><strong>Method</strong></td>
<td>181</td>
</tr>
<tr>
<td>Participants</td>
<td>181</td>
</tr>
<tr>
<td>Materials</td>
<td>181</td>
</tr>
<tr>
<td>Procedure</td>
<td>182</td>
</tr>
<tr>
<td><strong>Results</strong></td>
<td>184</td>
</tr>
<tr>
<td>Surface Approach to Learning</td>
<td>187</td>
</tr>
<tr>
<td>Deep Approach to Learning</td>
<td>188</td>
</tr>
<tr>
<td>Differences between Deep and Surface Learners</td>
<td>188</td>
</tr>
<tr>
<td><strong>Discussion</strong></td>
<td>190</td>
</tr>
</tbody>
</table>

### CHAPTER 8: PREDICTING STUDENTS’ APPROACHES TO LEARNING FROM A KNOWLEDGE OF THEIR PERSONAL CHARACTERISTICS

<table>
<thead>
<tr>
<th>Section</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Overview</strong></td>
<td>194</td>
</tr>
<tr>
<td><strong>Method</strong></td>
<td>195</td>
</tr>
<tr>
<td>Participants</td>
<td>195</td>
</tr>
<tr>
<td>Materials</td>
<td>196</td>
</tr>
<tr>
<td>Procedure</td>
<td>198</td>
</tr>
<tr>
<td><strong>Results</strong></td>
<td>198</td>
</tr>
<tr>
<td>Overview</td>
<td>198</td>
</tr>
<tr>
<td>Surface Approach to Learning</td>
<td>199</td>
</tr>
<tr>
<td>Surface –Achieving-Motive Approach to Learning</td>
<td>201</td>
</tr>
<tr>
<td>Deep Approach to Learning</td>
<td>201</td>
</tr>
<tr>
<td>Deep-Achieving Approach to Learning</td>
<td>204</td>
</tr>
<tr>
<td><strong>Discussion</strong></td>
<td>206</td>
</tr>
<tr>
<td>Locus of Control</td>
<td>206</td>
</tr>
<tr>
<td>Personality Type</td>
<td>207</td>
</tr>
<tr>
<td>Age</td>
<td>207</td>
</tr>
<tr>
<td>Intelligence</td>
<td>208</td>
</tr>
<tr>
<td>Gender</td>
<td>208</td>
</tr>
<tr>
<td>Year of Study</td>
<td>209</td>
</tr>
<tr>
<td><strong>Summary of Strengths and Limitations of the Present Study</strong></td>
<td>209</td>
</tr>
<tr>
<td><strong>Conclusions</strong></td>
<td>210</td>
</tr>
</tbody>
</table>
LIST OF TABLES

Table 2.1  The motives and strategies of students approaches to learning  12
Table 2.2. Summary of studies using exploratory factor analysis of the SPQ  25
Table 2.3  Demographic information for studies using exploratory factor analysis of the SPQ  27
Table 2.4  Reliability information for studies using exploratory factor analysis of the SPQ  32
Table 2.5  Summary of studies examining the test-retest reliability of the SPQ  35
Table 2.6  Factor structures for item level investigation of the SPQ and LPQ  37
Table 2.7  Factor structures for subscale investigations of the SPQ and LPQ  41
Table 3.1  Item number and corresponding statements for the SPQ  63
Table 3.2  Cronbach’s alpha coefficients for the subscales and scales of the SPQ  66
Table 3.3  Rotated factor matrices for the motive subscales  71
Table 3.4  Rotated factor matrices for the strategy subscales  72
Table 3.5  Confirmatory factor analysis of the six subscales of the SPQ  75
Table 3.6  Factor loadings for the six subscales of the SPQ  78
Table 3.7  Inter-factor correlations for the subscales of the SPQ  80
Table 4.1  Focus group responses on learning strategies and motives for deep learners  98
Table 4.2  Focus group responses on learning strategies and motives for surface learners  100
Table 4.3  Common learning strategies and motives identified by both deep and surface learners in the focus group  101
Table 4.4  The interview rating scale developed for the pilot study  106
Table 4.5  The SOLO taxonomy  109
Table 4.6  The modified SOLO taxonomy developed for this study  110
Table 4.7  The revised interview rating scale  113
Table 4.8  Cronbach’s alpha coefficients for the subscales and scales of the SPQ  117
Table 4.9  Correlations between responses to the SPQ, interview and written task ratings  119
Table 5.1  Comparison of previous research undertaken on the 3P model of learning  140
Table 5.2  Research undertaken on the relationship between personal characteristics and approaches to learning  145
Table 6.1  Cronbach’s alpha coefficients for the subscales and scales of the SPQ  170
Table 6.2  Means and standard deviations for the two administrations of the SPQ  173
Table 7.1  Structure and teaching methods for traditional and non-traditional subjects  183
Table 7.2  Reliability data for three administrations of the SPQ  185
Table 7.3  Means and standard deviations for the three administrations of the SPQ  186
Table 8.1  Multiple regression of personality variables on the surface approach to learning  200
Table 8.2  Multiple regression of personality variables on the surface-achieving-motive approach to learning  202
Table 8.3  Multiple regression of personality variables on the deep approach to learning  203
Table 8.4  Multiple regression of personality variables on the deep-achieving approach to learning  205
Table 9.1  Inter-factor correlations for the six observed variables in the SEM  220
**LIST OF FIGURES**

| Figure 2.1 | General model of study processes | 7 |
| Figure 2.2 | Systems model of study processes | 8 |
| Figure 2.3 | The hierarchical factor structure of the SPQ | 21 |
| Figure 3.1 | Scree plot diagrams for the six subscales of the SPQ | 70 |
| Figure 3.2 | Two factor model of the SPQ | 81 |
| Figure 5.1 | General model of study processes | 134 |
| Figure 5.2 | Systems model of study processes | 137 |
| Figure 9.1 | The hypothesised 3P model of learning with three approaches to learning | 215 |
| Figure 9.2 | The hypothesised 3P model of learning with two higher-order approaches to learning | 216 |
| Figure 9.3 | The standardised solution for the 3P model of learning with three approaches to learning | 221 |
| Figure 9.4 | The standardised solution for the 3P model of learning with two higher-order approaches to learning | 223 |
### LIST OF APPENDICES

<table>
<thead>
<tr>
<th>Appendix</th>
<th>Title</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Appendix A</td>
<td>The Study Process Questionnaire and Demographic Information</td>
<td>246</td>
</tr>
<tr>
<td>Appendix B</td>
<td>Interview Questions</td>
<td>252</td>
</tr>
<tr>
<td>Appendix C</td>
<td>Different Versions of the 3P Model of Learning</td>
<td>254</td>
</tr>
<tr>
<td>Appendix D</td>
<td>Comments by Students Regarding Assignment Writing with Interpretation</td>
<td>261</td>
</tr>
<tr>
<td>Appendix E</td>
<td>Changes to Study Process Questionnaire for Study 4</td>
<td>269</td>
</tr>
<tr>
<td>Appendix F</td>
<td>Personal Style Inventory</td>
<td>272</td>
</tr>
<tr>
<td>Appendix G</td>
<td>Study Control Questionnaire</td>
<td>277</td>
</tr>
<tr>
<td>Appendix H</td>
<td>Consent Form for Obtaining Grade-Point-Average</td>
<td>280</td>
</tr>
</tbody>
</table>
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To my husband, family and friends who often wondered if we were nearly there yet – I can finally say - yes.
This has not previously been submitted for a degree or diploma in any university. To the best of my knowledge and belief, the thesis contains no material previously published or written by another person except where due reference is made in the thesis itself.
CHAPTER 1
INTRODUCTION

Overview

The concept that students learn in different ways is not new. Academics know that certain students they teach will have a seemingly insatiable desire to learn and understand what they are learning, while others will do the bare minimum required to pass the course being taught (Biggs, 1999). They also know that some academics appear to foster a love of learning in their students, while others do not (Newble & Clarke, 1986). The way students learn is essentially a mix of their own reasons for studying and their perceptions of the learning environment they are in (Prosser & Trigwell, 1999b). Biggs’s (1987a) 3P model of learning provides a useful framework for understanding the way learning occurs. The model proposes personal characteristics and environmental influences (presage factors) combine to create the approach a student uses in their learning (process factors), which in turn influences the learning outcomes (product factors) they are able to attain.

Measurement of Approaches to Learning

The validity and utility of Biggs’s model of learning depends directly on adequate and appropriate measurement of the central construct of approaches to learning. Therefore, an important first step in the analysis of the model is to ensure the measure chosen for this purpose, in this instance the Study Process Questionnaire (SPQ), is valid and reliable. Examination of the psychometric research on the SPQ reveals problems with both research methodologies and the cultural specificity of this instrument. These problems have been particularly highlighted by more recent advances in methods of statistical analysis and guidelines for interpretation of factor analysis. Thus, it was considered important to examine the psychometric properties of the SPQ prior to an investigation of the 3P model of learning.

Examining the 3P Model of Learning

Previous research on the 3P model of learning has tested specific linear relationships between the different components of the model. As a broad range of variables are available for inclusion, a problem with this research has been the lack of consistency in the variables
chosen for inclusion in previous studies. Therefore, a series of studies designed to examine the components of the 3P model, would be a useful first step in the examination of the model.

Aims

The research programme consists of two sections: validation of the SPQ, and examination of the 3P model of learning. The examination of the psychometric properties of the SPQ was considered a necessary precursor to an examination of the 3P model of learning.

Validation of the SPQ

The first section (chapters 2 to 4) examines the construct and concurrent validity of the SPQ. A range of methodologies are employed to examine the factor structure and to assess whether the SPQ is an appropriate measure of the deep and surface approach to learning constructs. To this end the following research questions are addressed.

1.1 Can the theorised first-, second- and third-order factor structures of the SPQ be supported using a convergent exploratory and confirmatory factor analysis approach on an Australian sample?

1.2 What is the retest reliability of the SPQ?

1.3 Do the deep and surface approaches to learning, as measured by the SPQ, reflect the underlying deep and surface learning constructs utilising a multitrait-multimethod approach? That is, do the SPQ deep and surface scores have a strong relationship with deep and surface scores as measured by an interview derived from learners’ and teachers’ judgments of deep and surface learning and a written task based on the SOLO taxonomy?

Examination of the 3P Model of Learning

The second section (chapters 5 to 9) examines the 3P model of learning by considering each component of the model in turn, and then the overall model. To this end the following research questions are addressed.

2.1 Can approaches to learning be considered stable traits?

2.2 What capacity does the SPQ have to be sensitive to changes in approaches to learning in different teaching environments?
2.3 What personal characteristics are predictors of deep learning, and what personal characteristics are predictors of surface learning?
2.4 What is the capacity of the 3P model of learning to explain the relationships between presage, process and product factors in this model?

Structure

The first section, chapters 2 to 4, focuses on examining the validity of the SPQ. Chapter 2 reviews the relevant literature on the SPQ, including the methodological issues associated with factor analysis. Chapter 3 examines the factor structure of the SPQ using a convergent methodology of exploratory and confirmatory factor analysis on the same sample, as well as an examination of the test-retest reliability of the SPQ. Chapter 4 examines the construct validity of the constructs of deep and surface learning using a multitrait-multimethod methodology.

The second section, chapters 5 to 9, investigates the 3P model of learning. Chapter 5 reviews the relevant literature on the development and testing of the 3P model of learning. Chapter 6 examines the stability of approaches to learning using a longitudinal sample across two and a half years. Chapter 7 tests the capacity of the SPQ to measure shifts in approaches to learning between different learning environments using a between-subjects comparison group design, and thus the trait versus situational nature of the approach to learning construct. Chapter 8 examines the presage component of the 3P model, assessing the capacity of a range of personal characteristics to predict deep and surface approaches to learning. Chapter 9 tests the 3P model of learning as a whole, using structural equation modelling on a range of presage, process and product variables identified as salient from the earlier studies in the research programme.

Finally, chapter 10 provides a summary of the findings and discusses the implications of this research programme for educational research and practice. The strengths and limitations of the research programme are examined, and directions for future research are proposed.
CHAPTER 2
DEVELOPMENT AND MEASUREMENT OF APPROACHES TO LEARNING

Overview

The role students’ play in their learning increasingly has become the subject of research. One particular focus has been assessing how students learn in specific circumstances, then generalising these learning experiences to gain a better understanding of how students approach their learning. Over the past 30 years, general agreement has emerged on the basic ways in which students approach learning tasks (see Biggs, 1999; Entwistle, 1991; Kember, Wong & Leung, 1999; Marton, Dall’Alba & Tse, 1993; Prosser & Trigwell, 1999b; Schmeck, 1988a, 1988b; Watkins & Hattie, 1980, 1981). This chapter reviews the literature on approaches to learning, with particular emphasis on the work of John Biggs from 1970 - 1999, with a detailed review and critique of the development and validation of the Study Process Questionnaire (SPQ; Biggs, 1979). In particular the construct validity of the SPQ, the concurrent validity of the deep and surface constructs, and the reliability of the subscales and scales of the SPQ will be discussed. Finally, this chapter provides the context for a series of studies related to these themes.

Approaches to Learning

Approaches to learning have been a focal topic of research for the last 30 years. This research has derived from two theoretical frameworks: student approaches to learning (SAL) and information processing (IP). The SAL framework is derived from qualitative work on student learning (see Biggs, 1993b; Entwistle & Waterston, 1988; Kember, Wong & Leung, 1999; Marton & Saljo, 1976a, 1976b; Prosser & Trigwell, 1999a, 1999b). Several researchers, including Biggs, have used this framework to study the approaches students have to their learning, and the SAL framework is generally viewed as having a student-focussed methodology underpinning its development. This means researchers first gathered information from students in an attempt to understand their learning, rather than imposing a predetermined theoretical stance on approaches to learning and assessing whether the two fitted. Conversely, the IP framework used a “top-down methodology” derived from cognitive
psychology (see Beishuizen, Stentjesdijk & van Putten, 1994; Dyne, Taylor & Boulton-Lewis, 1994; Fergusson-Hessler & de Jong, 1993; Glynn & Muth, 1994; Meyer, 2000; Schmeck, 1988b). This framework is based on the levels of processing (LOP) model developed by Craik and Lockhart (1972) and focuses on the learning strategies used by students, without recognising the broader context in which learning occurs. The discovery of deep and surface approaches to learning by these diverse theoretical frameworks provides credibility to the existence of deep and surface approaches to learning.

Deep learning encapsulates the students' level of involvement with the learning experience. Such students demonstrate an intrinsic interest in their work (Prosser & Trigwell, 1999a) and seek the underlying meanings or relationships in the material they are studying (Biggs, 1999). The underlying feeling consistently associated with deep learning is a sense of affinity with the learning experience (Biggs, 1987a). Surface learning, on the other hand, is a process of seeing learning as a means to an end. Here, students have a clear goal that needs to be attained, and the desire to use minimal input to attain their goal. For example, surface learning involves the use of minimalist methods such as rote learning to meet study requirements (Biggs, 1987a).

It is important to consider the broader context in which these learning approaches occur. Biggs (1993b) criticises the IP framework for being too narrow and ignoring the role of teaching context and individual characteristics identified as important by other researchers on approaches to learning. Just as Biggs considers the IP framework to be too narrowly focussed, the proponents of the more recent relational perspective on learning consider SAL to be too limited (Meyer, 2000; Prosser & Trigwell, 1999a; 1999b; Vermetten, Vermunt & Lodewijks, 1999). Relational theorists consider the separation of the person from their perceptions of their environment to be inappropriate. Instead, they suggest the individual’s awareness of each learning task is influenced by their previous learning experiences and that the individual’s perception of the learning task, based on this awareness, is critical to the student’s choice of learning approach. The next section of this chapter will briefly examine the broader context of learning, with a more detailed analysis provided in chapter 5.
Chapter 2

Importance of Approaches to Learning

Before examining in detail the constructs of deep and surface learning, it is important to consider the context in which these concepts are utilised. The 3P model (Biggs, 1987a) provides a useful context for understanding the importance of approaches to learning. As displayed in Figure 2.1 a student brings personal (personological) elements such as prior knowledge, abilities, home background and their own conceptions of learning to the learning experience. In addition, environmental (situational) influences such as subject area and teaching method play a role in the learning experience. As shown in the 3P model, Biggs (1987a) hypothesised that approaches to learning mediate between these presage factors and the product or outcome of learning. Biggs also suggested students identified as surface learners would have qualitatively and quantitatively different learning outcomes than students identified as deep learners. Therefore, an understanding of approaches to learning is essential before an understanding of their relationship with learning outcomes is possible.

A detailed examination of the various aspects of the 3P model of learning is included in chapter 5. For now, it is important to understand that while the 3P model of learning has undergone many transformations during the past 20 years, the basic components (presage, process and product) have remained constant. The major change in the model has been the incorporation of systemic processes of mutual influence between the learning components (see Figure 2.2). The linear model suggests the students’ personal characteristics and the situation they are in influences the learning approach they adopt, which in turn affects the outcomes they achieve from their learning. For example, a student who is older and has an internal locus of control and currently perceives their workload to be light, will adopt a deep approach to learning, which will result in higher grades and better quality learning. In this version of the model, there is no feedback between learning outcomes and further learning. Conversely, the systems model suggests that as well as the linear progression, there are also feedback loops between the various components of the model. The same student, then, would rethink their understanding of the learning context, and have changes in their motivation for
Figure 2.1. General model of study processes (Biggs, 1987a).
Figure 2.2. Systems model of study processes (Biggs, 1999).
learning based on the approach to learning they adopt. In addition, the outcomes of their learning would also influence the way in which they approached their next learning task. Further, it is important to recognise the dual nature of approaches to learning. Some researchers (Eley, 1992; Schmeck, 1983; Thomas & Bain, 1982) contend approaches to learning are traits and therefore do not change, while Biggs (1999) contends that students have a predisposition to one approach to learning which may, however, be influenced by a range of presage factors. Thus, a student identified generally as a deep learner, if exposed to a particular set of influences in a specific learning environment, may adopt a surface approach to learning.

The approach to learning a student adopts affects the effectiveness of their learning, independent of their own learning goals. The need to impart at least minimum levels of knowledge to students in the learning environment means educators need to understand the role of approaches to learning in how students learn. In particular an understanding of approaches to learning can be of use in academic counselling and diagnosis for underachievers (Biggs, 1987a, 1987b), and matching students with appropriate or optimal teaching staff (Biggs & Telfer, 1987; Booth, 1993; Collier, 1985; Dart & Clarke, 1991). Academic counselling involves assessing the probable causes of students’ difficulties. Knowing how an individual approaches their learning is thus a useful aspect of this diagnostic process. Biggs (1987a) outlines the six common learning profiles and offers suggestions for teachers regarding possible difficulties and tools for measuring approaches to learning. Further, knowing a student’s learning profile can help develop a wide range of study skills. For example, students who are predominantly surface learners may need training in reading for comprehension. Thus, approaches to learning offer a useful shorthand for diagnosing and treating various difficulties that can be encountered in the process of learning.

Research findings (see Biggs, 1978, 1985, 1993b; Biggs & Telfer, 1987; Crooks, 1988; Duckwall, Arnold & Hayes, 1991; Gadzella, Ginther & Williamson, 1986; Richardson & King, 1991; Watkins, 1982a) also suggest the approach to learning adopted by a student influences both the quality and quantity of their learning. Quantitative research for example,
has found a relationship between a deep approach to learning and academic achievement expressed as a higher grade point average (GPA) (see Biggs & Rihn, 1984; Miller, Always & McKinley, 1987; Miller, Finley & McKinley, 1990). Qualitative research has highlighted the relationship between depth of understanding of the material to be learned and a deep learning approach (see Biggs, 1993b; Newstead, 1992; Watkins & Hattie, 1990; Willis, 1993a). Further, deep learning is generally perceived by educationalists as more effective and desirable than surface learning (see Biggs, 1999; Kember & Leung, 1998). Thus, the importance of being able to differentiate between students employing deep and surface approaches to learning becomes apparent, as deep learning is associated with more desirable learning outcomes. It is therefore of prime importance that instruments designed to measure approaches to learning are both reliable and valid.

**Conceptions of Deep and Surface Learning**

Deep and surface learning are stable constructs that have been identified independently by several researchers, including Marton and Saljo (1976a, 1976b), Biggs (1987a), Entwistle (1991) and Schmeck (1988a, 1988b). The following is an analysis of these seminal researchers’ conceptions of deep and surface learning and their influence in understanding approaches to learning.

**Marton and Saljo’s Methodology**

The Gothenberg studies (Marton & Saljo, 1976a, 1976b) are considered to be some of the earliest focal work undertaken to identify approaches to learning. Marton and Saljo employed qualitative methodology in their research on learning approaches. Students were asked to read a selected passage of text. They were then interviewed, asked open-ended questions on how they approached the task and specific questions designed to assess what they understood from the text. Two distinct approaches to learning were identified as being utilised by students. One, labelled deep level processing, recorded the direction of attention to the intentional content of the learning material in order to comprehend the underlying meaning of the information. The second, labelled surface level processing, recorded the direction of attention to remembering the content of the learning material in order to reproduce the
information. Marton and Saljo refer to deep processing as the “signification” of learning, and surface processing as the “sign” of learning.

**Biggs’s Methodology**

At around the same time Biggs (1970a, 1987a) undertook work on approaches to learning from a different perspective, using available literature as the basis for designing a questionnaire to measure approaches to learning. The development of this questionnaire is discussed later in this review. Biggs (1987a, p. 10) defined approaches to learning as “a composite of a motive and an appropriate strategy.” The motives and corresponding strategies combine to create one of three approaches to learning. Motives are the reasons or motivations a student had for undertaking study. Biggs proposes three motives that a student may choose: deep, surface, and achieving. As can be seen in Table 2.1, a student who is deeply motivated studies because they are interested in the subject area. A student who has a surface motive wants to meet the minimum requirements of the course, and thus personal interest in the subject matter is of no concern. Similarly, students with an achieving motive are stimulated by grades rather than interest. However, their primary aim is to obtain the highest grades possible, not simply to pass as is usually the case with students who have a surface motive.

Biggs (1987a, 1987b) proposed that each learning motive be expressed through a corresponding learning strategy. Strategies are the methods employed by students to obtain their goals or fulfill their motivation for studying (see Table 2.1). A student who employed deep strategies would read widely and integrate new information with previous knowledge. Students employing surface strategies would read minimally and limit themselves to the information required to simply pass the subject. Similarly, students employing achieving strategies would be strategic about what they read, and organise their time to maximise their grades. Biggs (1987a) suggested congruency between students’ motives and strategies are important to their conceptions of learning and their overall attitude toward future learning. For example, a student with achieving motives, but using surface strategies, would be unlikely to feel satisfied with the outcome of their learning.
Table 2.1

The motives and strategies of students approaches to learning.

<table>
<thead>
<tr>
<th>Approach</th>
<th>Motive</th>
<th>Strategy</th>
</tr>
</thead>
<tbody>
<tr>
<td>Surface</td>
<td>Meet requirements minimally; balance between failing and working more than is necessary.</td>
<td>Limit target to bare essentials and reproduce them through rote learning.</td>
</tr>
<tr>
<td>Deep</td>
<td>Intrinsic interest in what is being learned; develop competence in particular subjects/courses.</td>
<td>Discover meaning by reading widely, interrelating with previous relevant knowledge etc.</td>
</tr>
<tr>
<td>Achieving</td>
<td>Enhance ego and self-esteem through competition; obtain highest grades, whether or not material is interesting.</td>
<td>Organise one’s time and working space; to follow up all suggested readings, schedule time, behave as ‘model student.’</td>
</tr>
</tbody>
</table>

*Note.* Adapted from Biggs (1987a)
Comparing Definitions of Approaches to Learning

Similarities are evident, with both Marton and Saljo’s (1976a) and Biggs’s (1993b) definitions of deep and surface approaches to learning including dynamics, components and interpretation. Both Marton and Saljo (1976b) and Biggs (1978), utilising different methodologies, initially identified two dynamics that measured approach to learning: deep and surface. While Biggs (1982) referred to the concepts as utilising and reproducing learning, he subsequently adopted Marton and Saljo’s (1976a) terms of deep and surface learning (see Biggs & Kirby, 1984). Marton and Saljo (1976a) suggest surface learning involves rehearsing material for accurate recall, while deep learning involves coding information for meaning. These definitions are consistent with Biggs’s (1989a) own definitions of surface strategy - which involves limiting study to those essential facts able to be reproduced through rote learning - and deep strategy - which involves focussing on the underlying meaning of the material in order to achieve the integration of the material into the broader context. Similarly, both Marton and Saljo (1976a, 1976b) and Biggs’s (1987a) definitions of deep and surface learning share a motivational or intentional component that affects the approach a student uses when learning.

There are, however, two major differences between Marton and Saljo’s (1976a, 1976b) and Biggs’s (1987a, 1999) research on approaches to learning. While both identified deep and surface approaches to learning, Marton and Saljo used student experiences as the basis of their work. Biggs (1987a), on the other hand, used available theoretical literature to develop his questionnaire. Marton and Saljo’s (1976a) use of interview material encompassed the essence of SAL methodology, where the responses of the students became the starting point for developing an understanding of the different processes available in learning. This qualitative methodology contrasts with Biggs’s quantitatively based questionnaire, derived from the theoretical literature on student learning. The finding that the deep and surface processing emerged using quite different methodologies, strengthens the argument for the existence of these two constructs.
The second major difference between Marton and Saljo’s (1976a, 1976b) and Biggs’s (1987a, 1999) findings centres on a third construct of achieving. Marton and Saljo’s (1976a, 1976b) research did not support a third construct measuring approaches to learning, while Biggs (1987a, 1999) found evidence for the achieving approach in both his review of the literature, and his subsequent empirical work on the Study Behaviour Questionnaire (SBQ), the forerunner to the SPQ. The achieving approach to learning is based on the assumption that the goal of the student is to make public his or her own ability to succeed (Biggs, 1987a). Thus, it involves the use of strategies appropriate for reaching this goal. In this way Biggs considers the achieving approach to be conceptually different from both the deep and surface approaches to learning, as its focus is primarily on the way in which learning tasks are organised to succeed, rather than a desire to understand or simply minimally meet requirements in order to reach some other goal. The conceptually different nature of the achieving approach may be one reason why a qualitative methodology did not uncover this approach. Another reason may be Marton and Saljo’s (1976a, 1976b) focus in their studies on the strategies used to complete specific tasks. The achieving strategies may not have been readily identifiable from either the deep or surface strategies, as achieving strategies can be also either deep or surface strategies, depending on the task to be completed.

Entwistle: Four Constructs of Learning

Entwistle and his colleagues (see Entwistle, 1981, 1988, 1991, 1997; Entwistle & Entwistle, 1991; Entwistle, Hanley & Hounsell, 1979; Entwistle & Kozeki, 1985; Entwistle, Kozeki & Tait, 1989a, 1989b; Entwistle & Tait, 1990, 1994; Entwistle & Waterston, 1988), using a similar approach to Biggs (1987a) found four constructs related to approaches to learning, namely meaning (deep), reproducing (surface), achieving, and non-academic. Entwistle defines the achieving orientation in a similar fashion to Biggs’s (1987a) achieving approach, with an emphasis on the desire to achieve good grades using whatever strategies are needed to achieve this end. Entwistle (1981) emphasises that the high grades of the achieving-oriented student do not necessarily require the student to understand the learning material, and understanding will occur only when this is a requisite for a high grade. The
non-academic orientation, as its name implies, relates to those aspects of learning associated with a lack of motivation, negative attitudes, disorganised study and a desire not to be a participant in the learning environment (Entwistle & Tait, 1990).

Further, the definitions of surface and deep learning proposed by Entwistle and his colleagues are very similar to those proposed by Biggs (1978b; 1993b) and Marton and Saljo (1976a, 1976b). According to Entwistle and his colleagues, students using a surface approach to learning focus on the material to be processed. They seek to recall verbatim those facts and ideas presented. The task is seen as separate from the student, with no impact on the broader context of the student’s life. Students using a surface approach are more concerned with completing the task than with improving their own skills and knowledge. Entwistle (1991) defines the learning process in this context as atomistic.

Conversely, Entwistle (1991) defines a deep learning process as holistic. The intention of a deep learning approach is to extract personal meaning from the learning task and to actively process the material. The student challenges the ideas and arguments presented in learning, and tries to integrate these into the broader context of their personal experiences and prior knowledge (Entwistle, 1981). Essentially the student reconstructs their personal framework, or schema, in the light of new information. This process is continuous and is used to integrate the information into an established network of meaningful connections.

Comparing Entwistle and Biggs

Similarities between Entwistle (1981, 1991) and Biggs (1978, 1993b) go beyond the definitions provided for deep and surface learning. Firstly, both researchers independently developed questionnaires to measure approaches to learning, which included deep and surface approaches to learning. Secondly, both researchers agree that although the student’s approach to learning can be influenced by the context and the content of learning, this is mediated by their predisposition to use one approach over the other. Thirdly, both Entwistle (1981, 1991) and Biggs (1978, 1993b) consider the process of learning (strategies) and the intention of learning (motives) to be of importance, where the earlier work of Marton and Saljo (1976a, 1976b) focussed more on the learning strategies being used by the student. The identification
of learning motives and strategies is of particular interest as Entwistle (1981, 1991) and Biggs (1978b, 1993b) used somewhat different methodologies (viz. interviews and literature review respectively) to develop their questionnaires to measure approaches to learning. Thus, both motives and strategies are recognised as important in the understanding of approaches to learning by these researchers.

**The Influence of Cognitive Psychology**

Cognitive psychologists also were able to offer insight into a theoretical understanding of approaches to learning (Craik & Lockhart, 1972). However, their research is more in line with the research undertaken by Marton and Saljo (1976a, 1976b) than Biggs (1987a) and Entwistle (1991). The levels of processing (LOP) model suggests incoming stimuli, such as words, are subjected to a series of analyses starting with shallow sensory analysis and proceeding to deep semantic analysis. The level at which information is processed depends on the nature of the stimuli and the amount of time available for processing. A concept that has some meaning for the individual is more likely to be processed deeply, because it triggers various associations with past experiences. Based on the theory, Schmeck (1988a; Schmeck, Ribich & Ramanaiah, 1977) generated an instrument based on a series of true-false statements about the tactics students employ in their learning. Schmeck (1988a) emphasises the role of learning strategies in the field of approaches to learning. Rather than measuring environmental factors, such as temperature and social stimulation, Schmeck focuses on the relationship between strategies, tactics and outcomes in learning. This differs from the broader perspective of Biggs’s research (1999) and perhaps offers a partial explanation for why the work of IP theorists has been criticised as being too narrow with respect to approaches to learning. Schmeck (1988b) suggests that although much time is spent teaching tactics, little time is spent considering how these various tactics mesh. For example, students who do not relate the material they are learning to their own life can be assisted by being taught self-referencing strategies, rather than the traditional rote learning tactics inherent within most curricula (Schmeck & Meier, 1984).
Schmeck’s (1988a) work differentiates between fact retention, methodical study, deep, and elaborative learning. Memorising tactics are characteristic of a shallow or surface learning style, where comprehension-directed tactics are characteristic of a deep or elaborative learning style. For example, a student who compares and contrasts different sources of material is said to be using deep processing tactics (Schmeck, Geisler-Brenstein & Cercy, 1991), where a student who uses traditional study methods is using methodical study tactics. These definitions differ from Biggs’s (1993b) own definitions of deep and surface approaches. Where Biggs includes both critical thinking and personalising the task in his definition of deep learning, Schmeck separates these into deep and elaborating processing.

Deep processing is defined by Schmeck (1988a) as the tendency to extrapolate beyond the specific information and instruction provided by a teacher to the student in order to learn, where elaborative processing refers to the experiential and self-referencing approach to learning. Schmeck and others have identified the differences between the two in terms of memory, with deep processing being similar to semantic memory and elaborative processing similar to episodic memory. In a similar fashion, Biggs (1987a) includes aspects of fact retention and methodical study within surface learning, where Schmeck (1988a) divides these into separate approaches to learning, labelled fact retention and methodical study. This division of the deep and surface approaches to learning is a major difference between the work of Biggs and Schmeck.

Thus, while the conceptualisation of deep and surface learning approaches provided by Schmeck appears to be more complex than those provided by Biggs and others (Entwistle, 1991; Marton & Saljo, 1976a), a closer inspection suggests the differences between the two are semantic, clearly defined by the theory underpinning the various researchers. For example, in cognitive psychology learning tactics or strategies become the focus of research, as this is how the information is retained in memory, rather than looking further to include the motives students have for participating in their current learning. In spite of the differences between SAL and IP perspectives on approaches to learning, the same basic themes continue
to appear in the literature, suggesting strong and independent support for the existence of the deep and surface constructs.

**Summary**

The general conceptions of deep and surface learning appear to be consistent, despite the diversity of methodologies employed. Marton and Saljo (1976a, 1976b) and Entwistle (1991) used interviews with students to derive deep and surface constructs. Biggs (1987a), in contrast, used an extensive review of the literature as the basis for his work. Nevertheless, both methodologies derived the same constructs. Schmeck (1988a) approached the topic differently again, using IP theory and factor analysis to explore approaches to learning. He still found deep and surface constructs. This consistency across a range of methodological and theoretical perspectives strengthens the argument for the existence of the deep and surface constructs.

However, the review of the researchers has also identified some weaknesses such as a lack of uniformity regarding other potential approaches to learning (viz., achieving approach - Biggs, 1993a; achieving and non-academic orientations - Entwistle & Tait, 1990; methodical study - Schmeck, 1983). Moreover differences in methodology led to the differences in the understanding of approaches to learning. For example, Marton and Saljo’s interview process related to a specific task provided information regarding learning strategies, while Biggs’s review of the literature led to the development of a questionnaire that measured learning motives as well as learning strategies. The next section examines previous research undertaken on the measurement of approaches to learning, particularly the SPQ.

**Measurement of Approaches to Learning**

The methodologies that have been used to test approaches to learning further support deep and surface approaches to learning as stable constructs. Both quantitative and qualitative methodologies have independently established the existence of deep and surface approaches to learning. Quantitative measures include several self-report questionnaires designed to produce learning profiles for students (see Biggs, 1993b; Entwistle, 1991; Schmeck, 1988b). Qualitative measures include interviews and behavioural measures designed to understand the
processes individuals use in approaching their learning (see Biggs & Collis, 1982a; Marton & Saljo, 1976a; Schmeck & Phillips, 1982; van Rossum & Schenck, 1984; Watkins, 1983). Each of these will be discussed in turn in the following sections of this chapter to build an understanding of the scope of previous research and the reasons for undertaking the current research programme.

Quantitative Measurement of Approaches to Learning

There are three important questionnaires designed to measure approaches to learning from the student approaches to learning (SAL) perspective: the Approaches to Studying Inventory (ASI), the Study Process Questionnaire (SPQ) and its high school equivalent, the Learning Process Questionnaire (LPQ). The ASI was developed by Entwistle and his colleagues (see Entwistle, 1981; Entwistle et al., 1979) to cover a range of concepts including approaches to learning, learning styles, motivation and study. The current version of the ASI is the Revised Approaches to Study Inventory (RASI) (Entwistle & Tait, 1994), a 38-item, 5-subscale questionnaire, rated on a five-point Likert scale. The ASI was designed after extensive research using qualitative and quantitative methodologies to implement ‘approaches to studying’ and ‘styles of learning,’ as originally defined by Marton and Saljo (1976a, 1976b). The SPQ was theoretically derived from a literature review that suggested a range of variables presumed to be relevant to approaches to academic learning (Biggs, 1978b). Ten unidimensional scales were developed from the literature to measure the study process domain. The current version of the SPQ (Biggs, 1987a) is a 42-item, six-subscale questionnaire rated on a five-point Likert scale.

Both the ASI and the SPQ are extensively used in educational psychology. The present research programme focuses on the SPQ for two reasons. Firstly, the focus of the second section of this research programme is to examine the 3P model of learning proposed by Biggs (see Figure 2.1). The constructs measured by the SPQ are an integral component of this model. Thus it was considered more appropriate to use the SPQ as a measure of approaches to learning rather than the ASI. It was also considered important to assess the validity and reliability of the SPQ prior to its inclusion in the 3P model, as previous validation work on the
SPQ has predominantly relied on exploratory factor analysis (EFA) to measure the construct validity of the instrument. More recent research indicates this may not be the most appropriate methodology for examining the factor structure of instruments (Tabachnick & Fidell, 2001), and thus it was considered necessary to reassess the factor structure of the SPQ. Secondly, concerns have been expressed by a number of researchers as to the extent of the cultural specificity of both the SPQ and the ASI (see Hattie & Watkins, 1981; Kember & Gow, 1990). As the SPQ was developed using samples of Australian and Canadian students, it was considered that it may be more appropriate for the current research also investigating samples of Australian tertiary students, than the ASI. Also, as most of the validation research undertaken on the SPQ has utilised non-English as a first language samples, it was considered worthwhile to further investigate the SPQ with English as a first language sample. These issues will be discussed further in subsequent sections of this chapter.

Development of the Study Process Questionnaire

The SPQ was originally developed to implement the study process domain (Biggs, 1978b). The 80 items were derived from a literature review that suggested a number of personality variables, presumed to be relevant to approaches to academic learning. Ten unidimensional scales were developed to measure the study process domain and constitute the first order factor structure of the SPQ. Figure 2.3 depicts the three different levels of factor structures of the instrument examined by Biggs. Level one relates to the original ten unidimensional scales derived from the literature review. These unidimensional scales were then reworked to fall in line with other research on approaches to learning, creating the three approaches to learning (deep, surface and achieving) and the three motive (deep motive, surface motive and achieving motive) and three strategy (deep strategy, surface strategy and achieving strategy) subscales of the SPQ. These are regarded as the second level of the SPQ factor structure. Finally, the deep, surface and achieving approaches to learning combine to form two higher-order (level three) factors (deep-achieving and surface-achieving).

Initially, principal components analysis (PCA) with varimax rotation was conducted for three separate samples: Canadian (n=420); Australian (n=150; n=148) to determine the
Figure 2.3. The hierarchical factor structure of the SPQ.
second-order factor structure. The results of the analyses were similar for all groups (see Biggs, 1978b). Scales loading on factor one were fact-rote; pragmatism; test anxiety; academic neuroticism and class dependence. The second factor comprised academic motivation; internality; meaningful learning; and openness. The third factor displayed more variance across the samples; however, study skills consistently loaded the highest. Biggs originally labelled these three factors reproducing, internalising and organising. However, these factors were later renamed surface, deep and achieving (see Biggs & Kirby, 1984) to partly correspond with the surface level processing and deep level processing concepts defined by Marton and Saljo (1976a). These three factors constitute the second-order factor structure. In order to determine whether the achieving subscales could be combined, Biggs (1987a, 1987b) conducted third-order exploratory factor analysis with the deep and surface scales, utilising the aforementioned sample. Results of the analyses suggested that both deep-achieving and surface-achieving combinations were possible. The results of this research added support to Biggs’s (1987b) theoretical notion that achieving is qualitatively different, from both deep and surface approaches to learning.

Biggs (1992, 1993b) subsequently investigated the internal structure of the SPQ, using a large sample of Chinese students (n=2338). The internal consistency of the SPQ was moderate to good for the subscales ranging from .53 (surface motive) to .75 (deep strategy). The test-retest reliability for the six subscales was moderate, ranging from .51 (achieving strategy, deep strategy) to .69 (deep motive) after two months, and from .41 (achieving strategy) to .68 (achieving motive) after four months (refer to Tang, 1991). Test-retest reliability criteria generally accepts up to .4 to be indicative of poor reliability, .41 to .75 as fair to good and greater than .75 as excellent reliability (see Corcoran, & Fischer, 1987). Test-retest reliability of the SPQ is discussed in greater detail in a subsequent section.

Exploratory factor analysis was performed using principal factor analysis (PFA) with varimax rotation. Each subscale was hypothesised to load on a single factor. Four subscales: surface strategy, deep strategy, achieving motive and achieving strategy displayed single factor solutions. The surface motive and deep motive subscales, however, each yielded two
factor solutions. The conceptual purity of the surface motive and deep motive subscales can be considered questionable because each of these subscales appears to contain two distinct factors: five items loaded on the first factor of surface motive, and two on the second factor; four items loaded on the first factor of deep motive and three items on the second factor.

At the same time Biggs (1992, 1993b) also conducted confirmatory factor analysis (CFA) on the six-sub scales of the SPQ. Using LISREL, Biggs undertook separate CFAs on each of the subscales. The two goodness-of-fit (GOF) criteria utilised in Biggs’s analyses were the goodness-of-fit (GFI) index and the root-mean-square residual (RMR). The GFI measures whether the proposed model is better than no model. The GFI index ranges from 0 (no fit) to 1 (perfect fit) with values above .90 considered a good fit (Mueller, 1996; Schumacker & Lomax, 1996). The GFI indices for the SPQ subscales were all above .97, suggesting a good fit. The RMR refers to the degree of misfit between the model and the data. The researcher defines the level for the RMR, as this residual is unstandardised, and is sometimes difficult to interpret (Tabachnick & Fidell, 2001). However, a small RMR is considered to indicate a good model fit (Schumacker & Lomax, 1996). Biggs (1992) selected .05 as the level for his analyses. Based on this, the majority of the RMR for the subscales are < .05, ranging from .035 (achieving strategy) to .044 (deep motive). The RMR for the surface motive subscale was .072, suggesting some unaccounted for variance within this subscale. Thus, the findings from both the early exploratory and more recent confirmatory factor analyses, suggest the surface motive subscale is not conceptually pure and warrants further investigation.

Recently, Biggs, Kember and Leung (2001) published a revised version of the SPQ, the R-SPQ-2F, which consists of 20 items designed to measure deep and surface approaches to learning. Their rationale for this revision was to update the instrument and to provide a short-form for use by teachers. The items consist of a mix of items from the SPQ and new items taken from a pool of items developed for the new instrument. Confirmatory factor analysis was undertaken on the R-SPQ-2F utilising a Hong Kong sample (n=495). Biggs et al. suggest the removal of the achieving scale from the instrument was based on the different nature of this scale, and the increase in research findings suggesting a two-factor higher-order solution
to the SPQ, mapping achieving over the deep and surface scales. An analysis of the R-SPQ-2F, while beyond the scope of this research programme, highlights problems associated with the achieving scale of the SPQ. Based on the research to date it was decided that the achieving scale should not be included in a study of the constructs underlying approaches to learning, as there have repeatedly been issues raised regarding the conceptual purity of the achieving scale and its ability to stand alone as a scale (Biggs, 1987a; Bolen, Wurm & Hall, 1994; Kember & Leung, 1998; Rowell, Dawson & Pollard, 1993; Watkins & Dahlin, 1997; Wong, Lin & Watkins, 1996). Biggs et al.’s (2001) recent decision to remove the achieving scale is consistent with this decision in the current thesis.

Validation Work Conducted on the Study Process Questionnaire

Most validation studies of the SPQ have focussed on the construct validity of the instrument. Construct validity is the measurement of the validity of a construct or theme (Fallowfield, 1993) commonly analysed using factor analysis (Babbie, 1992). While there have been a number of factor analytic studies conducted on the SPQ; the majority of these studies have used EFA (see Table 2.2). There have been only a limited number of studies employing CFA, and few investigating the concurrent validity of the constructs.

Exploratory factor analysis of the Study Process Questionnaire. Validation work on the SPQ spans a period of 30 years. During this time, there have been many advances in statistical methodology related to factor analysis. It is important to review and critique the validation work on the SPQ in the light of current developments with EFA methodology (see Fabrigar, MacCallum, Wegener & Strahan, 1999). The five issues of particular interest to the SPQ relate to: the appropriateness of EFA to the research question; sample size; the choice of a specific procedure; decisions regarding extraction of factors; and the choice of a specific rotation (see Comrey & Lee, 1992; Fabrigar et al., 1999; Tabachnick & Fidell, 2001). It is also of importance to consider the limitations associated with EFA, as these further affect the validation work undertaken on the SPQ. Finally, the cultural specificity of the SPQ has been repeatedly questioned (for a review see Watkins & Biggs, 1996), and there have been several
### Table 2.2

*Summary of studies using exploratory factor analysis of the SPQ*

<table>
<thead>
<tr>
<th>Researcher(s)</th>
<th>Year</th>
<th>Analysis</th>
<th>Rotation</th>
<th>No. of factors extracted</th>
</tr>
</thead>
<tbody>
<tr>
<td>Watkins &amp; Hattie</td>
<td>1980</td>
<td>Not</td>
<td>Varimax</td>
<td>5</td>
</tr>
<tr>
<td>Watkins &amp; Astilla</td>
<td>1982</td>
<td>PAF</td>
<td>Not Reported</td>
<td>2</td>
</tr>
<tr>
<td>O’Neil &amp; Child</td>
<td>1984</td>
<td>PAF</td>
<td>Varimax/Oblim</td>
<td>13</td>
</tr>
<tr>
<td>Ramsden et al</td>
<td>1989</td>
<td>Not</td>
<td>Oblique</td>
<td>6</td>
</tr>
<tr>
<td>Kember &amp; Gow</td>
<td>1990</td>
<td>PFA</td>
<td>Varimax</td>
<td>10</td>
</tr>
<tr>
<td>Beckwith</td>
<td>1991</td>
<td>Not</td>
<td>Varimax</td>
<td>6</td>
</tr>
<tr>
<td>Christensen et al.</td>
<td>1991</td>
<td>PCA</td>
<td>Varimax</td>
<td>6</td>
</tr>
<tr>
<td>Kember &amp; Gow</td>
<td>1991</td>
<td>PFA</td>
<td>Varimax</td>
<td>10</td>
</tr>
<tr>
<td>Rowell et al.</td>
<td>1993</td>
<td>Not</td>
<td>Not Reported</td>
<td>2</td>
</tr>
<tr>
<td>Bolen et al.</td>
<td>1994</td>
<td>PFA</td>
<td>Varimax</td>
<td>6</td>
</tr>
<tr>
<td>Volet et al.</td>
<td>1994</td>
<td>PFA</td>
<td>Varimax</td>
<td>8</td>
</tr>
<tr>
<td>Akande</td>
<td>1997</td>
<td>PFA</td>
<td>Varimax/Oblim</td>
<td>5</td>
</tr>
<tr>
<td>Watkins &amp; Akande</td>
<td>1994</td>
<td>PFA</td>
<td>Oblique</td>
<td>2</td>
</tr>
<tr>
<td>Watkins &amp; Murphy</td>
<td>1994</td>
<td>PFA</td>
<td>Varimax/Oblim</td>
<td>2</td>
</tr>
<tr>
<td>Albaili</td>
<td>1995</td>
<td>PFA</td>
<td>Oblique</td>
<td>2</td>
</tr>
<tr>
<td>Hilliard</td>
<td>1995</td>
<td>FA</td>
<td>Varimax</td>
<td>6</td>
</tr>
<tr>
<td>Watkins &amp; Dahlin</td>
<td>1997</td>
<td>PFA</td>
<td>Oblique</td>
<td>2</td>
</tr>
<tr>
<td>Akande</td>
<td>1998</td>
<td>FA</td>
<td>Oblique</td>
<td>2</td>
</tr>
<tr>
<td>Burnett &amp; Dart</td>
<td>2000</td>
<td>M-LFA</td>
<td>Oblim</td>
<td>3</td>
</tr>
<tr>
<td>Zhang</td>
<td>2000</td>
<td>PFA</td>
<td>Oblim</td>
<td>2</td>
</tr>
</tbody>
</table>

*Note.* PAF = Principal Axis Factoring; PFA = Principal Factor Analysis; PCA = Principal Components Analysis; FA = Factor Analysis; MLFA = Maximum Likelihood Factor Analysis.
EFA studies undertaken to look specifically at this question. Each of these issues will be
discussed in relation to the validation work undertaken on the SPQ.

**Appropriateness of exploratory factor analysis.** The first issue of particular interest is
whether EFA is an appropriate technique for undertaking validation work on the SPQ. EFA
is primarily designed to summarise or reduce data at the early stages of research (Tabachnick
& Fidell, 2001), not to test theories about latent models, as is required for direct testing of the
structure of the SPQ designated by Biggs (1993b). Thus, a more appropriate methodology for
this work would be CFA. However, the preponderance of EFA research on the SPQ must be
considered in light of the methodologies available when the research was originally
undertaken. CFA has only gained wide acceptance and use within the last decade. It is
interesting to note that current researchers (Burnett & Dart, 2000; Zhang, 2000) still employ
EFA as a validation tool on the SPQ, suggesting there is still some inconsistency regarding
the role for EFA and CFA within research of this type.

**Appropriate sample size.** The second issue of interest is what sample size is acceptable
for EFA research. Previously a sample size of 100 was considered poor, 300 good, and 1000
excellent based on Comrey and Lee’s (1992) criteria (see also Tabachnick & Fidell, 2001).
More recently, Fabrigar et al. (1999) reviewed the appropriateness of this, suggesting instead
the sample size required should be considered in terms of the strength of the factor loadings.
If factor loadings are low (.30) then a large sample in excess of 1000 may not even be large
enough. Conversely, if the factor loadings are high (> .80) then a smaller sample of 100 –
150 is acceptable. The application of these criteria to the SPQ reveals some limitations in
previous studies.

Table 2.3 provides demographic information for the validation studies conducted on the
SPQ. As can be seen, the sample size for these studies ranges from 109 (Beckwith, 1991) to
2143 (Kember & Gow, 1991). Beckwith’s (1991) sample would be considered poor based on
the traditional understanding of sample size, however, it might be currently considered
acceptable in light of the more recent criteria (viz. Fabrigar et al., 1999). According to
Comrey and Lee’s (1992) criteria, Beckwith (1991) should have had a minimum sample size
### Table 2.3

**Demographic information for studies using exploratory factor analysis of the SPQ**

<table>
<thead>
<tr>
<th>Researcher(s)</th>
<th>Year</th>
<th>N</th>
<th>Nationality</th>
<th>Instrument</th>
</tr>
</thead>
<tbody>
<tr>
<td>Watkins &amp; Hattie</td>
<td>1980</td>
<td>562</td>
<td>Australian</td>
<td>SBQ</td>
</tr>
<tr>
<td>Watkins &amp; Astilla</td>
<td>1982</td>
<td>275</td>
<td>Filipino</td>
<td>LPQ</td>
</tr>
<tr>
<td>O’Neil &amp; Child</td>
<td>1984</td>
<td>245</td>
<td>British</td>
<td>SPQ</td>
</tr>
<tr>
<td>Ramsden et al</td>
<td>1989</td>
<td>1475</td>
<td>Australian</td>
<td>SPQ</td>
</tr>
<tr>
<td>Kember &amp; Gow</td>
<td>1990</td>
<td>1043</td>
<td>Chinese</td>
<td>SPQ</td>
</tr>
<tr>
<td>Beckwith</td>
<td>1991</td>
<td>109</td>
<td>Not reported</td>
<td>SPQ</td>
</tr>
<tr>
<td>Christensen et al.</td>
<td>1991</td>
<td>328</td>
<td>Australian</td>
<td>SPQ</td>
</tr>
<tr>
<td>Kember &amp; Gow</td>
<td>1991</td>
<td>2143</td>
<td>Hong Kong</td>
<td>SPQ</td>
</tr>
<tr>
<td>Rowell et al.</td>
<td>1993</td>
<td>226</td>
<td>Australian</td>
<td>LPQ</td>
</tr>
<tr>
<td>Bolen et al.</td>
<td>1994</td>
<td>532</td>
<td>American</td>
<td>SPQ</td>
</tr>
<tr>
<td>Murray-Harvey</td>
<td>1994</td>
<td>423</td>
<td>Australian</td>
<td>SPQ</td>
</tr>
<tr>
<td>Volet et al.</td>
<td>1994</td>
<td>434</td>
<td>Australian</td>
<td>SPQ</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>International</td>
<td>(short-form)</td>
</tr>
<tr>
<td>Watkins &amp; Akande</td>
<td>1994</td>
<td>265</td>
<td>Nigerian</td>
<td>SPQ</td>
</tr>
<tr>
<td>Watkins &amp; Murphy</td>
<td>1994</td>
<td>192</td>
<td>English</td>
<td>SPQ</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>ESL</td>
</tr>
<tr>
<td></td>
<td></td>
<td>257</td>
<td>Malay</td>
<td>SPQ</td>
</tr>
<tr>
<td></td>
<td></td>
<td>75</td>
<td>Malay</td>
<td>SPQ</td>
</tr>
<tr>
<td>Albaili</td>
<td>1995</td>
<td>246</td>
<td>Arabic</td>
<td>SPQ</td>
</tr>
<tr>
<td>Hilliard</td>
<td>1995</td>
<td>339</td>
<td>Canadian</td>
<td>SPQ</td>
</tr>
<tr>
<td>Watkins &amp; Dahlin</td>
<td>1997</td>
<td>149</td>
<td>Swedish</td>
<td>SPQ</td>
</tr>
<tr>
<td>Akande</td>
<td>1998</td>
<td>750</td>
<td>South African</td>
<td>SPQ</td>
</tr>
<tr>
<td>Burnett &amp; Dart</td>
<td>2000</td>
<td>1994</td>
<td>Australian</td>
<td>SPQ</td>
</tr>
<tr>
<td>Zhang</td>
<td>2000</td>
<td>67</td>
<td>American</td>
<td>SPQ</td>
</tr>
<tr>
<td></td>
<td></td>
<td>678</td>
<td>Hong Kong</td>
<td>SPQ</td>
</tr>
<tr>
<td></td>
<td></td>
<td>167</td>
<td>Nanjing</td>
<td>SPQ</td>
</tr>
</tbody>
</table>

**Note.** SPQ = Study Process Questionnaire; SBQ = Study Behaviour Questionnaire; LPQ = Learning Process Questionnaire
of 300 to be considered acceptable. In order to determine sample size, it is necessary to look at the factor loadings obtained by Beckwith. Table 2.6 (p 37) displays the factor structure for studies using the 42 questions of the SPQ as items. As can be seen in this table, factor loadings for Beckwith’s analysis range from .30 to .67, and should therefore, according to the Fabrigar et al.’s (1999) criteria regarding appropriate sample size, require a sample in excess of 1000. This analysis suggests Beckwith’s (1991) sample size is questionable in light of both the old and new criteria. Similarly, Watkins and Dahlin (1997) have a relatively small sample (n = 149) and factor loadings ranging from .37 to .83 for the primary loading (see Table 2.7). Again, this sample size is relatively small. Watkins and Murphy (1994) and Zhang (2000) also use small samples (original (n=192) and Malay (n=75); US (n=67) and Nanjing (n=193) respectively) within their research comparing the SPQ across different cultures. In fact, the majority of the validation studies undertaken on the SPQ have low to moderate factor loadings. This analysis suggests all of the validation studies undertaken on the SPQ to date utilising EFA require a minimum sample size of at least 200 - 300. Thus, based on their sample size, the findings of Beckwith (1991), Watkins and Dahlin (1997), Watkins and Murphy (1994) and Zhang (2000) can be considered questionable. All other studies (Akande, 1998; Albaili, 1995; Bolen et al., 1994; Burnett & Dart, 2000; Christensen et al., 1991; Hilliard, 1995; Kember & Gow, 1990, 1991; Murray-Harvey, 1994; O’Neil & Child, 1984; Ramsden, Martin & Bowden, 1989; Rowell et al., 1993; Volet et al., 1994; Watkins & Akande, 1994; Watkins & Astilla, 1982; Watkins & Hattie, 1980) demonstrate sample sizes within this range, suggesting that on this criterion alone, they are acceptable validation studies of the SPQ.

Choice of exploratory factor analysis procedure. The third issue regards the choice of a specific procedure used to analyse the data. There are two common procedures, exploratory factor analysis (EFA) and principal components analysis (PCA). Both are often referred to as EFA, which is not entirely appropriate, as the function of these two analyses is theoretically and mathematically different (Tabachnick & Fidell, 2001). For instance, theoretically, in EFA, the variables are caused by the factors, whereas in PCA, the variables are summarised
to create factors. EFA is based on the common factor model and looks at the variance shared by the factors, while in PCA all of the variance is analysed (Tabachnick & Fidell, 2001). The goal of EFA is to investigate the relationship between the observed variables, whereas the goal in PCA is data reduction. EFA is considered more appropriate when the researcher has little theoretical or empirical basis on which to make strong assumptions regarding the factor structure of the variables, while PCA should be used when there is already a good understanding of the expected factor structure. However, when the goal is to identify latent constructs, EFA rather than PCA is deemed the more appropriate (Fabrigar et al., 1999). As can be seen in Table 2.2, most researchers utilised EFA rather than PCA. This can be considered the more appropriate approach, given that the goal has been to examine the latent constructs comprising the SPQ. An exception is the analysis conducted by Christensen et al. (1991) which utilised PCA and found only one of the six subscales (achieving strategy) loaded as expected, and concluded there was limited support for Biggs’s (1987a) conception of the SPQ. Biggs (1993b) was critical of this study, accurately suggesting the methodology utilised by Christensen et al. (1991) was inappropriate. Biggs (1993b) suggested by adding together the factor structure for the subscales of the SPQ found by Christensen et al. (1991) that the “hit-rate” for the factor structure of the SPQ improved enormously. This debate regarding the appropriateness of the procedure utilised to analyse the SPQ is important, as the results of the Christensen et al. study highlight how different procedures can influence the resulting factor structure. As discussed elsewhere in this thesis, the inability to find a consistent factor pattern for the SPQ may be the result of the many variations of analysis undertaken to date.

Burnett and Dart (2000) did not simply undertake EFA, instead using maximum-likelihood factor analysis (MLFA). This extraction method estimates factor loadings and maximises the likelihood of sampling the observed correlation matrix from a population (Tabachnick & Fidell, 2001). An interesting feature of MLFA is the ability to undertake significant tests for the factors, and thus it can be considered more similar to CFA than EFA.
Perhaps this is why Burnett and Dart (2000) are the only researchers to date to identify a 3-factor solution for the SPQ.

**Extraction of factors.** The fourth issue of importance is decisions regarding the extraction of factors within the analysis. Before a factor analysis can be undertaken, the researcher needs to decide the number of factors that should be extracted. Generally, eigenvalues and scree tests are utilised to make this decision (Tabachnick & Fidell, 2001). Eigenvalues over the value of one have been considered acceptable for deciding to include a factor for analysis (Tabachnick & Fidell). Similarly, within the scree test, those eigenvalues before the line begins to plateau are considered suitable for analysis. Fabrigar et al. (1999) suggest the maximum-likelihood (ML) procedure for making this decision is becoming more popular as it is more statistically sound than the other methods. In ML a range of different goodness of fit indices are calculated, however this technique does require multivariate normality. As can be seen in Table 2.2 there has been some diversity in the number of factors extracted in previous research. Predominantly researchers have found a 2- or 6-factor solution in their analyses of the SPQ. The propensity of these researchers to choose either of these may be because of the factor structure previously proposed by Biggs (1987a) for analysis. Unfortunately, several researchers (Beckwith, 1991; Bolen et al., 1994; Christensen et al., 1991; Hilliard, 1995; Ramsden et al., 1989; Rowell et al., 1993; Volet et al., 1994; Zhang, 2000) did not specify their criteria for decisions regarding the number of factors to extract. The majority of these researchers utilised a six-factor varimax solution and from this, it can be inferred that they were probably using Biggs’s own research and theoretical framework as their criterion. However, the omission of their decision process makes it difficult to assess the validity of the resulting factor structures. The majority of the researchers generally cite a combination of eigenvalues and screeplots as their reasons for choosing a two-factor solution (see Table 2.2).

**Methods of rotation.** The final issue relates to the method of rotation chosen by researchers. The two main types of rotation available in factor analysis are orthogonal and oblique. Orthogonal rotation is used when the underlying constructs are considered independent, whereas oblique rotation is used when the underlying constructs are considered
to correlate (Tabachnick & Fidell, 2001). The majority of the validation studies of the SPQ have utilised an orthogonal varimax rotational technique (see Table 2.2). Varimax is the most commonly used rotational technique and is recommended by Tabachnick and Fidell (2001) as the default option (see also Fabrigar et al., 1999). Varimax seeks to maximise the variance of loadings on each factor. The other predominant rotational technique used in the validation studies on the SPQ was oblimin. This oblique rotational technique allows for a wide range of intercorrelations between factors. Fabrigar et al. suggest research should first try an oblique rotation and then proceed to an orthogonal rotation only when it has been shown there is no correlation between the factors.

According to Biggs (1993b) in his critique of Christensen et al. (1991), the six subscales of the SPQ are not orthogonal, as they comprise motive and strategy components of three approaches to learning. In accordance with his argument then, the factor structures in the studies undertaken by Beckwith (1991), Christensen et al. (1991), Bolen et al. (1994) and Hilliard (1995) should all be reconsidered, as they all utilised a varimax rotation on a 6-factor solution for the SPQ. Further, as deep and surface approaches to learning are related (see Biggs, 1999), it could be further assumed all factor analyses undertaken on the SPQ should use oblique rather than orthogonal rotations.

In summary then, the five issues associated with EFA are a useful guideline for analysing the factor structures provided by the body of research on the SPQ. Five studies undertaken on the factor structure of the SPQ/LPQ can be considered problematic, for reasons of questionable sample sizes (Beckwith, 1991; Watkins & Dahlin, 1997; Watkins & Murphy, 1994; Zhang, 2000), use of PCA as a method of analysis (Christensen et al., 1991), and use of inappropriate rotational technique for a 6-factor solution (Beckwith, 1991; Christensen et al., 1991; Bolen et al., 1994; Hilliard, 1995). A consideration of the remaining EFA validation studies on the SPQ reveals further problems.

Internal reliability. Another important issue to consider is the internal reliability of the SPQ scales, as various studies have provided quite differing results. Internal consistency typically is measured using Cronbach’s alpha to determine the homogeneity of the scales and
Table 2.4

Reliability information for studies using exploratory factor analysis of the SPQ

<table>
<thead>
<tr>
<th>Researcher(s)</th>
<th>Scale α</th>
<th>Subscale α</th>
<th>10 scale version of SPQ</th>
</tr>
</thead>
<tbody>
<tr>
<td>Watkins &amp; Hattie</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Watkins &amp; Astilla</td>
<td>.71</td>
<td>.82</td>
<td>.76</td>
</tr>
<tr>
<td>O’Neil &amp; Child</td>
<td>.69</td>
<td>.76</td>
<td>.78</td>
</tr>
<tr>
<td>Ramsden et al</td>
<td></td>
<td></td>
<td>Not Reported</td>
</tr>
<tr>
<td>Kember &amp; Gow</td>
<td>.72</td>
<td>.80</td>
<td>.79</td>
</tr>
<tr>
<td>Beckwith</td>
<td>Not Reported</td>
<td>.57</td>
<td>.43</td>
</tr>
<tr>
<td>Christensen et al.</td>
<td></td>
<td></td>
<td>Not Reported</td>
</tr>
<tr>
<td>Kember &amp; Gow</td>
<td></td>
<td></td>
<td>Not Reported</td>
</tr>
<tr>
<td>Rowell et al.</td>
<td></td>
<td></td>
<td>Not Reported</td>
</tr>
<tr>
<td>Bolen et al.</td>
<td></td>
<td></td>
<td>Not Reported</td>
</tr>
<tr>
<td>Murray-Harvey</td>
<td></td>
<td></td>
<td>Not Reported</td>
</tr>
<tr>
<td>Volet et al.</td>
<td>.68</td>
<td>.77</td>
<td>.62</td>
</tr>
<tr>
<td>Watkins &amp; Akande</td>
<td>.67</td>
<td>.70</td>
<td>.78</td>
</tr>
<tr>
<td>Watkins &amp; Murphy</td>
<td>Not Reported</td>
<td>.53</td>
<td>.53</td>
</tr>
<tr>
<td>Albaili</td>
<td>.67</td>
<td>.73</td>
<td>.73</td>
</tr>
<tr>
<td>Hilliard</td>
<td>Not Reported</td>
<td>.49</td>
<td>.54</td>
</tr>
<tr>
<td>Watkins &amp; Dahlin</td>
<td>Not Reported</td>
<td>.41</td>
<td>.57</td>
</tr>
<tr>
<td>Akande</td>
<td>Not Reported</td>
<td>Ranged from .49 to .73</td>
<td></td>
</tr>
<tr>
<td>Burnett &amp; Dart</td>
<td>.71</td>
<td>.81</td>
<td>.77</td>
</tr>
<tr>
<td>Zhang</td>
<td></td>
<td></td>
<td>Not Reported</td>
</tr>
<tr>
<td>US</td>
<td>.71</td>
<td>.81</td>
<td>.83</td>
</tr>
<tr>
<td>HK</td>
<td>.75</td>
<td>.82</td>
<td>.82</td>
</tr>
<tr>
<td>NJ</td>
<td>.76</td>
<td>.76</td>
<td>.78</td>
</tr>
</tbody>
</table>

Note. S = Surface; D = Deep; A = Achieving; SM = Surface Motive; SS = Surface Strategy; DM = Deep Motive; DS = Deep Strategy; AM = Achieving Motive; AS = Achieving Strategy.
subscales of the SPQ. This method provides standardised alphas for the items and scale. As can be seen in Table 2.4 seven researchers did not provide information regarding internal consistency (Bolen et al., 1994; Christensen et al., 1991; Hilliard, 1995; Kember & Gow, 1991; Murray-Harvey, 1994; Ramsden et al, 1989; Rowell et al., 1993), and thus the results of these studies cannot be fully interpreted. For the remaining 14 studies, there is reasonably good internal consistency using Cronbach’s alpha for the deep, surface and achieving scales (range of .67 - .83) and poor to good for the six subscales (range of .39 -.78). A consistent pattern of findings across these studies indicates poor reliability of the surface motive and surface strategy subscales, and to a lesser extent, the deep motive subscale (see Table 2.6). Comrey (1973) suggests .71 is a suitable criterion for indicating good internal consistency. The application of Comrey’s criteria and the absence of reliability information in seven of the studies, bring into question the homogeneity of the subscales of the SPQ. Thus, it is important for the findings of EFA studies to be evaluated in light of the low to moderate internal consistency for the subscales of the SPQ.

Test-retest reliability. The test-retest reliability of the SPQ has only received limited attention in previous research. Perhaps this is because Biggs (1987a) argued test-retest reliability is not an appropriate methodology for analysing a measure where there are expected to be changes in scores. Test-retest reliability is of most use when designing research that requires multiple administrations of the same instrument. Thus, if the instrument itself proves to be unreliable, then any research undertaken on the stability of approaches to learning using repeated measures of the SPQ should be considered invalid. Test-retest reliability criteria generally accepts .0 to .4 as being indicative of poor reliability, .41 to .75 as fair to good and greater than .75 as excellent reliability (see Corcoran & Fischer, 1987).

A small number of researchers (Cornell, 1986; Edwards, 1986; Murray-Harvey, 1994; Tang, 1991) have demonstrated the test-retest reliability of the SPQ. Murray-Harvey, (1994) analysed the test-retest reliability using Pearson’s product moment correlation to ascertain the reliability of the subscales and scales of the SPQ. Pearson’s product moment correlation is a
linear measure of association between variables. This has now been questioned as the most appropriate correlation analysis to conduct on data of this nature (see Tabachnick & Fidell, 2001). A more appropriate method for analysing data of this nature has been identified as Spearman’s Rho, where scores are initially ranked and then these rank orders are compared to ascertain whether changes in the relative ranking of students occur over time (Tabachnick & Fidell, 2001).

Overall, the test-retest reliability has been moderate for the subscales of the SPQ. As can be seen in Table 2.5 the reliability of the subscales is relatively consistent for each researcher, though longer time lapses result in overall lower correlations. Across researchers, the achieving motive subscale appears to be the most consistent, ranging from .66 (Tang, 1991) to .77 (Murray-Harvey, 1994) both with a retest period of two months. Conversely the least consistent appears to be the achieving strategy subscale ranging from .41 after 4 months (Tang, 1991) to .83 after two months (Murray-Harvey, 1994). These results could be in part due to the expectation that reliability will naturally decrease over time. An examination of the time lapse between administrations of the SPQ reveals no apparent consistency between different researchers. Cornell (1986) has lowest reliability for the surface strategy subscale (.49), while Edwards (1986) has lowest reliability for the deep strategy subscale (.63), and Tang (1991) has lowest reliability for the achieving strategy subscale (.41). Taken at face value, it appears the strategy subscales are the most susceptible to change at an interval of four months. However, Cornell (1986) has the highest reliability for the achieving strategy subscale (.72) which conflicts with Tang’s (1991) finding for the same time period.

Researchers utilising test-retest methodology need to be more transparent in their reporting regarding the type of correlation utilised, and the context in which testing occurred, as such factors as time of year, proximity of exams and whether the test was completed in class or outside of the classroom environment may unduly influence results (see Biggs, 1987a). An aim of this thesis is to investigate the test-retest reliability of the approaches to learning as measured by the SPQ over a three month time frame. An innovative feature of this study is the use of rank-order correlation, to ascertain whether the relative position of
<table>
<thead>
<tr>
<th>Researcher</th>
<th>Year</th>
<th>N</th>
<th>Retest</th>
<th>SM</th>
<th>SS</th>
<th>DM</th>
<th>DS</th>
<th>AM</th>
<th>AS</th>
<th>S</th>
<th>D</th>
<th>A</th>
<th>S-A</th>
<th>D-A</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cornell</td>
<td>1986</td>
<td>60</td>
<td>4 months</td>
<td>.60</td>
<td>.49</td>
<td>.63</td>
<td>.52</td>
<td>.70</td>
<td>.72</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Edwards</td>
<td>1986</td>
<td>69</td>
<td>4 months</td>
<td>.70</td>
<td>.60</td>
<td>.60</td>
<td>.63</td>
<td>.67</td>
<td>.68</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Tang</td>
<td>1991</td>
<td>180</td>
<td>2 months</td>
<td>.67</td>
<td>.55</td>
<td>.69</td>
<td>.51</td>
<td>.66</td>
<td>.51</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>180</td>
<td>4 months</td>
<td>.64</td>
<td>.52</td>
<td>.56</td>
<td>.45</td>
<td>.68</td>
<td>.41</td>
<td></td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Murray-Harvey</td>
<td>1994</td>
<td>72</td>
<td>2 months</td>
<td>.51</td>
<td>.48</td>
<td>.66</td>
<td>.69</td>
<td>.77</td>
<td>.83</td>
<td>.60</td>
<td>.73</td>
<td>.82</td>
<td>.76</td>
<td>.50</td>
</tr>
<tr>
<td></td>
<td></td>
<td>280</td>
<td>12 months</td>
<td>.51</td>
<td>.42</td>
<td>.63</td>
<td>.60</td>
<td>.64</td>
<td>.55</td>
<td>.56</td>
<td>.66</td>
<td>.63</td>
<td>.61</td>
<td>.65</td>
</tr>
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</table>

*Note.* SM = Surface Motive; SS = Surface Strategy; DM = Deep Motive; DS = Deep Strategy; AM = Achieving Motive; AS = Achieving Strategy; S = Surface; D = Deep; A = Achieving; S-A = Surface-Achieving, D-A = Deep-Achieving
students changes over time (see chapter 3). It is expected that the test-retest reliability of the subscales, scales and higher order scales of the SPQ will be high over a three month timeframe.

*Interpreting factor loadings.* Finally, it is important to consider the interpretation of the obtained factor loadings. Interpretation of factor loadings is one of the more prevalent limitations in factor analytic research (Fabrigar et al., 1999). Commonly a cut-off point of .30 for factor loadings was considered suitable (Comrey & Lee, 1992). More recently, based on empirical investigations (see Tabachnick & Fidell, 2001), this cut-off point has been adjusted with loadings >. 32 considered the lower limit. Loadings of .45 are considered fair, .55 good, .63 very good and >. 71 excellent. The following interpretation of the studies on the SPQ will apply the more recent Tabachnick and Fidell (2001) findings regarding suitable cut-off points, as the studies themselves used a range of differing cut-off points which thus makes direct comparison of the factor structures somewhat difficult. For example, Beckwith (1991) accepts factor loadings as low as .19 in his factor structure of the SPQ, making it inappropriate to directly compare this factor structure with more stringent factor structures developed from factor loadings of >.30. Further, according to Tabachnick and Fidell (2001), items with splitloadings of >. 32 on two or more factors should be excluded from interpretation. This is important, as several of the studies reviewed (Akande, 1998; Albaili, 1995; Biggs, 1993b; Bolen et al., 1994; Christensen et al., 1991; O’Neil & Child, 1984; Watkins & Dahlin, 1997; Zhang, 2000) ignored splitloadings, and simply included these items on the factor with the greatest loading. The use of such differing guidelines for the interpretation of factors presents further difficulties in establishing consistent patterns of findings across studies of the SPQ.

*Studies analysing the Study Process Questionnaire items.* Table 2.6 displays the factor structure for the six studies that analyse the 42-items of the SPQ/LPQ and the two studies using a short 21-item (Volet et al., 1994) or 24-item (Hilliard, 1995) form of the SPQ at an item level. Based on the limitations of EFA already discussed, four studies (Beckwith, 1991;
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**Note.** SM = Surface Motive; SS = Surface Strategy; DM = Deep Motive; DS = Deep Strategy; AM = Achieving Motive; AS = Achieving Strategy
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Bolen et al., 1994; Christensen et al, 1991; Hilliard, 1995) cannot be considered because the factor structures may be questionable. Of the remaining four, O’Neil and Child (1984) provide a 6-factor, Kember and Gow (1991) a 10-factor, Volet et al. (1994) a 5-factor, and Burnett and Dart (2000) a 3-factor solution for the SPQ. These different factor structures highlight the underlying problem of EFA; that is, that the choice of factor solution is open to interpretation by the individual researcher. Without examining the screeplots and eigenvalues for each of these studies, it can be argued that these differing findings may be the result of underlying structural problems in the SPQ scales or subscales.

For O’Neil and Child (1984), the loadings for the deep and achieving subscales were relatively straightforward, with four items (deep motive, deep strategy and achieving strategy) or five items (achieving motive) for each subscale loading on the predicted factor (see Table 2.5). Two items (9 and 13) had split loadings and will, as considered by Comrey and Lee (1992), not be considered further in the interpretation of this factor structure. Also, the surface subscales displayed some instability. The surface strategy subscale was particularly unstable, with only two items loading on the predicted factor. The surface motive subscale was marginally better with three items loading on the predicted factor. While the 10-factor solution provided by Kember and Gow (1991) is not as easily interpretable as O’Neil and Child’s (1984), there is, however, some correspondence between the two: the majority of the deep items loading across three factors, and the majority of the achieving factors loading across two factors. The surface items in this instance span four factors.

The 5-factor solution provided by Volet et al. (1994) is based on a 21-item short-form of the SPQ developed by examining previous validation work on the instrument to identify those items with the highest loadings on each of the six subscales. Four items were selected for each motive, and three items for each strategy subscale. Four factors (surface strategy, deep motive, deep strategy and achieving motive) loaded in accord with Biggs’s (1987a) proposed structure. There was minimal instability with the surface motive subscale. The achieving strategy items loaded with deep motive, suggesting the possibility of the third-order factor structure for the SPQ, namely deep + achieving and surface. Biggs proposed this third-order
factor structure for the SPQ; however, his interpretation suggested the achieving scale loaded on both the deep and surface scales.

Finally, Burnett and Dart’s (2000) three-factor solution provides adequate factor loadings for the deep and surface scales, while the achieving scale is not only lower but has all items negatively loading on the factor. Negative loadings suggest there is a negative association between the variable and the factor (see Hair, Anderson, Tatham & Black, 1998). For example, if the question was “I have a strong desire to excel in all my studies” (SPQ item 9) then a negative association would suggest that the students who rate this item highly had a low score on the achieving scale. Comparing the results of O’Neil and Child (1984) and Burnett and Dart (2000) reveals eight items – surface motive (items 7 and 19), surface strategy (items 10 and 16), deep motive (items 32 and 38), deep strategy (item 29) and achieving motive (item 27) – that appear problematic, given they do not load on any factor.

These four studies do not reveal a clear pattern of results that can be used to identify the factor structure of the SPQ. For example, problems have been identified with the structure of the surface subscales and scales, but this does little to assist in the understanding of the factor structure of the SPQ. Therefore, it is evident further investigation of the factor structure of the SPQ is required to identify whether there is an underlying factor structure to this instrument or whether the factor structure is truly volatile.

*Studies analysing the Study Process Questionnaire subscales.* Table 2.7 displays the factor structures from the six studies (Akande, 1998; Albaili, 1993, 1995; Watkins & Akande, 1994; Watkins & Dahlin, 1997; Watkins & Murphy, 1994; Zhang, 2000) that provided information regarding analyses of factor structures at the subscale level (i.e., motive/strategy). As can be seen in the table, the majority of these studies included multiple samples, making a total of 13 factor structures to consider. However, the small sample sizes for the original (n=192) and Malay (n=75) (Watkins & Murphy, 1994), and the US (n=67) and Nanjing (n=193) (Zhang, 2000) samples suggest, using Fabrigar et al.’s (1999) criteria, that these four factor structures should be excluded from any further comparison. Six of the remaining nine factor structures provided a similar result, with the deep and achieving subscales loading onto
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*Note.* SM = Surface Motive; SS = Surface Strategy; DM = Deep Motive; DS = Deep Strategy; AM = Achieving Motive; AS = Achieving Strategy;
one factor, and the surface subscales loading onto a second factor.

Within these six factor structures however, there is some difference in the loading for the various subscales. For example, surface motive loads differently in Watkins and Akande’s (1994) study for different samples; surface motive on the second factor for the Nigerian sample has a substantially higher loading (.67) than for the Australian sample (.35). (The cultural specificity of the SPQ is an important issue and will be discussed in more detail subsequently.) Two of the three remaining factor structures demonstrated split-loadings for the achieving motive subscale (Akande, 1998; Zhang, 2000), while the final factor structure had the achieving motive subscale loading on the second factor (Watkins & Akande, 1994).

The nine factor structures discussed add further support to the notion of a third-order factor structure proposed by Biggs (1987a), where the achieving subscales blend with the deep and surface scales, indicating the achieving scale is not an approach in its own right. It is interesting to note the achieving motive subscale seems to be associated with both deep and surface scales, whereas achieving strategies are consistently linked with the deep scale. The pattern of results is not clear though, and it is evident further investigation of the subscale factor analysis of the SPQ is needed to identify where the achieving subscales fit in the structure of this instrument.

Further exploratory factor analytic studies analysing the Study Process Questionnaire. There are four additional EFA studies (Murray-Harvey, 1994; Ramsden et al., 1989; Watkins & Astilla, 1982; Watkins & Hattie, 1980) conducted on the SPQ which warrant discussion. These studies are considered separately, because each represents a unique approach to the task at hand (viz. Watkins and Hattie (1980) analysed the early 80-item version of the SPQ, Watkins and Astilla did not provide adequate information for interpreting their results, and Ramsden et al. (1989) and Murray-Harvey (1994) concurrently factor analysed the LPQ/SPQ and another instrument).

Firstly, Watkins and Hattie (1980) conducted an internal investigation of the earlier 80-item version of the SPQ (see Biggs, 1978, 1979). The results of this study were inconsistent with Biggs’s proposed model of the study process complex (approaches to learning),
revealing five factors rather than the three proposed by Biggs. Watkins and Hattie’s (1980) findings were consistent with Biggs’s (1978, 1979) findings on deep and surface learning, however differences were evident on the achieving scale. Watkins and Hattie’s (1980) analysis suggested achieving comprised two separate factors of test anxiety/neuroticism and study skills/motivation. Further, there was some evidence of a fifth factor, measuring pragmatism. The results of this study suggest the achieving scale may measure more than one construct, raising concerns regarding the structure of this scale.

The second study by Watkins and Astilla (1982) did not report a table of factor loadings, which restricts comparison with other studies. However, they state that two factors (Eigenvalues 5.20 and 0.17 respectively) were extracted, and that all six subscales loaded at least .89 on the first factor, suggesting one general factor underlying the responses to the SPQ. Watkins and Astilla conclude that the SPQ may not be valid for Filipino students because of an acquiescence response set, rather than any problems with the SPQ per se, again raising the issue of the cultural specificity of the SPQ.

Finally, Ramsden et al. (1989) and Murray-Harvey (1994) conducted factor analysis on the LPQ/SPQ in conjunction with other instruments. Ramsden et al. (1989) concurrently factor analysed the LPQ and the School Experiences Questionnaire (SEQ) using EFA. The result was a three-factor solution with the first factor containing the items from the SEQ and a split loading for the achieving strategy subscale of the SPQ. Factor two comprised the surface motive, surface strategy subscales and a split loading for the achieving motive subscale of the SPQ. The third factor comprised the deep motive and deep strategy subscales and a split loading for the achieving strategy subscale. Similarly, Murray-Harvey (1994) concurrently factor analysed the SPQ and the Productivity Environmental Preference Survey (PEPS). Eight factors were extracted, two of which directly related to the SPQ. Deep strategy, deep motive and achieving strategy loaded onto one factor, while surface strategy and surface motive loaded on the second factor. Achieving motive was split across both factors. The results of these two studies again offer support to a third-order factor structure of the SPQ (i.e., deep-achieving + surface-achieving).
The results of these four studies, the results of the other exploratory factor analyses and the inability for seminal researchers (viz. Biggs, Marton & Saljo, Entwistle) in this field to agree on the achieving scale, all suggest problems with the achieving scale. While problems with the surface scale are widely acknowledged in the literature, there is perhaps also a need to recognise that the achieving scale may not, in fact, be supported by an underlying construct.

Summary. In summary, the results of many of these previous EFA studies on the SPQ provide some evidence for collapsing the achieving subscales onto the deep and surface scales. In particular there has been a tendency for the achieving motive subscale to be linked with the deep and surface scales, and for achieving strategy to only be associated with deep learning scales (Biggs, 1987a). In light of the critique of the validation work conducted on the SPQ using EFA procedures, it is important to extend the research on the factor structure of the SPQ, by going back to “first principles”, and undertaking EFA analysis of the SPQ at an item and scale level. It is important to do so, however, using the most recent technique, in order to avoid the limitations identified in this review with EFA. It is acknowledged that CFA is the more appropriate methodology for undertaking such research. However, in order to conduct an exhaustive examination of the factor structure of the SPQ, the first section of this thesis will undertake EFA to ascertain the extent of support for Biggs’s (1987a) original factor structure of the SPQ. Further, it is also useful to undertake EFA on the SPQ at an item and subscale level, in order to make direct comparisons between findings from the present thesis and previous studies on the SPQ. This involves revisiting the methodology proposed by Biggs (1993b) for analysing the six-subscale (surface motive, deep motive, achieving motive, surface strategy, deep strategy, achieving strategy) of the SPQ. As Biggs’s SPQ was developed in Australia, and there are some concerns regarding the cultural specificity of this instrument, an Australian sample will be used to examine whether Biggs’s contention that the six subscales of the SPQ do each load onto a single factor can be supported. Two different sets of hypotheses are suggested for the factor structure of the SPQ. Firstly, in accord with Biggs (1979, 1987a, 1987b, 1993b) it is hypothesised that the items for each of these six
subscales will load on a single factor. Further, EFA will be utilised to examine the second- and third-order factor structures for the SPQ. It is hypothesised using EFA, items will load onto three factors representing deep, surface and achieving. Secondly, in accord with patterns of previous findings on the SPQ it is hypothesised that the items for each of the six subscales will load across two or more factors. Further, EFA will be utilised to examine the second- and third-order factor structures for the SPQ. It is hypothesised using EFA, items will load onto three factors, but that these may not represent the deep, surface and achieving scales identified by Biggs, but rather there will be some crossover between the achieving scale and the deep and surface scales respectively. In accordance with Biggs and the pattern of previous findings, it is hypothesised the six subscales will load onto two factors representing deep-achieving and surface-achieving. Before moving to a critique of the limited CFA’s conducted to date on the SPQ it is important to highlight the problems associated with EFA as these further affect the validation work discussed above.

Problems with exploratory factor analysis. As well as the five issues currently facing research utilising EFA there are also several problems inherent in the reliance on EFA to validate the underlying structure or constructs of an instrument. As previously highlighted, the number of factors to be extracted in research using EFA and the subsequent cut-off points for factor loadings is open to interpretation. Further, EFA is not necessarily the most appropriate methodology to measure construct validity, as it is difficult to replicate the results of previous research using this technique. Researchers suggest that even when using the same data, this can be an arduous task (Fabrigar et al. 1999). Tabachnick and Fidell (2001) suggest two major problems associated with factor analytic studies. Firstly, there are no external criteria on which the factor solution can be tested. Factor analytic studies are limited to an analysis of the interpretability of the factor solution. Secondly, after factors have been extracted, there are a limitless number of rotations available for interpretation, which all account for the same amount of variance. Each rotation, however, gives a slightly different definition of the factors. This, combined with the lack of external criteria, suggests there are an infinite number of possible solutions to any research using factor analysis that can neither
be proved nor disproved by an external criterion. Thus, the individual researcher’s interpretation of the factor analysis is based on their assessment of the factors, and as such there is no way of deciding whether factor analysis offers a single definitive answer to a research question. This is not, however, a concern with CFA.

**Confirmatory factor analysis of the Study Process Questionnaire.** In comparison to EFA there have been relatively few CFAs undertaken on either the SPQ or the LPQ. CFA techniques are designed to test whether data fits a predicted model (Schumacker & Lomax, 1996) and thus allows the direct testing of the theoretical structure of the SPQ as designated by Biggs (1987a).

In EFA, the data set determines the underlying dimensions or structure. The converse can be said of CFA. In CFA, the theory is used to decide the underlying structure of the SPQ, in essence testing hypotheses. This structure is then analysed, using the data to ascertain how closely the actual structure matches the theorised structure (Mueller, 1996). CFA provides a framework for addressing many of the limitations associated with EFA in assessing the validity and reliability of an instrument. For example, using CFA, the first-, second-, and third-order factor structures of the SPQ, proposed by Biggs (1987a), can be directly assessed.

There have been only six CFA studies undertaken on the SPQ or the LPQ. Just as there are a range of issues to consider when analysing the EFA studies undertaken on the SPQ, there are also some key issues to be considered when discussing the CFA studies of the SPQ. In particular, requirements for sample size in CFA are similar to those in EFA. Instead of focussing on the participant/variable ratio, the focus is on the ratio of participants to estimated parameters (Tabachnick & Fidell, 2001). It is commonly accepted that a sample of 200 is adequate for CFA (Schumacker & Lomax, 1996). However, as is the case with EFA the suggestion is made that sample size should be related to the estimated size of effect and normal distribution of the measured variables (Tabachnick & Fidell, 2001). Thus, the sample size of the CFA studies needs to be considered when interpreting the results of these studies.

Hattie and Watkins (1981) investigated the internal structure of the SPQ using Filipino (n=173) and Australian (n=255) first year university students. The internal consistency was
moderate to good for the Australian sample (ranging from .60 on the surface motive to .74 on the achieving strategy) and described as encouraging for the Filipino sample (ranging from .51 on surface motive to .60 on deep strategy). Unrestricted maximum likelihood common factor analysis (see Joreskog, 1969) was used to test the factor structure of the SPQ. CFA was then used to test two (motive and strategy) and three (deep, surface and achieving) factor models. The results provided support for a three-factor model of study processes rather than a motive/strategy model with the Australian sample, while findings from the Filipino data were less conclusive. The factor structure provided support for the validity of the SPQ as a measure of study methods, while querying the use of the instrument with Filipino students.

Andrews, Violato, Rabb and Hollingsworth (1994) conducted a CFA using structural equation modelling (SEM) (EQS – see Bentler, 1989) to test Biggs’s (1987a) three-factor model of learning approaches (deep, surface and achieving), using the LPQ, the high school equivalent of the SPQ. The questionnaire was administered to Canadian school students (n=205). The overall fit of the data to the model was good (CFI=. 97 based on 11 degrees of freedom; RMS=.17), and the three latent variables were confirmed. The loadings from the deep motive (.64) and deep strategy (.68) to the deep approach latent variable were high. The loadings from the surface motive (.42) and surface strategy (.99) to the surface approach latent variable suggested a reliance on the strategy component. The loadings from the achieving motive (.44) and the achieving strategy (.46) to the achieving approach latent variable were moderate. The results of this research lend further support to the validation of the three approaches to learning (deep, surface and achieving) found by Biggs (1978) and some others (see Kember & Gow, 1990; O’Neil & Child, 1984; Watkins & Hattie, 1980) using EFA.

Wong et al. (1996) tested the internal structure of the LPQ using a cross-cultural sample of 1918 students drawn from six countries (Nigeria = 200; Zimbabwe = 270; Malaysian = 301; China (Beijing) = 621; China (Hong Kong) = 356; International (Hong Kong) = 170). Internal consistency for the six subscales was moderate (ranging from .41 on surface motive to .85 on deep motive). CFA tested six different models for the different groups of students.
Overall, three models were supported. Some samples fitted the two factor model (surface + achieving, deep), while others had a better fit with the model combining achieving with deep (surface, deep + achieving). Some cultural groups supported a three factor model (deep, surface, achieving).

Kember and Leung (1998) tested the internal structure of the SPQ and the LPQ using, respectively, a sample of university (N = 4834) and secondary school (N = 3254) students in Hong Kong. Internal consistency for the six subscales was moderate for the SPQ (ranging from .57 on surface strategy to .74 on achieving strategy). A similar, though weaker, pattern was visible for the six subscales of the LPQ (ranging from .39 on surface strategy to .69 on achieving strategy). CFA tested seven different models based on the factor structures provided by Biggs (1987a) for both the SPQ and the LPQ. The model with the overall best fit for both the SPQ ($\chi^2 = 96.25; \text{CFI} = .99; \text{df} = 7$) and the LPQ ($\chi^2 = 222.2; \text{CFI} = .95; \text{df} = 7$) was a two factor model. This model equates to the third-order factor structure (surface + achieving and deep + achieving) proposed by Biggs (1987a).

Sachs and Gao (2000) tested the internal structure of the LPQ using a sample of Mainland Chinese secondary students (n = 1070). Internal consistency for the six subscales was moderate, ranging from .41 on surface strategy to .62 on deep strategy. SEM tested five different models based on the factor structures provided by Biggs (1987a) for the LPQ. The models with the overall best fit were a two-factor ($\chi^2 = 115.83; \text{CFI} = .92; \text{df} = 7$) and three-factor model ($\chi^2 = 115.83; \text{CFI} = .92; \text{df} = 7$). These models equate to the third-order (surface + achieving and deep + achieving) and second-order factor structures proposed by Biggs (1987a). Sachs and Gao (2000), however, suggest several problems associated with the internal consistency and factor structure of the LPQ, and suggest items should be revised to improve the overall psychometric properties of the instrument.

Finally, Fox, McManus and Winder (2001) tested the internal structure of a shortened 18-item version of the SPQ using a sample of English medical students (n = 1349). Internal consistency for the six subscales was generally moderate, ranging from .29 on surface motive to .73 on deep motive. SEM tested nine different models based on the factor models analysed...
by Kember and Leung (1998) and two new models. The model with the overall best fit was a three factor model with one higher order factor (deep-achieving) ($\chi^2 = 51.6; \text{CFI} = .95; \text{df} = 6$). This model equates to a combination of the second-order (deep, surface and achieving) with the third-order (deep + achieving). Fox et al. (2001) found significant correlations between the subscales of the SPQ, which they suggest provides a more complex structure than the motive/strategy model suggested by Biggs (1987a).

In summary, the relatively few confirmatory factor analytic studies of the SPQ/LPQ give support to both the two and three latent variable models of these instruments. Four researchers found support for the two latent variable model (Fox et al., 2001; Kember & Leung, 1998; Sachs & Gao, 2000; Wong et al., 1996), and four researchers found support for the three latent variable model (Andrews et al., 1994; Fox et al., 2001; Hattie & Watkins, 1981; Sachs & Gao, 2000). The diverse cultures in which this research was conducted may provide some insight into the different results obtained by the researchers. For instance, Hattie and Watkins (1981) consider the acquiescence response set displayed by Filipino students problematic for use of the SPQ within that population. While the cultural setting of the research may impact on the results of a given study, another important consideration is the language of administration. If students from non-English speaking backgrounds are asked to complete the SPQ in English, differences between studies may be the result of different interpretations of the words. In addition, if the SPQ is translated into different languages, subtle changes in the nature of the questions may influence the way students respond to the questions. It should be noted however that only 3, of the 12 analyses were conducted on students from English speaking backgrounds; namely Hattie and Watkins (1981) with Australian students, and Andrews et al. (1994) with Canadian students and Fox et al. (2001) with English students. This is interesting, as many of the later EFA’s of the SPQ/LPQ using the third-order structure suggested a two-factor solution for the SPQ/LPQ. However, based on the results of the CFA research, the exact nature of this relationship is not yet fully established. Further research needs to be conducted on the SPQ using confirmatory factor analytic techniques in order to establish a consistent pattern of the structure of the latent
variables. As the majority of the above studies did not test both the two and three latent variable models of the SPQ, this thesis will investigate both of these models to ascertain which is the more appropriate. Further, as no study to date has examined the item-level factor structure of the SPQ, this will also be investigated as part of a convergent methodology used in this study. That is, this thesis aims to systematically and exhaustively examine all three levels of the SPQ (i.e., first-, second- and third-order factor structures), using a single sample and employing both EFA and CFA statistical methods. Thus, it is hypothesised in accordance with Biggs (1993b), that CFA will confirm that seven items comprise each of the six subscales of the SPQ. As previous research using EFA has displayed a different pattern of results to that proposed by Biggs, a second contrasting hypothesis, that CFA with the six subscales of the SPQ will not each have seven items will also be tested. It is hypothesised, in accordance with Biggs’s findings (1993ba) that CFAs conducted on an Australian sample of university students will find support for the three latent variable model of the SPQ. Once again, as previous research to date has provided a different pattern of results, a second contrasting hypothesis, that CFA will find support for the three latent variable model, but this will not comprise the same variables as outlined by Biggs will be tested. Finally, in accord with both Biggs and previous research to date, it is hypothesized that CFA will find support for the two latent variable model.

*Cultural specificity of the Study Process Questionnaire.* The cultural specificity of the SPQ has been repeatedly questioned (see Marton, Dall’Alba & Tse, 1993) and several of the EFA studies discussed above were, in part, designed to look specifically at this question. The various EFA studies undertaken included a broad sample of people from a wide variety of cultures including American (Bolen et al., 1994), Arabic (Albaili, 1995), Australian (Biggs, 1987a; Christensen et al., 1991; Murray-Harvey, 1994; Watkins & Hattie, 1980), Canadian (Andrews et al., 1994), Chinese (Kember & Gow, 1991), Filipino (Hattie & Watkins, 1981; Watkins & Astilla, 1982), Nepalese (Watkins, Regmi & Astilla, 1991), Nigerian (Watkins & Akande, 1993) and Swedish (Watkins & Dahlin, 1997).
As mentioned above, Hattie and Watkins (1981) raised the question of the acquiescence response set of Filipino students, suggesting the SPQ may not be an appropriate tool for measuring approaches to learning with this population. Further, research conducted by Gow et al. (1989) suggested students from a wide range of cultures may interpret the questions of the SPQ differently, which in turn may affect the outcome of EFA research findings. Biggs (1996) suggests the SPQ may not be appropriate for Nepalese students, but suggests the median cross-cultural coefficients are generally adequate for a two-factor solution of the SPQ (.98 and .92 respectively). However, when the actual factor structures for the four samples (Nigeria, Brunei, Indonesia, Nepal) provided are compared, it is evident that the Nigerian sample differs from the other three by including the achieving motive subscale with the surface subscales rather than the deep and achieving strategy subscales, as evident in the other samples. Kember and Gow (1990, 1991) found some instability in the six-factor solution of the SPQ, and suggested this instability may be linked to the choice of a Chinese sample rather than any inherent problems with the SPQ. Watkins and Murphy (1994) specifically investigated the cross-cultural applicability of the SPQ using three different versions of the instrument (English, English as a second language – ESL, and Malay) by comparing the factor structures for the three versions of the SPQ developed specifically for this study. The results of their study were inconsistent with previous research. It is not possible to determine whether these differences are due to cross-cultural concerns, or whether the differences are the result of problems with small sample sizes as discussed earlier.

The cultural specificity of the SPQ has also been highlighted in CFA studies undertaken on the SPQ and its high school equivalent, the LPQ. Hattie and Watkins (1981) found differences in the results for the Australian and Filipino students and suggested no clear conclusions could be drawn from the results for the Filipino sample. Similarly Wong et al. (1996) found different factor structures for the LPQ within the different participant countries (Nigeria, Zimbabwe, Malaysia, China – Beijing, China – Hong Kong, International – Hong Kong) included in their study. Though the authors of this study assert that their results support using the LPQ with non-Western countries, because all participant countries found
two factor solutions utilising CFA analysis, these very differences between the factor structures for the different countries suggest there is a need to be cautious when relating the LPQ and the SPQ to different cultures.

Based on these findings to date, it can be confidently argued that there are problems of cultural specificity associated with the SPQ. As the purpose of the first section of the current research programme is to validate the factor structure of the SPQ, it is important to limit any possible confounds associated with issues such as cultural specificity. Thus, it has been decided to use an Australian sample, as this is the population from which Biggs first tested and developed the SPQ. Only limited CFA’s have been conducted on the SPQ/LPQ with English speaking samples of students. Moreover, given findings by Dahlin and Watkins (2000) based on interviews that Chinese students perceived memorising as an integral component of understanding, thus subsuming a surface approach within a deep approach, and that the bulk of both EFA and CFA research conducted on the SPQ, especially by Biggs (1987a, 1990, 1992, 1993b, 2001) has utilised samples of Chinese students, an exhaustive and systematic re-appraisal of the psychometric properties of the SPQ is best conducted with English speaking students. Moreover, it is proposed to utilise a convergent methodology by conducting EFA and CFA analyses on the same sample. This approach has the advantage of holding sample characteristics constant, eliminating a degree of ‘noise’ in a data set and thus allowing an underlying structure of an instrument to be clearly identified. This convergent methodology has only been used once on the SPQ by Biggs (1999) and only then on the subscale structure.

Concurrent validity of the Study Process Questionnaire. Validation work on the SPQ, other than factor analysis (exploratory or confirmatory), has been very limited. Christensen et al. (1991) measured the concurrent validity of the SPQ, comparing scores on the SPQ with the Weinstein and Mayer (1986) taxonomy, which measures the strategies employed on two learning tasks, one simple and one complex. The definitions of Biggs’s (1987a) deep and surface approaches to learning are consistent with Weinstein and Mayer’s (1986) organisation and elaboration (deep), and rehearsal (surface) strategies. The results of the study were not
significant, suggesting no corresponding relationship between the SPQ and the cognitive strategy employed. Thus, Christensen and her colleagues (1991) concluded that there was a discrepancy between the scores on the SPQ and the expectations based on the underlying constructs. The results of their study therefore suggested the deep and surface constructs of the SPQ lack conceptual purity, and may not be as valid as some factor analytic findings suggested.

Wilson, Smart and Watson (1996) correlated the scales on the SPQ with the meaning, reproducing and achieving orientations of the ASI. The analysis revealed significant positive correlations between deep approach and meaning orientation ($r = .61, p<.001$), surface approach and reproducing orientation ($r = .62, p<.001$), and between achieving approach and achieving orientation ($r = .46, p<.001$) indicating the SPQ scales and the ASI orientations are measuring similar constructs. The moderate size of the loadings indicated they were not, however, measuring identical constructs. Significant negative correlations were also displayed between deep approach and reproducing orientation ($r = -.37, p<.001$), and between surface approach and meaning orientation ($r = -.49, p<.001$) indicating deep and surface are conversely related to each other. Two further studies (Kember & Gow, 1991; Miller et al., 1990) used both the SPQ and the ASI, however, neither study attempted any statistical comparison of the two instruments.

There is evidently a need for further research to be undertaken on the concurrent validity of the SPQ. A useful approach would be to conduct and compare the findings of quantitative methodologies discussed above with qualitative methodologies, to expand understanding of the deep and surface constructs of the SPQ. By combining these two methodologies, the factor structure of the SPQ could be examined, and then the convergent and discriminant validity of the constructs could be assessed to gauge if the SPQ items are measuring the underlying learning constructs. A useful methodology for undertaking such research is the multitrait-multimethod matrix. This was of interest in the present thesis. To develop such a methodology it is important to also review the qualitative work undertaken on the SPQ.
Qualitative Measurement of Approaches to Learning

Research indicates two predominant approaches to the qualitative measurement of learning: interviews (see Dalhgren, 1984; Eklund-Myrskog, 1997; Gow et al., 1989; Marton, Dall’Alba & Beatty, 1993; Marton & Saljo, 1976b; Ramsden & Entwistle, 1981; Ridley, Schutz, Glanz & Weinstein, 1992; van Rossum & Schenck, 1984) and the SOLO (Structure of Observed Learning Outcomes) taxonomy (see Biggs, 1979, 1985; 1989b; Biggs & Braun, 1972; Biggs & Collis, 1982a, 1982b; Boutlon-Lewis, 1994, 1995; Trigwell & Prosser, 1991; 1992; Watkins, 1983; Willis, 1993a, 1993b). The results of these studies generally support the two constructs of deep and surface, but not the achieving construct. This could be due, in part, to the conceptual differences between deep and surface, and achieving approaches to learning. As noted earlier, more recent research tends to map the achieving approach across the deep and surface approaches to learning, suggesting not only that achieving is a different concept from deep and surface learning, but that it may actually be a component of the other two approaches to learning. Also, the lack of support for the achieving approach to learning is probably due, in part, to the difficulty in measuring the achieving approach using instruments such as the SOLO taxonomy, which is specifically designed to examine the level of learning on a surface - deep continuum. It should also be noted that the majority of the qualitative studies have been conducted using the ASI, rather than the SPQ. Thus, a qualitative approach to the validation of the SPQ would be useful to a further understanding of the validity of the instrument.

Interview Methodology

Thomas and Bain (1982, 1984) suggest that, where questionnaires are designed to measure an individual’s style of learning, interviews measure the contextual variability of learning. Research on approaches to learning using an interview format typically employs one of two methodologies – interviews based on talking through the process used in a specific learning task (Dalhgren, 1984; Marton & Saljo, 1976b; Ridley et al., 1992; van Rossum & Schenck, 1984); and open-ended interviews designed to gather information about the overall
approach adopted by a student (Kember & Gow, 1990; Ramsden, Beswick & Bowden, 1986; Ramsden & Entwistle, 1981; Watkins & Hattie, 1985).

Task-specific interviewing that analyses approach to learning has typically involved asking students to complete a learning task, such as the reading of some text (see Marton & Saljo, 1976b) followed by answering a series of questions about both the content of the reviewed material, and the processes or strategies used to complete the task. The purpose of the interview is to gather qualitative information about the learning approach adopted by the interviewee, which is then analysed and compared with their learning outcomes. Rather than being a direct measure of approach to learning, this interview tends to measure both approach and metacognitive awareness of the individual’s learning approach. Results of these studies (Dahlin & Watkins, 2000; Gow, Kember & Chow, 1991; Marton, Dall’Alba & Beaty, 1993; Saljo, 1981; Watkins & Hattie, 1985; Willis, 1993a) have generally been interpreted as supporting the existence of deep and surface approaches to learning based on qualitative analysis of the data. No studies to date have statistically analysed the interview material. Rather, they have used the interviews to provide anecdotal information. Conclusions have been based on subjective inferences that may or may not be accurate.

Dahlin and Watkins (2000) interviewed German (n = 18) and Chinese (n = 48) students regarding the task of repetition in their learning. Students were asked in-depth questions regarding memorising and understanding, to ascertain whether cultural differences led to differences in interpretation. Results revealed differences between the cultures. The Chinese students perceived memorising as an integral component of understanding, where the German students perceived both memorising and understanding as separate activities. This research raises concerns regarding the cultural specificity of instruments designed to measure approaches to learning such as the SPQ, as one of the assumptions underlying the deep and surface scales of the SPQ is that understanding is intrinsically linked to deep learning, while memorising is linked to surface learning (Biggs, 1993b; Entwistle, 1997).

Open-ended interviewing has typically involved asking students a general question about their learning such as “What do you mean by learning?” (Marton, Dall’Alba & Beaty, 1993).
As with task-specific interviewing, the information obtained using open-ended questions has been interpreted as offering support for the existence of deep and surface approaches to learning. Information from these interviews has simply been used to add anecdotal stories to complement other analyses. Thus, no study to date, however, has empirically tested the relationship between responses to interview questions and scores on the deep and surface scales of the SPQ. It was of interest in the first section of this thesis to conduct a concurrent validation of the SPQ using a qualitative methodology initially, followed by an empirical investigation of the data.

**SOLO Taxonomy Methodology**

Research on the qualitative measurement of learning outcomes also has been undertaken using the Structure of Observed Learning Outcome (SOLO) taxonomy. The SOLO taxonomy (Biggs & Collis, 1982a) assesses the structural quality of students’ learning outcomes. These outcomes are measured by evaluating the student’s written responses to a learning task on a continuum ranging from a rating of 1 (prestructural) to 5 (extended abstract). Scores from 1 to 3 are categorised as representing a surface approach to learning, while scores of 4 and 5 represent a deep approach to learning (Watkins, 1983).

Research using the SOLO taxonomy asks questions designed to elicit responses to a specific learning task (Biggs, 1979, 1995; Burnett, 1999; Cantwell & Millard; 1994; Collis & Biggs, 1983; Watkins, 1983; Watkins & Regmi, 1995), and general questions about what has been learned in a specific course (Boutlon-Lewis, 1994, 1995; Trigwell & Prosser, 1991, 1992). Results of studies using the SOLO taxonomy suggest there is a relationship between an individual’s approach to learning and the resulting outcomes of learning. Biggs (1979), for example, found an interaction between the deep approach and higher learning quality, and between the achieving approach and lower quality outcomes. Trigwell and Prosser (1991) correlated qualitative results obtained on the SOLO taxonomy with ratings on the ASI, and found a positive correlation between the two instruments on the deep scale. However, the correlation between the two instruments for the surface scale was not significant. This finding suggests the surface scale of the ASI and the surface level of learning measured in the
SOLO taxonomy may not be measuring the same construct. Such empirical testing of the relationship between the SOLO taxonomy and the surface scale of the SPQ has not been tested.

**Multitrait-Multimethod (MTMM) Methodology**

Multitrait-Multimethod methodology (MTMM; Campbell and Fiske, 1959) is a systematic and rigorous method for examining the convergent and discriminant validity of a psychometric instrument. As the name suggests a MTMM matrix examines more than one construct at a time (multitrait), using several different measurement techniques (multimethod), to determine firstly how well each construct is defined across the different measures (convergent validity), and secondly, how different any construct is from other constructs (divergent validity). Convergent validity is the ability of different methods to measure the same construct (Campbell & Fiske, 1959). Conversely, discriminant validity is the ability of the one method to discriminate between different constructs. Campbell and Fiske advocate that this methodology should be used when two or more traits are to be examined using two or more different methods. This methodology has not been applied to an investigation of the SPQ. Thus, the current research programme will employ a combination of qualitative and quantitative methodologies to measure the construct validity of the SPQ using MTMM.

In an effort to assess whether the deep and surface approaches to learning constructs, as measured by the SPQ, are measuring the underlying deep and surface learning constructs (see chapter 4) the current research programme will empirically test the relationship between responses to interview questions, written tasks and the deep and surface scales of the SPQ. It is expected findings will show a strong significant relationship between interview responses for deep and surface approaches and the deep and surface constructs using a MTMM matrix to test the deep and surface constructs. Further, it is expected that there will be a strong significant relationship between the SOLO taxonomy conceptualisation of deep and surface and the deep and surface scales of the SPQ. Also, there will be a strong significant relationship between the interview responses for deep and surface and the SOLO taxonomy
conceptualisation of deep and surface. The ability of each of the measures to discriminate between deep and surface will also be tested. It is expected the deep scale on the SPQ would have a low, non-significant relationship with the surface scale on the SPQ. Similarly, it is expected the deep scale on the interview will have a low, non-significant relationship with the surface scale on the interview. Finally, the deep scale on the written assessment is expected to have a low, non-significant relationship with the surface scale on the written assessment.

Summary and Purpose of Section 1

The preceding literature review suggests that, while there has been a considerable amount of work undertaken on the SPQ over the past 30 years, several major concerns remain regarding this work. Firstly, while the structure of the SPQ and its high school equivalent, the LPQ, have been analysed for the past 30 years, many of these studies have been limited by reliance on EFA. The findings from a number of these EFA studies can be considered limited in light of more recent methodological developments regarding the application and interpretation of EFA. Of those studies, which apply the most recent criteria regarding appropriateness of EFA to the research question, namely, sample size, the choice of a specific procedure, decisions regarding extraction of factors, and the choice of a specific factor rotation, there was no clear picture regarding the factor structure of the SPQ. Some studies offered a six-factor solution, others a three-factor solution or a two-factor solution. The results of these EFA studies on the SPQ must also be considered to be limited in light of the SPQ’s seeming cultural specificity. There are concerns that students from different cultural and lingual backgrounds, especially Chinese students (Dahlin & Watkins, 2000) may interpret the SPQ questions in different ways and, given that a substantial amount of EFA work conducted on the SPQ has been with samples of non-English speaking students, the factor structure of the SPQ proposed by Biggs (see 1993b, 1999) may be confounded. This also holds true for the limited number of CFA studies undertaken on the structure of the SPQ or LPQ with Biggs’s (1993b) confirmatory work conducted entirely with Chinese students. Many of these studies have been undertaken in cross-cultural environments, which again may have influenced the structure of the SPQ provided by these studies. The first aim of the
current research programme is to reassess the factor structure of the SPQ, using an Australian sample, as this was the predominant culture in which the SPQ was first developed. In addition, it was proposed to use a convergent methodology by conducting both EFA and CFA on the same sample of students. This has the advantage of holding sample characteristics constant, so that an underlying structure will clearly be shown. Both EFA and CFA will be used to determine if support can be given to the factor structure proposed by Biggs. It is expected that the factor structure of the SPQ will be partially supported by both EFA and CFA methodologies. It is reasonable to except support for the second- and third-order factor structures as outlined in the hypotheses (see pp. 43-44, 48; chapter 3).

A related issue has been the validity of the deep and surface constructs. While Biggs (1987a) and others (see Entwistle, 1997; Marton & Saljo, 1976a, 1976b) agree on the conceptualisation of these two constructs, little empirical work has been undertaken to cross-validate these measures. The validity of the deep and surface constructs needs to be assessed using a range of methodologies rather than, as has been the case, reliance on factor analytic studies as the predominant means of measuring the validity of approaches to learning, as this does not consider the concurrent validity of these constructs. Campbell and Fiske (1959) offer a useful methodology, the multitrait-multimethod matrix, for the validation of constructs. Interviews and the SOLO taxonomy clearly provide two qualitative methodologies that could be usefully applied to the measurement of the concurrent validity of the SPQ. The second aim of the first section of this current research programme is to examine the concurrent validity of the deep and surface constructs as measured by the SPQ utilising a multitrait-multimethod matrix. It is expected that the concurrent validity of the deep and surface constructs will be high between the SPQ, interview and written task rated by the SOLO taxonomy.
CHAPTER 3
THE CONSTRUCT VALIDITY OF THE STUDY PROCESS QUESTIONNAIRE

Overview

As seen in the previous chapter, validation studies of the SPQ/LPQ have been predominantly based on EFA techniques (see chapter 2). Relatively few studies (see Andrews et al., 1994; Fox et al., 2001; Hattie & Watkins, 1981; Kember & Leung, 1998; Sachs & Gao, 2000; Wong, et al., 1996) have attempted to use CFA to validate the first-, second- and third-order factor structures defined by Biggs (1987a, 1987b, 1993b). A critique of the results of both the exploratory and the confirmatory factor analyses conducted on the SPQ and LPQ to date have provided more support for the third-order factor structure than for either the first- or the second-order factor structure. It is difficult, however, to determine the extent to which these findings represent an accurate picture of the underlying structure of the SPQ, as many of the EFA studies conducted on the SPQ can be considered to be less than reliable, in light of current developments regarding optimal EFA methodology, as discussed in chapter 2.

Further, differences in the results of previous studies have been influenced by the potential problems associated with the diverse cultural settings in which the research has been undertaken. For example, it has been suggested students in Hong Kong consider rote learning to be a precursor to understanding the information that is being learned, rather than a study strategy in itself (Watkins & Biggs, 1996). Thus, this understanding of rote learning may influence the factor structure underlying the SPQ using a sample of Hong Kong students, which may, in turn, confound the results of such a study. Additionally, given that much of the validation work undertaken on the SPQ, particularly using CFA has been with samples of Chinese students, further validation work with English speaking students is needed. As convergent methodology demonstrated in the previous chapter, there is little evidence to support the cross-cultural applicability of the SPQ. Therefore, it was decided to validate the SPQ within the same culture in which it was first developed; that is an Australian sample of undergraduate tertiary students. In addition, in light of sampling concerns with the previous
validation work on the SPQ it was decided to use a convergent sampling methodology and to conduct both item and scale level EFA’s and CFA’s on the SPQ using the same sample of university students. The advantage of this methodology is that sample characteristics are held constant and thus results can be more easily compared from different analyses.

The purpose of this first study is to reassess the factor structure of the SPQ using a single sample of Australian university students. Both exploratory and confirmatory factor analyses will be utilised at the subscale and scale levels to ascertain whether support can be given to the original factor structure proposed by Biggs (see 1979, 1987a, 1987b, 1993b), or whether support can be given to the general pattern of findings in the associated research to date (see chapter 2).

In accordance with Biggs’s findings (1993b) it is expected that:

H3.1. Utilising EFA, items for each of the six subscales will load on a single factor.
H3.2. CFA will confirm that seven items comprise each of the six subscales of the SPQ.
H3.3. Utilising EFA, items will load on three factors representing deep, surface and achieving approaches to learning.
H3.4. CFA will confirm three latent variables deep, surface and achieving approaches to learning.

In accordance with patterns of previous findings on the SPQ, a contrasting set of hypotheses will predict that:

H3.5. Utilising EFA, items for each of the six subscales will load across two or more factors.
H3.6. CFA will not confirm the theoretically proposed item to subscale structure of each of the six subscales of the SPQ
H3.7. Utilising EFA, items will load on three factors, but that these factors will not represent the deep, surface and achieving approaches to learning identified by Biggs (1987a, 1999), but rather there will be some crossover between the achieving scale and the deep and surface scales respectively.
H3.8. CFA will confirm three latent variables deep, surface and achieving approaches to learning with some crossover between the achieving scale and the deep and surface scales respectively.

And in accordance with both Biggs and the pattern of previous findings on the higher order structure of the SPQ it is expected that:

H3.9. Utilising EFA, items will load on two higher-order factors deep achieving and surface achieving approaches to learning

H3.10. CFA will confirm two higher order latent variables deep-achieving and surface-achieving approaches to learning.

Method

Participants

Two hundred and sixty undergraduate psychology students (86 male, 174 female) at an Australian university volunteered to participate in the study. The students were drawn from two different cohorts of first year students within the same degree programme (n = 171; 89). The age of participants ranged from 17 to 52, with a mean age of 22.08 (SD=7.55). The students participating in this study are all from English speaking backgrounds and were Australian by birth. A subset of 87 participants (22 male, 65 female) were retested three months later.

Materials

The SPQ is a 42-item questionnaire designed to measure the approach to learning used by an individual student. Each item is a statement regarding either a learning motive (e.g., I have a strong desire to excel in all my studies) or a learning strategy (e.g., I try to work consistently throughout the term and review regularly when the exams are close). The items on the questionnaire combine to give scores for six-subscaler (deep motive, deep strategy, surface motive, surface strategy, achieving motive, achieving strategy) each with seven items, as well as three-scales (deep, surface, achieving) each with fourteen items. Items are rated on a five-point Likert scale ranging from 1 (this item is never or only rarely true of me) to 5 (this item
Table 3.1

**Item number and corresponding statements for the SPQ**

<table>
<thead>
<tr>
<th>Item</th>
<th>Statement</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>I chose my present courses largely with a view to the job situation when I graduate rather than out of their intrinsic interest to me.</td>
</tr>
<tr>
<td>2</td>
<td>I find that at times studying gives me a feeling of deep personal satisfaction.</td>
</tr>
<tr>
<td>3</td>
<td>I want top grades in most or all of my courses so that I will be able to select from among the best positions available when I graduate.</td>
</tr>
<tr>
<td>4</td>
<td>I think browsing around is a waste of time, so I only study seriously what’s given out in class or in the course outlines.</td>
</tr>
<tr>
<td>5</td>
<td>While I am studying, I often think of real life situations to which the material that I am learning would be useful.</td>
</tr>
<tr>
<td>6</td>
<td>I summarise suggested readings and include these as part of my notes on a topic.</td>
</tr>
<tr>
<td>7</td>
<td>I am discouraged by a poor mark on a test and worry about how I will do on the next test.</td>
</tr>
<tr>
<td>8</td>
<td>While I realise the truth is forever changing as knowledge is increasing, I feel compelled to discover what appears to me to be the truth at this time.</td>
</tr>
<tr>
<td>9</td>
<td>I have a strong desire to excel in all my studies.</td>
</tr>
<tr>
<td>10</td>
<td>I learn some things by rote, going over and over them until I know them by heart.</td>
</tr>
<tr>
<td>11</td>
<td>In reading new material I often find that I’m continually reminded of material I already know and see the latter in a new light.</td>
</tr>
<tr>
<td>12</td>
<td>I try to work consistently throughout the term and review regularly when the exams are close.</td>
</tr>
<tr>
<td>13</td>
<td>Whether I like it or not, I can see that further education is for me a good way to get a well-paid or secure job.</td>
</tr>
<tr>
<td>14</td>
<td>I feel that virtually any topic can be highly interesting once I get into it.</td>
</tr>
<tr>
<td>15</td>
<td>I would see myself basically as an ambitious person and want to get to the top, whatever I do.</td>
</tr>
<tr>
<td>16</td>
<td>I tend to choose subjects with a lot of factual content rather than theoretical kinds of subjects.</td>
</tr>
<tr>
<td>17</td>
<td>I find that I have to do enough work on a topic so that I can form my own point of view before I am satisfied.</td>
</tr>
<tr>
<td>18</td>
<td>I try to do all my assignments as soon as possible after they are given out.</td>
</tr>
<tr>
<td>19</td>
<td>Even when I have studied hard for a test, I worry that I may not be able to do well in it.</td>
</tr>
<tr>
<td>20</td>
<td>I find that studying academic topics can at times be as exciting as a good novel or movie.</td>
</tr>
<tr>
<td>21</td>
<td>If it came to the point, I would be prepared to sacrifice immediate popularity with my fellow students for success in my studies and subsequent career.</td>
</tr>
<tr>
<td>22</td>
<td>I generally restrict my study to what is specifically set as I think it is unnecessary to do anything extra.</td>
</tr>
<tr>
<td>23</td>
<td>I try to relate what I have learned in one subject to that in another.</td>
</tr>
<tr>
<td>24</td>
<td>After a lecture or lab I reread my notes to make sure they are legible and that I understand them.</td>
</tr>
<tr>
<td>25</td>
<td>Lecturers shouldn’t expect students to spend significant amounts of time studying material everyone knows won’t be examined.</td>
</tr>
<tr>
<td>26</td>
<td>I usually become increasingly absorbed in my work the more I do.</td>
</tr>
<tr>
<td>27</td>
<td>One of the most important considerations in choosing a course is whether or not I will be able to get top marks in it.</td>
</tr>
<tr>
<td>28</td>
<td>I learn best from lecturers who work from carefully prepared notes and outline major points neatly on the blackboard.</td>
</tr>
<tr>
<td>29</td>
<td>I find most new topics interesting and often spend extra time trying to obtain more information about them.</td>
</tr>
<tr>
<td>30</td>
<td>I test myself on important topics until I understand them completely.</td>
</tr>
<tr>
<td>31</td>
<td>I almost resent having to spend a further three or four years studying after leaving school but feel that the end results will make it all worthwhile.</td>
</tr>
<tr>
<td>32</td>
<td>I believe strongly that my aim in life is to discover my own philosophy and belief system and to act strictly in accordance with it.</td>
</tr>
<tr>
<td>33</td>
<td>I see getting high grades as a kind of competitive game, and I play it to win.</td>
</tr>
<tr>
<td>34</td>
<td>I find it best to accept the statements and ideas of my lecturers and question them only under special circumstances.</td>
</tr>
<tr>
<td>35</td>
<td>I spend a lot of my free time finding out more about interesting topics which have been discussed in different classes.</td>
</tr>
<tr>
<td>36</td>
<td>I make a point of looking at most of the suggested readings that go with the lectures.</td>
</tr>
<tr>
<td>37</td>
<td>I am at university mainly because I feel that I will be able to obtain a better job if I have a tertiary qualification.</td>
</tr>
<tr>
<td>38</td>
<td>My studies have changed my views about such things as politics, my religion, and my philosophy of life.</td>
</tr>
<tr>
<td>39</td>
<td>I believe that society is based on competition and schools and universities should reflect this.</td>
</tr>
<tr>
<td>40</td>
<td>I am very aware that lecturers know a lot more than I do and so I concentrate on what they say is important rather than rely on my own judgement.</td>
</tr>
<tr>
<td>41</td>
<td>I try to relate new material, as I am reading it, to what I already know on that topic.</td>
</tr>
<tr>
<td>42</td>
<td>I keep neat, well-organised notes for most subjects.</td>
</tr>
</tbody>
</table>
is always or almost always true of me). Combined scores on each subscale range from 7 to 35 and from 14 to 70 for each scale. A student’s profile can then be developed based on their scaled scores (see Biggs, 1987a, 1987b). However, for the purpose of this study, subscale and scale scores rather than profiles will be used. SPQ items are listed in Table 3.1. Students completed a questionnaire package that included the SPQ and demographic information (see Appendix A).

Procedure

Questionnaire packages were handed out to students during lectures. Students were informed that participation in the study was voluntary and the questionnaires would remain anonymous. To this end, students participating in the study were asked to complete the SPQ and return it to a box provided for this purpose within a public access area of the university before the end of the following week. The subset of students retested after a period of three months followed the same procedure.

Results and Discussion

Prior to undertaking the analyses, the data was checked for univariate and multivariate outliers (see Tabachnick & Fidell, 2001). After these checks were conducted, three participants were removed from further analysis as they were found to be both univariate and multivariate outliers, thus reducing the sample size to 257. While the sample size for the current study falls within the acceptable range of at least 200 – 300, identified as the requirement for validation studies on the SPQ (see chapter 2; Fabrigar et al, 1999), the Kaiser-Meyer-Olkin (KMO) measure of sampling adequacy was also conducted to determine whether the sample size was appropriate for undertaking factor analysis based on this measure. Values of .6 or above are considered appropriate for good factor analysis (Tabachnick & Fidell, 2001). The KMO for the current data was acceptable at .77.

Reliability

Cronbach’s Alpha

The internal consistency of the three scales and six subscales of the SPQ were assessed using the SPSS program SCALE (Norusis, 1998). Alpha coefficients for the present sample
were moderate, ranging from .57 on the surface motive and surface strategy subscales, to .75 on the achieving strategy subscale, and from .67 on the surface scale to .80 on the deep scale (see Table 3.2). The pattern of internal consistency for the current study is similar to that from previous research (see Table 2.3). Generally, the surface scale and subscales (surface motive; surface strategy) are found to be less stable than either the deep or achieving scales and subscales (deep motive; deep strategy; achieving motive; achieving strategy). This pattern is strongly demonstrated in the results of the current study.

Retest Reliability

The test-retest reliability of the SPQ scales and higher order scales at a three month interval was then assessed utilising Spearman’s Rho to examine the rank-order correlation. Rank-order correlation involves ranking the values of all participants from smallest to largest, with the Pearson product moment correlation then computed on these ranks (Tabachnick & Fidell, 2001). This methodology was considered the most appropriate for examining shifts in time for the participants on the scales and subscales of the SPQ, as one purpose of this research was to examine whether the relative position of students had changed over time. Test-retest reliability criteria generally accepts a correlation of .0 to .4 as being indicative of poor reliability; .41 to .75 as fair to good; and greater than .75 as excellent reliability (see Corcoran & Fischer, 1987).

Over a period of three months there were significant correlations for the surface motive ($r = .70, p<.01$), surface strategy ($r = .53, p<.01$), deep strategy ($r = .48, p<.01$), achieving motive ($r = .58, p<.01$) and achieving strategy ($r = .54, p<.01$) subscales of the SPQ, suggesting good reliability for these subscales. The correlation for the deep motive subscale ($r = .37, p<.01$) while significant, suggests poor test-retest reliability according to the correlation criteria. Previous research undertaken over a period of a few months has evidenced good test-retest reliability for the six subscales of the SPQ; for example, Edwards (1986) found the deep motive strategy to have one of the weakest correlations ($r = .60$), but the resultant correlation was not as weak as present findings. Previously, the lowest correlation for the deep motive subscale was .56 for a testing period of 4 months (Tang, 1991; see also Table 2.5).
<table>
<thead>
<tr>
<th>Subscale</th>
<th></th>
<th>Scale</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>α</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Surface Motive</td>
<td>.57</td>
<td>Surface</td>
<td>.67</td>
</tr>
<tr>
<td>Surface Strategy</td>
<td>.57</td>
<td>Deep</td>
<td>.70</td>
</tr>
<tr>
<td>Deep Motive</td>
<td>.67</td>
<td>Achieving</td>
<td>.64</td>
</tr>
<tr>
<td>Deep Strategy</td>
<td>.70</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Achieving Motive</td>
<td>.64</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Achieving Strategy</td>
<td>.75</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Achieving</td>
<td>.72</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
The results at the scale level of the SPQ result in similar conclusions. There was a moderate significant correlation for the surface \((r = .68, p < .01)\), deep \((r = .47, p < .01)\) and achieving \((r = .49, p < .01)\) scales of the SPQ, suggesting the scales have good reliability over a period of three months. The results of the current study are not as strong as those reported by Murray-Harvey (1994), the only reported test-retest reliability available for the scales of the SPQ.

There is a moderate significant correlation for the surface-achieving-motive \((r = .73, p < .01)\) and deep-achieving \((r = .57, p < .01)\) scales over a period of three months. These results are in accord with Murray-Harvey’s (1994) results, even though the surface-achieving-motive scale is different in the current study to the surface-achieving scale utilised in her study. In both instances the higher-order surface scale evidenced higher reliability over a period of a few months than the higher-order deep scale. Perhaps then, students using a surface-achieving approach to learning are less influenced by short-term fluxes in perceptions of learning environment (etc.) than students using a deep-achieving approach to learning.

Overall, retest reliability for the present study while acceptable, is lower, when compared with the available data from previous test-retest reliability work undertaken on the SPQ. Further, there are differences between the current study and previous test-retest studies regarding the reliability of the individual subscales. Whereas previous research generally found one of the achieving subscales to be more reliable, the current research found the surface strategy subscale to be more reliable. In contrast, however, the surface strategy subscale was the least reliable subscale in three of the five studies undertaken over a period of a few months (Cornell, 1986; Edwards, 1986; Murray-Harvey, 1994).

Differences between the results of the present study and previous research include the timing of data collection, the choice of reliability analysis, and the retesting period. Considering the current results were obtained at the start of semester two and at the end of semester two, this may have influenced the way in which students responded to the SPQ questions. Those studies conducted over a short period of time would have tested students at
the commencement and completion of the semester in the same learning context. Reasonably, it can be expected that students would generally be more focussed on the achieving aspects of learning with exams pending, than they would be at the commencement of a new course (see Biggs, 1987a). Students’ perceptions of the learning environment may influence the way they respond to questions at the beginning and end of semester, even though the learning context itself has not changed.

Another issue affecting a comparison of the current with previous findings is the analyses used. This research used Spearman’s Rho to analyse the data, ranking the students and comparing these rankings to examine changes, whereas previous research has used Pearson’s product moment correlation (see chapter 2). As discussed previously, product moment correlation compares the linear relationship between variables. While this analysis provides a test of the reliability of the variables is does not consider the relative position of participants. Namely, do students change relative to each other or independent of each other? Thus, the Spearman’s Rho analysis used in the present study can be considered a more stringent measure of test-retest reliability, and may account for differences in findings with other studies.

**Subscale Structure**

*Exploratory Factor Analyses.*

The methodology replicated that used by Biggs (1993b), in order to allow for direct comparisons with his findings. It should be noted that while this methodology is not the most appropriate for analysing the factor structure of the SPQ, it was chosen to facilitate direct comparison with Biggs’s findings. Each seven-item subscale was separately factor analysed using principal components analysis with a varimax rotation. EFA analysis of the factor structure of the SPQ subscales was undertaken using the SPSS program DATA REDUCTION (Norusis, 1993). Interestingly, in his critique of Christensen et al. (1991) Biggs (1993b) suggested this methodology was inappropriate, as the subscales of the SPQ are not orthogonal, comprising motive and strategy components of the three approaches to learning. In line with this, further analyses of the subscales of the SPQ were also conducted using an
oblique rotation to ascertain whether the structure of the subscales is more appropriate utilising this rotation. CFA for each subscale will also be undertaken in accord with Biggs’s (1993b, 1999) own research.

Using an eigenvalue cut-off point of one as the criterion for determine the number of factors, only one of the subscales (achieving strategy) cleanly loaded on a single factor, as suggested by Biggs (1993b). The remainder of the subscales displayed loadings across two (deep motive, achieving motive, deep strategy) or three (surface motive, surface strategy) factors. However, using the scree plot test criterion (see Comrey & Lee, 1992) suggested a different picture, with the deep motive and surface subscales appearing to require a one-factor solution (see Figure 3.1). Based on the combination of the two criteria, one-factor solutions were forced for these two subscales. The factor structures for the six subscales are displayed in Tables 3.3 and 3.4.

The suggested criterion of .32 (Tabachnick & Fidell, 2001) was used as the cut-off for factor loadings. Of the three subscales with loadings across more than one factor, two items cleanly loaded on factor 1 for the surface motive (7 and 19) subscale, and four items for both the achieving motive (3, 9, 15, and 21) and deep strategy (5, 11, 23, and 41) subscales. The total variance accounted for by the three-factor solution for the surface motive subscale was 61 percent. Of the remaining items, three (1, 25, and 31) loaded on factor 2 and one item (13) cleanly loaded on factor 3. Item 37 had a splitloading across factors 2 and 3, using .32 as the cut-off point for loadings. The total variance accounted for by the two-factor solution for the achieving motive subscale was 48 percent. Two items (33 and 39) loaded on factor 2 of the achieving motive subscale, and a further item (27) had splitloadings across both factors. Finally, the total variance accounted for by the two-factor solution for the deep strategy subscale was 60 percent. Two items (29 and 35) loaded on factor 2 of the deep strategy subscale, and the remaining item (17) had a splitloading across both factors.

The results of the present study offer only partial support to the first hypothesis (H3.1), as the results do not completely support the factor structure proposed by Biggs (1979) and
Figure 3.1. Scree plot diagrams for the six subscales of the SPQ.
Table 3.3

*Rotated factor matrices for the motive subscales*

<table>
<thead>
<tr>
<th>Surface Motive</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>Deep Motive</th>
<th>1</th>
<th>Achieving Motive</th>
<th>1</th>
<th>2</th>
</tr>
</thead>
<tbody>
<tr>
<td>SPQ1</td>
<td>-.04</td>
<td>.74</td>
<td>.06</td>
<td>SPQ2</td>
<td>.72</td>
<td>SPQ3</td>
<td>.77</td>
<td>-.02</td>
</tr>
<tr>
<td>SPQ7</td>
<td>.82</td>
<td>.12</td>
<td>.11</td>
<td>SPQ8</td>
<td>.54</td>
<td>SPQ9</td>
<td>.78</td>
<td>.03</td>
</tr>
<tr>
<td>SPQ13</td>
<td>.16</td>
<td>-.32</td>
<td>.74</td>
<td>SPQ14</td>
<td>.58</td>
<td>SPQ15</td>
<td>.75</td>
<td>-.08</td>
</tr>
<tr>
<td>SPQ19</td>
<td>.85</td>
<td>.04</td>
<td>.11</td>
<td>SPQ20</td>
<td>.72</td>
<td>SPQ21</td>
<td>.36</td>
<td>.25</td>
</tr>
<tr>
<td>SPQ25</td>
<td>.13</td>
<td>.64</td>
<td>-.10</td>
<td>SPQ26</td>
<td>.64</td>
<td>SPQ27</td>
<td>.40</td>
<td>.33</td>
</tr>
<tr>
<td>SPQ31</td>
<td>.23</td>
<td>.49</td>
<td>.35</td>
<td>SPQ32</td>
<td>.47</td>
<td>SPQ33</td>
<td>.04</td>
<td>.79</td>
</tr>
<tr>
<td>SPQ37</td>
<td>.07</td>
<td>.32</td>
<td>.81</td>
<td>SPQ38</td>
<td>.38</td>
<td>SPQ39</td>
<td>-.05</td>
<td>.72</td>
</tr>
</tbody>
</table>

% Variance: 29 18 14 35 30 18

*Note.* Extraction Method: Principal Component Analysis.
Rotation Method: Varimax with Kaiser Normalisation.
Table 3.4

*Rotated factor matrices for the strategy subscales*

<table>
<thead>
<tr>
<th>Surface Strategy</th>
<th>1</th>
<th>Deep Strategy</th>
<th>1</th>
<th>2</th>
<th>Achieving Strategy</th>
<th>1</th>
</tr>
</thead>
<tbody>
<tr>
<td>SPQ4</td>
<td>.59</td>
<td>SPQ5</td>
<td>.72</td>
<td>.18</td>
<td>SPQ6</td>
<td>.64</td>
</tr>
<tr>
<td>SPQ10</td>
<td>.41</td>
<td>SPQ11</td>
<td>.77</td>
<td>-.04</td>
<td>SPQ12</td>
<td>.78</td>
</tr>
<tr>
<td>SPQ16</td>
<td>.33</td>
<td>SPQ17</td>
<td>.34</td>
<td>.52</td>
<td>SPQ18</td>
<td>.68</td>
</tr>
<tr>
<td>SPQ22</td>
<td>.58</td>
<td>SPQ23</td>
<td>.78</td>
<td>.10</td>
<td>SPQ24</td>
<td>.64</td>
</tr>
<tr>
<td>SPQ28</td>
<td>.43</td>
<td>SPQ29</td>
<td>.04</td>
<td>.83</td>
<td>SPQ30</td>
<td>.45</td>
</tr>
<tr>
<td>SPQ34</td>
<td>.67</td>
<td>SPQ35</td>
<td>-.06</td>
<td>.84</td>
<td>SPQ36</td>
<td>.69</td>
</tr>
<tr>
<td>SPQ40</td>
<td>.64</td>
<td>SPQ41</td>
<td>.80</td>
<td>.04</td>
<td>SPQ42</td>
<td>.53</td>
</tr>
</tbody>
</table>

% Variance 28.38 38 22 41

supported in his later research (Biggs, 1993b). Also, the results offer only limited support to hypothesis 3.5, as only three of the subscales loaded across two or more factors (surface motive, deep strategy, and achieving motive), while the remaining three subscales (surface strategy, deep motive and achieving strategy) loaded on a single factor. Research on the factor structure of the SPQ has repeatedly found instability in the subscale structure of the instrument. There is for example, a consistent pattern of findings of items 7 and 19 loading together (Beckwith, 1991; Bolen et al., 1994; Christensen et al., 1991; Kember and Gow, 1990). However, in a number of studies items 7 and 19, along with item 25, have not loaded on any factor within the solution (see Burnett & Dart, 2000; O’Neil & Child, 1984; Volet et al., 1994). The factor loadings for the factor 1 for the achieving motive subscale concur with previous research (see Christensen et al., 1991; Kember & Gow, 1990; O’Neil & Child, 1984; Volet et al., 1994). Similarly results for the deep strategy subscale are, as expected, with many studies providing a solution comprising items 5, 11, 23 and 41 (see Bolen et al., 1994; Burnett & Dart, 2000) or some combination of these four items (see Beckwith, 1991; Christensen et al., 1991; Hilliard, 1995; Kember & Gow, 1990; O’Neil & Child, 1984; Volet et al., 1994).

The factor structures for the six subscales in the current study suggest surface motive, achieving motive and deep strategy subscales are measuring more than one construct. Returning to the questions associated with these items may shed some light on the resultant factor structures. Questions associated with the surface motive subscale can be seen to highlight different aspects of learning motivation. Factor 1 in the current study, comprising items 7 and 19, seems to be associated with fear of failure, whereas items 1, 25 and 31 on factor 2 relate to the notion of having to study in order to reach an end goal. Tied in with this is the notion of making minimal effort in order to attain this goal. All three questions are negatively construed, focussing heavily on possible resentment associated with studying. Items 13 and 37 also focus on goal attainment, but appear to be more positive in nature, which may explain why item 37 loads on both the second and third factors.
There is a clear distinction between questions associated with the first and second factors of the achieving motive subscale. Items 3, 9, 15 and 21 (factor 1) all relate to the notion of success and being at the top of either study or career, whereas items 33 and 39 (factor 2) focus on competition. Item 21 seems more calculating, as the student chooses the course based on the ability to be a successful competitor, and thus it is understandable why this item loads across both the factors. Similarly, there is a clear distinction between questions associated with the first and second factors of the deep strategy subscale. Items 5, 11, 23 and 41 loading on factor 2 all focus on relating the learned material to experience or previously learned material, whereas items 29 and 35 (factor 2) focus on the amount of extra time spent exploring topics of interest. Item 17 encompasses both of these, as it is about developing one’s own view on the topic. Again it is understandable why this item loads across both factors.

Principal axis factoring with direct oblimin rotation did not provide notably different solutions for the six subscales of the SPQ. However, items 17, 21 and 31 did not load onto the appropriate subscales in these analyses, while using PCA with varimax led to all items loading significantly onto associated factors. These results offer less support to Biggs’s findings (H3.1), but slightly more support to the pattern of findings from previous research to date (H3.5). Overall, these results highlight the differences that can occur in EFA based on methodological decisions.

Confirmatory Factor Analyses

The validity of the SPQ subscales was further analysed using confirmatory factor analysis (EQS – Bentler, 1989). In accordance with previous research conducted by Biggs (1992, 1993b), each of the six subscales of the SPQ were analysed separately. Table 3.5 displays the results of the CFAs for each of the six subscales. A good fit is considered to be a low non-significant chi-square, a comparative fit index (CFI) in excess of .90 and a root mean square error of approximation (RMSEA) less than .06 (see Mueller, 1996; Schumacker & Lomax, 1996; Tabachnick & Fidell, 2001). As can be seen in Table 3.5, in all cases the suggested
Table 3.5

Confirmatory factor analyses of the six subscales of the SPQ

<table>
<thead>
<tr>
<th>Subscale</th>
<th>$\chi^2$</th>
<th>CFI</th>
<th>RMS</th>
</tr>
</thead>
<tbody>
<tr>
<td>SM</td>
<td>65.55</td>
<td>.68</td>
<td>.13</td>
</tr>
<tr>
<td>DM</td>
<td>32.66</td>
<td>.91</td>
<td>.08</td>
</tr>
<tr>
<td>AM</td>
<td>36.58</td>
<td>.86</td>
<td>.08</td>
</tr>
<tr>
<td>SS</td>
<td>40.76</td>
<td>.79</td>
<td>.09</td>
</tr>
<tr>
<td>DS</td>
<td>108.84</td>
<td>.75</td>
<td>.17</td>
</tr>
<tr>
<td>AS</td>
<td>46.24</td>
<td>.90</td>
<td>.10</td>
</tr>
</tbody>
</table>

items comprising a subscale did not measure a single factor, offering support to hypothesis 3.6, but not to hypothesis 3.2.

The deep motive and achieving strategy subscales indicated a better fit than the other subscales. However, the chi-square for each of all six subscales was above an acceptable level, particularly for the deep strategy subscale (108.84). Further, the chi-square for each of the subscales was significant, suggesting the items comprising the six subscales do not fit with their respective models. However, it should be noted that the chi-square is considered the least reliable index (Schumacker & Lomax, 1996). The CFI values for the deep motive (.91) and achieving strategy (.90) subscales were acceptable. The lowest CFI evidenced was in the surface motive subscale (.68). The RMSEA for all subscales was above the recommended .06, although only values above .10 are considered indicative of a poor fit (see Tabachnick & Fidell, 2001). The RMSEA values for the deep motive (.08) and achieving strategy (.08) subscales were adequate. In the current study, the deep strategy subscale provides the least good fit ($\chi^2 = 108.84$, CFI = .75, RMSEA = .17), while Biggs (1992) found the surface motive subscale provided the least good fit (GFI = .97; RMR = .07).

The results of the EFA and the CFA on the six subscales of the SPQ in the present study raise concern regarding the suitability of conducting further analysis at the subscale level. It appears from the current findings there is a degree of instability in the majority of the subscales. Moreover, perhaps Biggs’s (1993b) assertion that the subscales should be regarded as motive and strategy components of the three approaches to learning should be more strongly considered. The results of the present study do not confirm any of the four associated hypotheses (H3.1, H3.2, H3.5 or H3.6). The results did not confirm, as proposed by Biggs (1999), that items for each of the subscales would load onto a single factor using either EFA (H3.1) or CFA (H3.2). Further, as the EFA suggested three of the subscales loaded onto a single factor, the results did not confirm the hypothesis that none of the subscales would load cleanly onto a single factor (H3.5), and as the deep motive and achieving strategy subscales provide a better fit than the remaining four subscales, hypothesis 3.6 cannot be confirmed. Based on the results of this study, the subscale structure of the SPQ
must be reassessed, as the items associated with the various subscales do not adequately measure those subscales.

**Scale Structure**

The second- and third-order structures proposed by Biggs (1987a, 1987b) were also tested using both EFA and CFA. The decision was made to analyse the data utilising both factor analytic techniques in order to identify parallels with the available research on the psychometric properties of the SPQ. As discussed in chapter 2, while EFA might no longer be considered the most appropriate methodology for such an analysis, the majority of studies undertaken on the factor structure of the SPQ have used EFA. In addition, as previously discussed such a systematic convergent methodology using EFA and CFA on the same student sample in the present study allows for comparisons of findings with previous studies, as well as between the different methodologies.

**Exploratory Factor Analyses**

Numerous exploratory analyses were undertaken using principal axis factoring and principal components analysis with both varimax and oblique rotations for both two and three scale models. Of these, principal axis factoring (PAF) with oblique rotation was conducted, and a two-factor solution was found, using both eigenvalue and scree plot criteria. The eigenvalues for the two factors were 2.12 and 1.55 respectively. Consistent with Biggs’s own research (1987a) only factor loadings above .40 were considered significant. The results for the two-factor solution are presented in Table 3.6.

The total variance accounted for by the two-factor solution for the subscales of the SPQ was 61 percent. Three subscales (deep motive, deep strategy and achieving strategy) loaded on the first factor and accounted for 35 percent of the variance. The remaining three subscales (surface motive, surface strategy and achieving motive) loaded on the second factor and accounted for 26 percent of the variance. It is interesting that the achieving subscales are split between the two factors, as the majority of previous research analysing the subscales of the SPQ has suggested both achieving motive subscales load with the deep subscales (see Table 3.6). With the exception of the achieving motive subscale not loading significantly on
Table 3.6

*Factor loadings for the six subscales of the SPQ.*

<table>
<thead>
<tr>
<th>Subscale</th>
<th>Factor 1</th>
<th>Factor 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Surface Motive</td>
<td>-.149</td>
<td>.504</td>
</tr>
<tr>
<td>Surface Strategy</td>
<td>-.083</td>
<td>.664</td>
</tr>
<tr>
<td>Achieving Motive</td>
<td>.346</td>
<td>.481</td>
</tr>
<tr>
<td>Achieving Strategy</td>
<td>.481</td>
<td>.043</td>
</tr>
<tr>
<td>Deep Motive</td>
<td>.709</td>
<td>-.089</td>
</tr>
<tr>
<td>Deep Strategy</td>
<td>.860</td>
<td>-.132</td>
</tr>
</tbody>
</table>

*Note.* Loadings >.40 are in bold
the first factor, the current findings are similar to Biggs’s (1987a) own third-order factor structure evidencing deep-achieving and surface-achieving factors. Overall, the results for the second-order structure (deep, surface, achieving) were not supported (H3.3 and H3.7). Thus, consistent with H3.9, the present findings support the two rather than three factor model of student learning.

**Confirmatory Factor Analyses**

Prior to the CFAs the inter-factor correlations for the six subscales of the SPQ were calculated using Pearson’s Product moment correlations (see Table 3.7). As expected, significant positive correlations were found between the surface subscales, the deep subscales and the achieving subscales, as well as weak, but significant negative correlations between the deep and surface subscales.

Confirmatory factor analyses were then conducted on the six subscales of the SPQ using EQS (Bentler, 1989) to test for both second- and third-order models. Firstly, the second-order model hypothesis (H3.4) was that the six subscales of the SPQ would combine to form the three approaches to learning: deep, surface and achieving. And the alternate hypothesis that there will be three latent variables, but that these will be some crossover between them was tested (H3.8). The goodness-of-fit indices for the second-order model ($\chi^2 = 34.46; \text{CFI} = .89; \text{RMS} = .20$) did not endorse the three factor model of the SPQ. Consequently, the results of the current CFA suggest the second-order factor structure of the SPQ may not offer the most appropriate conceptual framework for the SPQ. Thus, consistent with the EFA findings, the CFA did not appear to support the three latent variables of deep, surface and achieving (H3.4 and H3.8).

Secondly, the third-order structure proposed by Biggs (1987a) and the pattern of results in previous research (Andrews et al., 1994; Fox et al., 2001; Hattie & Watkins, 1981; Kember & Leung, 1998; Sachs & Gao, 2000; Wong et al., 2000) suggests the achieving subscales (achieving motive and achieving strategy) map over the surface and deep scales to produce two higher order factors. In his own research Biggs (1987a, 1993b) found achieving motive was associated with both deep and surface, while achieving strategy was only associated with
Table 3.7

*Inter-factor correlations for the subscales of the SPQ*

<table>
<thead>
<tr>
<th></th>
<th>SM</th>
<th>SS</th>
<th>DM</th>
<th>DS</th>
<th>AM</th>
<th>AS</th>
</tr>
</thead>
<tbody>
<tr>
<td>SM</td>
<td></td>
<td>.324**</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>SS</td>
<td>-.171**</td>
<td>-111</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>DM</td>
<td>-.163**</td>
<td>-.200**</td>
<td>.654**</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>DS</td>
<td>.168**</td>
<td>.244**</td>
<td>.247**</td>
<td>.108</td>
<td></td>
<td></td>
</tr>
<tr>
<td>AM</td>
<td>.001</td>
<td>-.110</td>
<td>.289**</td>
<td>.407**</td>
<td>.169**</td>
<td></td>
</tr>
</tbody>
</table>

*Note* ** p < 0.01 SM = Surface Motive; DM = Deep Motive; AM = Achieving Motive; SS = Surface Strategy; DS = Deep Strategy; AS = Achieving Strategy.
Figure 3.2. Two factor model of the SPQ.

Note ** p < 0.01 SM = Surface Motive; DM = Deep Motive; AM = Achieving Motive;
the deep scale. This finding is also supported by the present research findings, thus supporting hypothesis H3.10. The goodness of fit indices for the present study ($\chi^2 = 12.06; CFI = .97; RMS = .09$) offer support for the two factor model of the SPQ, as displayed in Figure 3.2. The loadings for the deep subscales (deep motive and deep strategy) were relatively high (.72 and .89 respectively), while the loadings for the surface subscales (surface motive and surface strategy) were moderate (.54 and .66 respectively). The achieving subscales (achieving motive and achieving strategy) loaded across both factors, with achieving motive loading significantly on both the surface (.55) and deep (.42) factors, whereas the achieving strategy subscale only loaded significantly on the deep subscale (.51). There was a significant negative correlation between the two latent factors of deep and surface (-.35).

Overall the results of these two CFAs further support the notion that the achieving scale functions in conjunction with the deep or surface approaches to learning, rather than forming a conceptually discrete learning approach. Essentially, the results for the second-order model are not surprising, as much of the literature on approaches to learning discusses the conceptual difference between achieving and the deep and surface constructs (Biggs, 1987a, 1987b, 1993b, 1999). Perhaps this difference is in part due to the primary focus of the achieving strategies on doing whatever is necessary to attain high grades, which may include either deep or surface strategies, as appropriate. Biggs (1987a) suggests the achieving approach differs from both the deep and surface approaches in the way in which the student develops their strategies. While deep and surface strategies are concerned with “ways in which students engage the context of the task itself,” achieving strategies describe the “ways in which students organise the temporal and spatial contexts surrounding the task” (Biggs, 1987a). Thus a student can quite easily rote-learn in an organised way, or read for meaning in an organised way. However, Biggs suggests it would be difficult for a student to simultaneously rote learn and seek meaning. Essentially, Biggs suggests the achieving approach maps over the deep and surface approaches to form the third-order factor structure. However, the results of the second-order factor structure in the current study do differ from
the results provided by Andrews et al. (1994) who confirmed the three latent variables deep, surface and achieving using the LPQ. Further, Fox et al. (2001), using a shortened 18-item version of the SPQ, confirmed a three factor model with one higher order factor (deep-achieving). This model equates to a combination of the second-order (deep, surface and achieving) with the third-order (deep + achieving).

There have been three studies of the third-order model that have previously found support for a two-factor structure. Of these, two have supported the factor structure proposed by Biggs (1987a, 1987b, 1993b). Both Kember and Leung (1998) and Sachs and Gao (2000) found the achieving subscales mapped over both the surface and the deep scales creating surface + achieving, and deep + achieving approaches to learning. Wong et al. (1996) found the achieving subscales also mapped over the deep and surface scales but in different ways. They found two different models for the LPQ using a cross-cultural sample, with some of the cultural samples fitting the two factor model (surface + achieving, deep), while others had a better fit with the model combining achieving with deep (surface, deep + achieving). These three studies and the present study, all suggest support for the deep-achieving, but not for the surface-achieving approach to learning. Interestingly, the results of the present study using an English speaking sample and the three studies used non-English speaking samples are all similar. However, as there have been problems associated with the cultural specificity of the SPQ (see chapter 2), and there is no clear pattern of findings for the higher-order surface factor structure, it has been decided the deep-achieving and surface-achieving-motive factor model found in the present study will be used in the remainder of this research programme.

Summary of Strengths and Limitations of the Present Study

The previous section has presented a discussion of the results obtained for the ten hypotheses of the present study. The focus was on interpreting the results of the present study in light of previous research. This section shifts the focus to a discussion of the general strengths and limitations of the present study.
Strengths

A particular strength of the present study is the use of a convergent sampling methodology to examine the construct validity of the SPQ. One of the problems associated with comparing the results of the factor analyses of different studies is that it is difficult to control for external factors, such as demographic differences, which have been identified as variables that may affect approaches to learning. Utilising a single sample of students to assess both the exploratory and confirmatory analysis of both item and scale structures of the SPQ ensures that any differences between the results are due to problems in the structure of the SPQ, rather than student related, or sampling difference factors. It must also be acknowledged that the use of both exploratory and confirmatory analysis allows for methodological differences between these two analytical tools to be highlighted. For instance, the item level exploratory analysis suggested three of the six subscales of the SPQ loaded in accord with Biggs (1987a, 1993b), but the confirmatory analysis suggested none of the subscales could be confirmed. The results of this study highlight how different results can be found simply by choice of analysis and again this suggests the exploratory factor analyses undertaken on the SPQ need to be examined with rigor, before the results of these studies can be used to understand the construct validity of the SPQ. Again, it raises the question of whether such results should be used in an examination of the construct validity of the SPQ.

A second strength of this study is the use of an Australian sample. As identified in chapter 2, research on the SPQ has found there are cultural differences in the factor structures of the SPQ. Several of the EFA studies undertaken on the SPQ were designed in part to assess the cultural specificity of the SPQ (Biggs, 1996; Gow et al., 1989; Hattie & Watkins, 1981; Kember & Gow, 1990, 1991; Watkins and Murphy, 1994). The findings to date indicate that it can be confidently argued that there are problems of cultural specificity associated with the SPQ. As the purpose of the present study was to validate the factor structure of the SPQ, it was important to limit any possible confounds associated with issues such as cultural specificity. Thus, it was decided to use an Australian sample, as this is the population from which Biggs first tested and developed the SPQ. Only limited CFA’s have
been conducted on the SPQ/LPQ with English speaking samples of students. Moreover, given findings by Dahlin and Watkins (2000) based on interviews that Chinese students perceived memorising as an integral component of understanding, thus subsuming a surface approach within a deep approach, and that the bulk of both EFA and CFA research conducted on the SPQ, especially by Biggs (1987a, 1992, 1993b, Biggs et al., 2001) has utilised samples of Chinese students, an exhaustive and systematic re-appraisal of the psychometric properties of the SPQ is best conducted with English speaking students.

A third strength of the present study was the use of Spearman’s Rho to assess the retest reliability of the SPQ. As already discussed, the rank-order correlations produced by this technique allow shifts in time to be accounted for. As such, the current study tested whether the relative position of students changed over time. This was the first time this technique has been used to assess the retest reliability of the SPQ. An associated strength is that this is only the second time to date, that the retest reliability of the scales and higher-order scales of the SPQ has been examined (see chapter 2).

Limitations

While evidently a strength of the current study, the use of a homogeneous sample of students is also a limitation. As discussed above, the choice of participants was a measured one, as there was a need to limit potential confounds associated with using a diverse student population. However, by using such a homogeneous sample of psychology students, the results of this study cannot be generalised to the broader student population. Traditionally, research on approaches to learning has used samples consisting of education, arts and science students (see Biggs, 1987a; Dart & Clarke, 1991; Kember & Gow, 1990; Trigwell & Prosser, 1991; Watkins & Hattie, 1985). However, to date only limited research has been conducted on the approaches to learning employed by psychology students (Miller et al., 1987, 1990; Wilson et al., 1996). On the other hand, conducting validation work on a constant sample is positive as approaches to learning have been found to vary between faculty and discipline (Biggs, 1987a; Cantwell & Moore, 1998; Clarke, 1986; Gledhill & van Der Merwe, 1989). The way in which psychology students approach their learning may differ from the
approaches to learning used within other faculties. Thus, it will be necessary for further research to be undertaken, within a variety of different courses in order to establish any consistent patterns in the factor structure of the SPQ.

Conclusions

The purpose of the present study was to reassess the psychometric properties of the SPQ at both subscale and scale levels. The aim was to apply Fabrigar et al.’s (1999) criteria to an examination of factor analysis of the SPQ, and to use this in conjunction with Biggs’s (1993b) own understanding of the appropriate methodology for analysing the psychometric properties of the SPQ. It was considered that an integration of these two viewpoints would allow a thorough examination of the factor structure of the SPQ. For example while Fabrigar et al. (1999) contend EFA is not the appropriate methodology for analysing the factor structure of an already established instrument, it was an important first step in understanding the SPQ as it has been conceptualised by Biggs (1993b). As has been shown, the methodology proposed by Biggs for the item analysis of the SPQ was not supported in this first study of the current research programme. Further, as examined in chapter 2, there are evidently cultural differences in the way in which the SPQ items factor. As much of the initial development work undertaken on the SPQ was conducted with Australian participants (Biggs, 1987a), it was considered appropriate to re examine the SPQ with a similar sample. This study utilised a sample of Australian students having English as their first language to examine the factor structure of the SPQ. As much of the more recent work has been conducted on non-English speaking, especially Chinese samples (Biggs, 1993b; Kember & Leung, 1998; Sachs & Gao, 2000; Wong et al., 1996; Zhang, 2000) it was considered particularly important to undertake research on an English speaking sample.

At the subscale level, the results of the current study suggest there is some instability at the subscale level of the SPQ. The results of the EFA analyses revealed the items for the deep motive, surface strategy and achieving strategy subscales each cleanly loaded on a single factor, while the surface motive, achieving motive and deep strategy subscales did not load onto a single factor (H3.1). Analysis of the subscales loading on more than one factor
revealed patterns in the factor structures for these three subscales. For example, the three factors comprising the surface motive subscale clearly identified three different aspects of learning motivation: fear of failure; negative aspects of goal attainment; and positive aspects of goal attainment. Similarly, there are clear distinctions between the items comprising factor one (success) and factor two (competition) of the achieving motive subscale. Further, there are clear distinctions between the items comprising factor one (previous experience/learning) and factor two (pursuit of interests) of the deep strategy subscale. Thus, the subscale factor structure identifies the multifaceted nature of the surface and achieving motive subscales and the deep strategy subscale as suggested by the pattern of previous results (H3.5).

Similarly, CFA analysis highlighted some instability in the items comprising each of the six subscales and raised concerns regarding further item-level analysis of the SPQ (H3.2 and H3.6). The deep motive and achieving strategy indicated a better fit than the four remaining subscales. When the EFA and CFA results are both considered in relation to the item-level analysis, it is apparent that only the deep motive and achieving strategy subscales provide a single latent variable. It is evident that the SPQ factor structure is problematic when considering the individual items that compose this questionnaire. A number of researchers (see Sachs & Gao, 2000; Volet et al., 1994) have suggested the need to revise the LPQ and SPQ respectively, in order to improve the psychometric properties of these instruments, and based on Biggs et al.'s (2001) development of the R-SPQ-2F, it is apparent that Biggs also concedes this point for the SPQ.

At the scale level, there was no support for a three-factor model of the SPQ using EFA (H3.3 and H3.7) or CFA (H3.4 and H3.8). There was, however, support for a two-factor model using both EFA (H3.9) and CFA (H3.10). Overall, the current study offers support for a third-order latent model comprising the deep-achieving and surface-achieving-motive latent variables. It is important to note in this study that while both of the achieving subscales load with the deep scale, only the achieving motive subscale loads with the surface scale. The results of the current study are in accord with results obtained by Watkins and Dahlin (1997), Akande (1998), and Zhang (2000) utilising EFA, but not with any of the previous findings.
utilising CFA (Kember & Leung, 1998; Sachs & Gao, 2000; Wong et al., 1996). Perhaps this is due to the multifaceted nature of the achieving motive subscale, identified in the current study as success and competition, which may be interpreted differently under different learning conditions. Another reason may be the use of an Australian sample as it has been found that students from different cultural backgrounds interpret the approaches to learning in different ways (see chapter 2; also Biggs, 1996; Gow et al., 1989; Hattie & Watkins, 1981; Kember & Gow, 1991; Watkins & Murphy, 1994). As discussed previously, the bulk of the CFA analyses have been conducted on non-English speaking samples.

Previous research on the factor structure of the SPQ and the LPQ have found a similar pattern of results (see Akande, 1998; Kember & Leung, 1998; Sachs & Gao, 2000; Watkins & Dahlin, 1997; Wong et al., 1996; Zhang, 2000), with more support indicated for the adoption of the third-order two factor model in research. However, even though the weight of evidence for the two-factor model is growing, the very nature of this two-factor model still is not clear. There appear to be two distinct two-factor models identified by the research findings (surface + achieving and deep + achieving; or surface + achieving-motive, and deep + achieving). The findings from the present study add support to the latter. There is, however, a need for further research to be undertaken on the factor structure of the SPQ in order to test the generalisability of the current findings. This would be optimised by undertaking research on the factor structure of the SPQ utilising the same convergent methodology with homogeneous samples of students as in the present study in order to minimise possible confounds, such as learning environment or teaching context. Undertaking research of this nature will establish sound methodological research on the psychometric properties of the SPQ by reducing or eliminating contextual learning environment or discipline differences, to confound the research. While the current research offers support to one two-factor model of the SPQ, there are other two-factor models, such as deep-achieving + surface, or deep + surface-achieving (Wong et al., 1996) or deep-achieving + surface-achieving (Kember & Leung, 1998; Sachs & Gao, 2000) available within the research literature. There is a need for further research to establish whether there is a single factor structure for the SPQ, or whether the factor structure
of the SPQ is influenced by the outside factors and as such can then be reworked in light of this new understanding.

Further, it is apparent that some of the items comprising the subscales of the SPQ are problematic. The reliability of the subscales is consistently moderate to low, with the surface subscales generally providing poor reliability. Further, the factor structure of each seven-item subscale is not clearly defined. Based on their research findings on the LPQ, Sachs and Gao (2000) suggest there is a need for the revision of the instrument. Similarly, based on this study on the factor structure of the items comprising each of the SPQ scales, the need is also apparent for the SPQ. Further Sachs and Gao suggest poor results of relational studies; for example they suggest that the relationship between personal variables and approaches to learning, undertaken with the LPQ, may be the result of problems in the factor structure of the instrument, thus masking real issues in learning. Again, modification of the SPQ is outside the scope of the current research programme because the overall aim of this research programme is to examine the 3P model of learning also proposed by Biggs (1987a, 1999), rather than to revise the SPQ. To this end, it is important to limit the problems associated with the subscales of the SPQ identified in this first study and, therefore, the remainder of this research programme will primarily focus on both the scale and higher-order scale structure of the SPQ, to limit the effect of the subscale problems.

The problems associated with the item level analysis of the SPQ suggest there may be concerns regarding the deep and surface constructs underlying the SPQ. The surface approach to learning appears to be the most problematic, with the present results suggesting the surface motive subscale is comprised of three factors measuring different aspects of learning motivation. While the factor structure of the SPQ has been and will remain the focus of much work in educational practice and research, there is also a need to consider whether the deep and surface constructs on which the SPQ and other measures of approaches to learning are valid. The focus of the next chapter is the validity of the deep and surface constructs utilising a multitrait-multimethod matrix to assess the concurrent validity of these two constructs.
CHAPTER 4

CONCURRENT VALIDITY OF DEEP AND SURFACE CONSTRUCTS
AS MEASURED BY THE SPQ.

Overview

As noted in chapter 3, the two constructs of deep and surface approaches to learning are traditionally measured using self-report questionnaires such as the SPQ. Research undertaken from a quantitative perspective provides support for the validity of the third-order structure of the SPQ. However, this research is limited by its reliance on the SPQ to identify and validate the deep and surface constructs. While the usage of qualitative methodology in research on approaches to learning has had limited application to date, it has nevertheless added some pertinent information to the field. Usually qualitative data is added after the fact, as a means of expanding on quantitative results. Within the field of approaches to learning, there have been no studies undertaken from a qualitative perspective with the aim of validating the SPQ (see chapter 2).

The purpose of the present study was to validate the deep and surface learning constructs, as defined by Biggs and measured by the SPQ in the research on approaches to learning, using qualitative methodologies already tried and validated within this field, namely interviews and the SOLO taxonomy. Often interviews have been used in addition to the SPQ to add anecdotal information to results where the analysis has been undertaken on the SPQ alone (Dahlin & Watkins, 2000; Gow et al., 1991; Marton, Dall’alba & Beaty, 1993; Saljo, 1979, 1981; Watkins & Hattie, 1985; Willis, 1993a). No study to date, has however, used a qualitative approach to statistically test the construct validity of the instrument.

It was decided not to include the achieving construct in the present study for three reasons. Firstly, Biggs (1987a, 1987b, 1996, 1999) and other researchers (Kember & Leung, 1998; Sachs & Gao, 2000; Wong et al., 1996) have repeatedly stated the achieving construct is qualitatively different from the deep and surface constructs. Further, the achieving construct is not consistently found throughout the literature on approaches to learning (Entwistle, 1991; Marton & Saljo, 1976a, 1976b; Schmeck, 1988a), which raises concerns
about its standing as an approach to learning in its own right. Finally, findings from the present research programme (see chapter 3) suggests there are problems inherent in the achieving approach to learning and as such it should not be considered in isolation, but with the deep and surface approaches to learning in the third level factor structure, as proposed by Biggs (1996).

For the current study, two qualitative measures of deep and surface approaches to learning were used with the deep and surface scales of the SPQ. The first was designed to elicit descriptions of deep and surface constructs from students themselves, and to use these as the basis of an interview measuring deep and surface approaches to learning. Ratings of deep and surface learning would then be based on verbal descriptions of student’s learning approaches rather than closed responses on a Likert scale. Written data obtained from the student sample would provide a second qualitative measure of deep and surface learning. The aim of the present study is to validate deep and surface approaches to learning as measured by the SPQ using a multitrait-multimethod matrix (Campbell & Fiske, 1959). This approach offers a measure of both the convergent and discriminant validity of the deep and surface scales of the SPQ.

In relation to the convergent validity of the deep scale it was hypothesised:

H4.1. The deep scale on the SPQ would have a significant positive correlation with the deep scale on the interview.

H4.2. The deep scale on the written task would have a significant positive correlation with the deep scale on the SPQ.

H4.3. The deep scale on the interview would have a significant positive correlation with the deep scale on the written task.

In relation to the convergent validity of the surface scale it was hypothesised:

H4.4. The surface scale on the SPQ would have a significant positive correlation with the surface scale on the interview.

H4.5. The surface scale on the written task would have a significant positive correlation with the surface scale on the SPQ.
H4.6. The surface scale on the interview would have a significant positive correlation with the surface scale on the written task.

Regarding the relationship between the deep and surface scales (discriminant validity), it was hypothesised that:

H4.7. The deep scale on the SPQ would have a low, non-significant correlation with the surface scale on the SPQ.

H4.8. The deep scale on the interview would have a low, non-significant correlation with the surface scale on the interview.

H4.9. The deep scale on the written task would have a low, non-significant correlation with the surface scale on the written task.

Method

Pilot Study: Stage One: Development of the Measures for the Deep and Surface Approaches to Learning

The present research aims to develop an interview protocol and written task to be used with the SPQ to examine the validity of the deep and surface constructs. The first stage in this process required an understanding of the general characteristics of students who were deep or surface in their approach to learning. This understanding would form the basis for the development of the interview protocol and written assessment tasks to be used in the main study. The research began with students identified as deep or surface based on their academic behaviour across four years of undergraduate study. This was considered a suitable methodology for two reasons: the student approaches to learning (SAL) methodological framework had a history of using students as the source of information on student learning (Biggs, 1999), it was considered appropriate to also begin with students as a basis for understanding the constructs of deep and surface learning; and Biggs’s (1987a; see also chapter 2) research began with a review of the education literature, to develop items to measure the deep and surface constructs. As one aim of the present study is to examine the convergent validity of the deep and surface constructs as measured by the SPQ, it was considered appropriate to use a different methodology having students’ understandings of
their approaches to learning as the point of departure for identifying and subsequently measuring these two constructs.

**Participants**

Six female psychology students were selected to participate in the first stage of the pilot study from a class of 60 fourth-year psychology students. These students were identified by two academic staff who had consistent contact with these students over a three year period, as either consistent deep or surface learners during their undergraduate studies. Three of the students were identified as deep learners and three were identified as surface learners. While there is little evidence to suggest gender plays a role in approach to learning (see chapter 5) only female students were selected to eliminate this as a potential confound of the study. The students participating in this study were all from English speaking backgrounds and were Australian by birth. Ages for the students ranged from 20 to 28, with a mean age of 24 (SD = 3.16).

**Materials**

A video camera was used to record the focus group.

**Procedure**

*Selection of participants.* Based on their own interactions with the students, the two staff members were independently asked to identify the students they considered to consistently display deep characteristics and the students they considered to consistently display surface characteristics in their approach to learning during their years of study within the degree programme. Conservative definitions of deep and surface learning were provided to the experts based on a review of the literature to identify commonalities in definitions (see Biggs, 1999; Entwistle, 1997; Marton & Saljo, 1976a; Prosser & Trigwell, 1999a; Schmeck, Geisler-Brentin & Cercy, 1991; Watkins, 1996). A deep approach to learning was defined as “intrinsic love of learning and desire to gain knowledge, and work that consistently displays understanding of the task.” A surface approach to learning was defined as “learning for a purpose, using whatever strategies are required to gain certain grades without too much effort.”
This methodology was chosen in order to select students for the study based on behavioural characteristics rather than on their own self-reported approach to learning as measured by a questionnaire such as the SPQ or ASI. As highlighted above, it was considered important that the methodology used to develop the interview protocol should be different from the methodology used in the development of the SPQ. Also there would be the potential for the SPQ to influence students’ perceptions of learning if administered before their involvement in the focus group. The aim of the focus group was to have naïve students who were not familiar with research on approaches to learning, in order to gain a true understanding of how these students went about their learning, rather than a filtered version of their learning based on what the research considered to be “good learning”.

The choice of fourth-year students for the pilot study was considered appropriate for two reasons. Firstly, the two academic staff had more data to use in their evaluation of these students, as they had not only interacted with these students in the teaching environment, but had also had many opportunities over the preceding years to mark their assignments and examinations, and make behavioural assessments of their skills and abilities. Thus, judgements were based on an evaluation over three years of the quality and depth of understanding these students consistently displayed in their work (process variable) rather than on their grade-point-average (GPA) (product variable). While research suggests there is a link between approaches to learning and GPA (Albaili, 1995; Duckwall et al., 1991; Eley, 1992; Gadzella, Ginther & Williamson, 1986; Lizzio, Wilson & Simons, 2001; Miller et al., 1990; Rose et al., 1996), this relationship is mediated by quantity and types of assessment. For example, heavy assessment workload and multiple choice examinations are associated with a surface approach to learning (Thomas & Bain, 1984; Wilson, Lizzio & Ramsden, 1997). Given that students in this programme had been assessed using multiple choice examination formats as well as essays and behavioural skills tests, it was decided not to base the classification of deep and surface learners on GPA. Secondly, fourth-year students have had at least three years of study which to develop their own way of learning, and thus are
more likely to be able to articulate their approach to an assignment or examination preparation than would a first-year student.

The academic staff were asked to look at the overall approach to learning undertaken by the fourth year students across their previous three years of study, rather than in relation to any particular course, as researchers have shown approach to learning can be temporarily influenced by a range of environmental factors such as workload (Kember & Leung, 1998) and perception of the learning environment (Lee & Lodewijks, 1995). Lists from the staff members were compared to identify a pool of surface learners and a pool of deep learners. Only students who had been nominated by both experts were considered for selection. In order to differentiate further, the staff members were each given a copy of the lists and asked to rank the students from the most to the least extreme examples of deep or surface learning in each group. Six students, including three representative of the most deep approach, and three representative of the most surface approach were identified, and asked to participate in the study. All agreed to participate in the focus group.

**Focus group methodology.** The purpose of the focus group was to gather as much information as possible about deep and surface approaches to learning based on the experiences of the participants. Similarities and differences between the two approaches to learning needed to be identified, so all six participants were included in the one focus group. Focus group methodology was chosen for the first stage of the pilot study as it was considered the best method of eliciting the thoughts and feelings of students regarding their approaches to learning (Krueger, 1988). Further, focus groups allow for a broad spectrum of information to be gathered, thus not limiting the responses to the already identified areas of knowledge of the facilitator (see Dick, 1993; Stewart & Shamdasani, 1990). Focus groups also generate ideas and data that may not have emerged using other methodologies such as interviews or questionnaires (Dick, 1991; Duffy, 1993), a criterion relevant to the present study.

A review of the literature on approaches to learning revealed two important concepts for discussion within the focus group. The literature suggested the motives a student had for undertaking their learning was an important component of their overall approach to learning.
Prosser and Trigwell (1999a) suggest the motivation a student has for learning will influence the strategies which they will use in completing the learning task. Motives and the corresponding strategies for learning have emerged as the two key building blocks in the literature on approaches to learning (see Biggs, 1999; Chalmers & Fuller, 1996; Prosser & Trigwell, 1999a; Ramsden, 1998). While students may find it difficult to respond to the more global question about their approach to learning, it is relatively simple for most students to explain why they are undertaking their study (motives) and the ways in which they undertake specific tasks such as examinations and assignments (strategies). Thus, it was decided to focus the majority of questions on the motive/strategy concepts, rather than the overall concept of approach to learning for the focus groups.

The particular questions for consideration during the focus group were (i) What strategies do you use when completing a learning task? and (ii) What are your underlying motives for undertaking learning tasks in the first place? These two broad questions were applied to a discussion of both assignments and examinations in the session, as these are the two major forms of assessment undertaken by most university students. The focus group session ran for two hours and involved a discussion of these two broad questions.

The focus group was co-facilitated by the primary researcher and another researcher familiar with the concepts in the literature and able to provide their own insights regarding the comments of the participants. Participants were advised that the information they provided during the focus group would be used in designing an interview protocol for a study on approaches to learning. The decision to inform the participants about the purpose of the focus group was to encourage them to talk openly and honestly about their learning strategies and motives, rather than their ideal strategies and motives. There were concerns that approaches to learning have a social desirability component (Watkins, 1996) - when asked, students may tend to provide the response they considered to be appropriate. A good example is the belief students have that “good students” will write several drafts of an assignment before submitting a final draft, while it is often the case that students will write one draft and only when the deadline is looming.
Results

Frequency counts were conducted to determine the main themes that emerged from the focus group. After the completion of the focus group, the two facilitators watched the video and discussed what they considered were the main themes emerging from the focus group. Only those statements agreed upon by both facilitators were included in the list. Three lists were compiled, one for deep learners on strategy and motive, one for surface learners on strategy and motive, and one for common strategies and motives. Students selected on the basis of the characteristics of the deep learning approach had clearly different strategies and motives to those selected on a surface approach to learning. Deep learners consider their life experiences and previous knowledge enable them to better understand their current studies. Table 4.1 summarises the themes common to deep learners. Some responses from deep learners’ included: “I do an awful lot of thinking about what they’re trying to say to me in the book,” and “I’ve got to link what goes where.” In response to questions about their motives for learning, deep learners’ responses included: “It’s secondary to me whether my marks are a grade or not, what’s really important is how I’ve done as a person,” and “There’s so much more to learn and know, and that’s a drive.” In each instance the deep learners appeared to personalise their learning.

In contrast, surface learners, tended to have less awareness of their motives and strategies for learning. In particular the way the surface learners approached writing an assignment suggested little awareness of the reason for undertaking such a task. These students focussed on trying to determine what the lecturers wanted from them and how to make sure they did this. For example: “If I’m doing an assignment I have no ideas until I look at the criteria,” and, “I summarise important bits of articles in my own words so that I can just slot them in to the assignments.” The responses of the surface learners tended to provide concrete examples of assignments they had recently completed rather than general tendencies towards the process of writing assignments. When asked about their motivation for learning their responses also tended to be fairly concrete: in response to questions about their motives for learning, surface learners responses typically included: “I never thought I’d get here,” and
Table 4.1

*Focus group responses on learning strategies and motives for deep learners.*

<table>
<thead>
<tr>
<th>Response</th>
<th>Frequency</th>
</tr>
</thead>
<tbody>
<tr>
<td>Uses predominantly own understanding of the question to decide what information to search for when conducting a library search.</td>
<td>3 (100%)</td>
</tr>
<tr>
<td>The essay transforms the information obtained from the literature.</td>
<td>3 (100%)</td>
</tr>
<tr>
<td>Reads to discover underlying meaning.</td>
<td>3 (100%)</td>
</tr>
<tr>
<td>Generates examples.</td>
<td>3 (100%)</td>
</tr>
<tr>
<td>Personalises the task/Applies own experience.</td>
<td>3 (100%)</td>
</tr>
<tr>
<td>Reads widely.</td>
<td>3 (100%)</td>
</tr>
<tr>
<td>Integrates the material into the broader context.</td>
<td>3 (100%)</td>
</tr>
<tr>
<td>Follows on leads/forms hypotheses/asks questions.</td>
<td>2 (67%)</td>
</tr>
<tr>
<td>Goes to the literature with a question in mind.</td>
<td>2 (67%)</td>
</tr>
<tr>
<td>Reviews material at different levels i.e. words and themes.</td>
<td>2 (67%)</td>
</tr>
<tr>
<td>Critically analyses the literature.</td>
<td>2 (67%)</td>
</tr>
<tr>
<td>Qualification important but learning of prime importance.</td>
<td>3 (100%)</td>
</tr>
<tr>
<td>Driven by interest/Desire to gain knowledge.</td>
<td>3 (100%)</td>
</tr>
<tr>
<td>Vocation or calling to psychology rather than a job.</td>
<td>3 (100%)</td>
</tr>
<tr>
<td>Assignments seen as means of consolidating learning.</td>
<td>3 (100%)</td>
</tr>
<tr>
<td>Motivated to learn about a subject area.</td>
<td>3 (100%)</td>
</tr>
<tr>
<td>Gain personal understanding.</td>
<td>3 (100%)</td>
</tr>
<tr>
<td>Personal growth.</td>
<td>3 (100%)</td>
</tr>
<tr>
<td>Enjoyable and/or satisfying.</td>
<td>2 (67%)</td>
</tr>
</tbody>
</table>
“I’m doing this because it’s a requirement to be a psychologist.” Table 4.2 summarises the themes common to surface learners.

While there were clear differences between deep and surface learners, there were also degrees of similarity in the learning strategies employed in preparing for examinations. Table 4.3 summarises the themes that are common to deep and surface learners. It was apparent from the discussion that both deep and surface learners procrastinated prior to beginning to write their assignments. Surface learners appeared to spend more time planning their assignments and summarising articles than did deep learners. Semantics may have played a role in this aspect of learning, as what a deep student considers to be procrastination may be different to a surface learners’ understanding of the term. For deep learners, what is labelled as procrastination may in essence be an integral component of the task allowing them time for reflection. Elsewhere, it has been documented that deep learners tend to need time to reflect on the information for themselves, while surface learners tended to continually return to the literature in order to gather inspiration (Biggs, 1973b). So, in effect, the procrastination of the deep learner may be more representative of training about how to write an assignment, rather than any real difference between deep and surface learners.

Semantics may also play a role in the understanding deep and surface learners have of the differences between learning and studying. Deep learners report a distinction between learning and studying, suggesting learning was a continuous process that occurs irrespective of the learning task, while studying was done specifically to prepare for an examination. Surface learners did not differentiate between the two: they suggested studying was the process by which learning takes place. While both deep and surface learners also agreed they relied on the assessment criteria when completing an assignment, differences were again evident in the extent to which they relied on those criteria. The timing - whether the criteria formed the starting point for the assignment or whether they were referred to later in the writing process - and the degree of reliance upon the criteria, or extent to which the criteria were slavishly followed during the writing process, were reportedly different. Surface learners viewed the criteria as a means of understanding what the lecturer wanted. As such,
Table 4.2  
*Focus group responses on learning strategies and motives for surface learners.*

<table>
<thead>
<tr>
<th>Surface Strategies</th>
<th>Response</th>
<th>Frequency</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Uses the literature as the basis for deciding what information is</td>
<td>3</td>
<td>(100%)</td>
</tr>
<tr>
<td></td>
<td>important and/or the question.</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Focus on important topics or key words in the literature.</td>
<td>3</td>
<td>(100%)</td>
</tr>
<tr>
<td></td>
<td>The essay brings together the important bits of information from</td>
<td>3</td>
<td>(100%)</td>
</tr>
<tr>
<td></td>
<td>various articles without critical analysis.</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Use rote learning techniques.</td>
<td>3</td>
<td>(100%)</td>
</tr>
<tr>
<td></td>
<td>Recalls information verbatim.</td>
<td>3</td>
<td>(100%)</td>
</tr>
<tr>
<td></td>
<td>Presents others’ ideas.</td>
<td>2</td>
<td>(67%)</td>
</tr>
<tr>
<td>Surface Motives</td>
<td>Qualification is more important than learning.</td>
<td>3</td>
<td>(100%)</td>
</tr>
<tr>
<td></td>
<td>Desire to minimally pass the course or avoid failure.</td>
<td>3</td>
<td>(100%)</td>
</tr>
<tr>
<td></td>
<td>Assignments’ chores that have to be done in order to pass.</td>
<td>3</td>
<td>(100%)</td>
</tr>
<tr>
<td></td>
<td>Motivated only when necessary to meet deadlines.</td>
<td>3</td>
<td>(100%)</td>
</tr>
<tr>
<td></td>
<td>Goal to get a job as a professional.</td>
<td>2</td>
<td>(67%)</td>
</tr>
<tr>
<td></td>
<td>Valuing “real world knowledge” rather than abstract learning.</td>
<td>2</td>
<td>(67%)</td>
</tr>
</tbody>
</table>
Table 4.3  
*Common learning strategies and motives identified by both deep and surface learners in the focus group.*

<table>
<thead>
<tr>
<th>Response</th>
<th>Frequency</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Learning Strategies</strong></td>
<td></td>
</tr>
<tr>
<td>Procrastination.</td>
<td>6 (100%)</td>
</tr>
<tr>
<td>Perceived difference between learning and study.</td>
<td>6 (100%)</td>
</tr>
<tr>
<td>Exam strategies.</td>
<td>5 (83%)</td>
</tr>
<tr>
<td>Reliance on assessment criteria.</td>
<td>4 (67%)</td>
</tr>
<tr>
<td><strong>Learning Motives</strong></td>
<td></td>
</tr>
<tr>
<td>Due dates influence motivation</td>
<td>6 (100%)</td>
</tr>
<tr>
<td>Marks/grades affect motivation</td>
<td>6 (100%)</td>
</tr>
<tr>
<td>Feel they could do better</td>
<td>5 (83%)</td>
</tr>
</tbody>
</table>
they identified the important aspects of the task from the marking criteria. This was particularly evident in the way they approached looking for articles. Surface learners were also keen to know the minimum number of articles required and minimum word limits for assignments. This is consistent with findings on surface learning, which suggest surface learners do only enough to receive a passing grade and essentially limit their own learning to attain this goal (Biggs, 1987a, 1999; Kember & Leung, 1998). In contrast deep learners seemed to almost forget about the marking criteria when doing assignments. If they used them at all, it was merely to check that they had met the requirements of the task.

*Motives for learning.* Agreement on motives for learning tended to focus specifically on learning tasks, such as assignments or examinations. Two motives generally common were the way in which the due date influenced motivation to write an assignment or study for an examination; and the way in which marks or grades affected motivation. Most people in the focus group found they lacked motivation for completing assignments until just before the due date. This need for external pressure appeared to reflect a general feeling of inadequacy regarding their abilities to write assignments. They said that they found the process of writing frustrating and that often they were faced with writers block, preferring to do anything but work on the task at hand. It is possible that the feelings of the participants reflected some of their concerns regarding the necessity for high grades to obtain their current positions in the fourth year of the degree programme. The participants tended to know which markers gave them good grades and which did not. This awareness appeared to directly influence their motivation for various tasks. The relationship between previous grades and current learning has been identified in the literature (see chapter 5).

Time management was also an issue for both deep and surface learners. For instance, one surface learner discussed how they allocated one week to complete each assignment, but when a lot of assignments were due at once, the time allocated for each assignment was reduced. Similarly, a deep learner suggested that when they had several assignments due they would not go to lectures or tutorials, instead spending the time on writing assignments. Participants did not generally appear to set long term goals throughout the semester. The
literature on approaches to learning identifies that the way students organise their learning is separate from the deep and surface approaches to learning (see Biggs, 1987a, 1993; Chalmers & Fuller, 1996). Biggs (1987b) calls this organisation of learning the achieving approach and suggests it can combine with the deep and surface approaches to learning to form higher level approaches to learning (see chapters 2 and 3). While the achieving subscales are associated with both the deep and surface constructs to form the higher-order scales described by Biggs and examined in the previous study, the achieving subscales and scale appear to be measuring a different type of construct than the deep or surface constructs. As discussed in chapter 2, other researchers examining the factor structure of approaches to learning have also found the achieving approach to learning does form an approach in its own right, and consider the achieving construct to be conceptually different from either the deep or surface constructs (see Kember & Leung, 1998; Sachs & Gao, 2000; Wong et al., 1996). Increasingly, deep and surface learning are typically discussed as the approaches to learning, without reference to the achieving approach (see Prosser & Trigwell, 1999a). For example, as highlighted in chapter 2, Biggs et al. (2001) have recently revised the SPQ and removed the achieving scale from the instrument, citing, as their reason, the different nature of the achieving approach. Thus, a student can be either an organised or disorganised, deep or surface learner. In line with this approach, the present study focused on the concepts of deep and surface approaches to learning.

The information from the focus group was also considered in relation to the ability of the questions to elicit responses from the participants, as the questions for the interview were still to be developed. Some concerns were raised regarding the use of examinations as a learning task for consideration in the interview, as all students elicited similar responses to this topic in the focus group. However, it was decided to include examinations in the pilot of the interview and then to ascertain, based on the results of the pilot, whether it was appropriate to include this topic in the main study. Once the information from the focus group had been discussed and the main themes had been agreed upon, the information was then used to develop the interview protocol and rating scale for the main study.
**Development of the Interview Protocol and Rating Scale for the Main Study**

The interview protocol and corresponding rating scale were developed from the main themes drawn from an analysis of the focus group material. The interview protocol was designed to be a series of open-ended questions about typical motives and strategies for learning. Some questions included a series of prompts to elicit more information on a range of topics – for example, how students undertake the process of writing an assignment. This was designed to help interviewers gather as much information as possible on which to rate students. The prompts also helped to standardise the protocol and allowed it to be administered by different interviewers if appropriate. The interview questions are presented in Appendix B.

The interview incorporated two sections. Section one focused on students’ learning strategies, and the second on students’ motivations for learning. The first section included a series of questions about typical university tasks such as writing assignments and examination preparation. The second section included questions about reasons for studying, learning and about completing specific learning tasks.

Questions were prioritised on the basis of certain assumptions. Firstly, learning motives were considered more useful in classifying students than learning strategies. The range of learning strategies utilised by students appeared to be more similar than their motives for learning. The research was designed to identify any differences in the learning strategies of deep and surface learners. As such, it was considered appropriate to minimise raters’ preconceptions about interviewees by firstly asking them about their learning strategies. Biggs (1988; see also Flavell, 1979; King, 1990; Perkins, 1991) discusses the role of metacognition in learning, suggesting that awareness of cognitive processes is linked to a deep approach to learning. In the focus group, surface learners appeared to have less understanding of their learning processes than deep learners. The way in which they reported various aspects of writing an assignment, for example, might appear quite similar but may have provided qualitatively different outcomes for them. A comment such as “I read and take notes,” might be made by a deep or surface learner. However what they actually mean by this
comment may be quite different. A deep learner may write down their own understanding of the essence of what the author is saying, while the surface learner may simply copy the information directly, or paraphrase for insertion in their own work. The deep learner has integrated the information, whereas the surface learner has not. This concept is discussed in chapter 6 and Appendix D. Thus, differentiating between deep and surface strategies may require a considerable amount of probing. Secondly, questions about completing tasks (i.e., strategies) are generally more easily answered than questions about the motivation for doing something. Thus, it was considered that the task related questions would serve as a warm-up to the introspective questions.

The corresponding interview rating scale consisted of 16 items, four to measure each of the learning motives (surface motive, deep motive) and learning strategies (surface strategy, deep strategy). The items were selected for inclusion on the basis of having the highest frequency counts from the focus group. Items were rated on a five-point Likert scale. The interview rating scale is displayed in Table 4.4.

Pilot Study: Stage 2: Testing of the Interview Protocol, Rating Scale and Written Tasks

The second stage of the pilot study was designed to test the reliability of the interview and written tasks developed from the focus group material gathered in stage one of the pilot study. There were two aspects of the interview that required testing. Firstly, the administration of the interview and its accompanying rating scale required testing for ease of administration and interpretability of obtained ratings. Further, it was considered important to familiarise interviewers with the interview protocol. Any potential problems in the protocol could be identified early in the process and this would decrease the likelihood of any problems in the interview style of the interviewer influencing the quality of the interviews in the main study.

Secondly, differential weightings are recommended for multitrait investigations of constructs (Babbie, 1992). Thus, it was considered appropriate to test the interview rating scale to ensure that some items were not more representative of deep or surface than other items on the interview rating scale.
Table 4.4

The interview rating scale developed for the pilot study.

<table>
<thead>
<tr>
<th>Surface strategy</th>
<th>Use the nouns/keywords from the given question to decide what information to search for when conducting a library search.</th>
<th>Not evident</th>
<th>Very Evident</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>The essay brings together the important bits of information from various articles without critical analysis. Presents others’ ideas.</td>
<td>1 2 3 4 5</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Use rote learning techniques. Recalls information verbatim.</td>
<td>1 2 3 4 5</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Does not make links between different information. Reviews the material minimally.</td>
<td>1 2 3 4 5</td>
<td></td>
</tr>
<tr>
<td>Deep strategy</td>
<td>Uses predominantly own understanding of the question to decide what information to search for when conducting a library search.</td>
<td>1 2 3 4 5</td>
<td></td>
</tr>
<tr>
<td></td>
<td>The essay transforms the information obtained from the literature. Critically analyses the literature.</td>
<td>1 2 3 4 5</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Generates examples. Personalises the task. Applies own experiences.</td>
<td>1 2 3 4 5</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Reads widely. Integrates the material into the broader context. Reviews material at different levels i.e. words and themes.</td>
<td>1 2 3 4 5</td>
<td></td>
</tr>
<tr>
<td>Surface motive</td>
<td>Qualification of prime importance.</td>
<td>1 2 3 4 5</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Desire to minimally pass and avoid failure.</td>
<td>1 2 3 4 5</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Assignments chores that have to be done in order to pass.</td>
<td>1 2 3 4 5</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Motivated to meet deadlines.</td>
<td>1 2 3 4 5</td>
<td></td>
</tr>
<tr>
<td>Deep motive</td>
<td>Driven by interest or desire to gain knowledge.</td>
<td>1 2 3 4 5</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Assignments means of consolidating learning. Enjoyable or satisfying.</td>
<td>1 2 3 4 5</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Motivated to learn about a subject area</td>
<td>1 2 3 4 5</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Gain personal understanding. Personal growth.</td>
<td>1 2 3 4 5</td>
<td></td>
</tr>
</tbody>
</table>
Based on the focus group information, two written tasks were devised, both with the potential for inclusion in the main study. Thus, it was important to test both questions to ascertain whether one provided more reliable results than the other.

**Participants**

Fifteen fourth-year psychology students (12 female, 3 male) were randomly selected from the remainder of the fourth year cohort to participate in the second stage of the pilot study. Students were informed participation was voluntary and they all agreed to participate. The students participating in this study were all from English speaking backgrounds and were Australian by birth. Ages ranged from 21 to 38, with a mean age of 27 (SD = 4.64).

Further, two experts (one male and one female) selected on the basis of their knowledge and experience in the area of teaching and learning effectiveness volunteered to help in the second stage of the pilot study. The six fourth-year psychology students who had participated in the focus group in the first stage of the pilot study also volunteered to help.

**Materials**

*Interview.* The interview format was designed to ask questions about the strategies students' use for writing assignments and studying for examinations; followed by questions about motives for undertaking the university degree. The interview questions are presented in Appendix B.

The interview rating scale was developed from the responses that were most typical of either the deep or surface learners who participated in the focus group. Each item was rated on a five-point Likert scale. As the interview rating scale was going to be used for two different purposes in stage two of the pilot, a rating of 1 was either “Not evident” (Interviews) or “Not relevant to the subscale” (Differential weightings), a rating of 2 was “Not very evident/ relevant,” a rating of 3 was “Uncertain of evidence/ relevance,” a rating of 4 was “Moderately evident/relevant,” and a rating of 5 was “Very evident/relevant.” The rating scale for the interviews is presented in Table 4.4.

*Written task.* The written task comprised two tasks. The first task posed a general question asking students to describe their learning to date in the course overall. The second
task asked them to specifically describe their learning in a particular, nominated subject. The questions were: (i) Write a paragraph on the following question: What have you learned in your degree so far? and (ii) Write a paragraph on the following question: What have you learned from your third year counselling course?

While the first task was considered more appropriate for the current study as it measured learning predispositions, rather than task specific learning approaches, there was the risk that the complexity of this task may affect the results obtained from this component of the study. Thus, both the general task and the easier specific task were included in stage two of the pilot study. These two tasks were similar to research undertaken on learning predispositions (Boulton-Lewis, 1994; 1995; Trigwell & Prosser, 1991; 1992) and specific tasks (Burnett, 1999; Cantwell & Millard, 1994). With the exception of Trigwell and Prosser (1992), research has predominantly focussed on measuring content rather than the structure of the response.

The accompanying rating scale for the written task was based on the SOLO (i.e., Structure of Observed Learning Outcome) taxonomy. The use of a multitrait approach necessitates an independent score for deep and for surface approaches to learning. The original SOLO taxonomy (see Table 4.5) provides a single score, where 1 relates to surface learning and 5 to deep learning. For the present study two separate scales were devised, one to measure surface and one to measure deep approaches to learning (see Table 4.6). The first scale consists of the first three levels (prestructural, unistructural and multistructural) of the original taxonomy and considers the content level of the response. A student whose response to the task was irrelevant or meaningless would receive a rating of 5 on this scale (i.e., surface approach). Conversely, a student who discussed several relevant features would receive a rating of 1 (i.e., deep approach).

The second scale consists of the last two levels of the original taxonomy, with the addition of a new level. The new level, coordinational, highlights the structural component of the original multistructural level, not considered in the first scale. Thus, the second scale is designed to examine the structure of the response to the task. A student whose response to
Table 4.5

*The SOLO taxonomy.*

<table>
<thead>
<tr>
<th></th>
<th></th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>PRESTRUCTURAL</td>
<td>Use of irrelevant information, or no meaningful response.</td>
</tr>
<tr>
<td>2</td>
<td>UNISTRUCTURAL</td>
<td>Answer focuses on one relevant aspect only.</td>
</tr>
<tr>
<td>3</td>
<td>MULTISTRUCTURAL</td>
<td>Answer focuses on several relevant features, but they are not co-ordinated together.</td>
</tr>
<tr>
<td>4</td>
<td>RELATIONAL</td>
<td>The several parts are integrated into a coherent whole; details are linked to conclusions; meaning is understood. The theory to practice link is made.</td>
</tr>
<tr>
<td>5</td>
<td>EXTENDED ABSTRACT</td>
<td>Answer generalises the structure beyond the information given; higher order principles are used to bring in a new and broader set of issues.</td>
</tr>
</tbody>
</table>

*Note.* Adapted from Biggs & Collis (1982).
### Table 4.6

*The modified SOLO taxonomy developed for this study.*

<table>
<thead>
<tr>
<th>Question</th>
<th>Rating Scale</th>
<th>Multistructural</th>
<th>Unistructural</th>
<th>Prestructural</th>
</tr>
</thead>
<tbody>
<tr>
<td>What is the content level of the response to the written task?</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>1 2 3 4 5</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Multistructural</strong></td>
<td><strong>Unistructural</strong></td>
<td><strong>Prestructural</strong></td>
</tr>
<tr>
<td></td>
<td>Answer focuses on several relevant features.</td>
<td>Answer focuses on one relevant feature.</td>
<td>Use of irrelevant information or no meaningful response.</td>
<td></td>
</tr>
<tr>
<td>What level of complexity in the structure of the written task is evident?</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>1 2 3 4 5</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Coordinational</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Focus on relevant features with minimal attempt at integration.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Several parts are integrated into a coherent whole.</td>
<td>Answer generalises the structure beyond the information given.</td>
</tr>
</tbody>
</table>
the task generalised their response beyond the scope of the question receives a rating of 5 on this scale (i.e., deep approach). Conversely, a student who barely attempted to integrate the information receives a rating of 1 (i.e., surface approach). Students were also asked to provide biographical information on their written response sheet.

A video recorder was used to record the interview, as the non-verbal feedback was considered of importance to the fine tuning of the interview process.

Procedure

The procedures varied for each of the three groups.

Experts. The two experts received the interview format and rating scale and were asked to suggest any possible changes. They were also asked to rate the relative importance of each of the items on the rating scale in order to determine whether items needed to be differentially weighted.

Focus group members. The six focus group members were also asked to rate items on the interview rating scale in order to determine whether items needed to be differentially weighted. These students were included in this process as they were the original source of the information. Thus they were asked both to rate the items on the interview scales and to provide qualitative feedback on the relative importance of each of the items.

Stage 2 participants. The 15 psychology students were interviewed using the interview format. Interviews lasted for approximately 40 minutes. This was followed by the two written tasks. It was decided not to counter balance the order of presentation between the interview and the written tasks as it was thought participants would need a “warm-up” to the written tasks. Further, it was considered that there would be no practice effect from the interview, as the two instruments were qualitatively different. However, the order of presentation for the two written tasks was counterbalanced to control for a possible order effect. Eight students were given the general question first, while the remainder began with the specific question. Participants were provided with paper to complete the written tasks on and to provide their biographical information on. Twenty minutes were allocated for this task, but participants were informed there was no time limit as such and they could write as
little or as much as they considered necessary to complete each task. On completion of the written tasks participants were informally asked to comment on the difficulty of each of the written tasks. Overall, there appeared to be no perceived difference of the difficulty of the two written tasks.

Results

Interview. The experts confirmed the overall structure of the interview and the accompanying rating scale and suggested minor changes to both. For example, they suggested a general question about the relationship between studying and learning be included at the beginning of the interview. This is of interest, as early researchers linked approaches to learning with teaching study skills (for example Dart & Clarke, 1991). It was also suggested detailed questioning of examination strategies and motives should be removed, indicating this did not add anything substantial. Further, this was apparent from the focus group, where there was little differentiation between deep and surface learners on examination motives and strategies, and also from the interviews conducted with the students in the second stage of the pilot study.

The ratings of the interview rating scale of the experts and the focus group participants were consistent. The raters identified 11 of the 16 items on the interview rating scale to be very relevant (rating 5). Most raters (75% agreement) rated the remaining five items as very relevant (rating 5). The remaining two raters (25% agreement) rated the five items as moderately relevant (rating 4). These results suggest there was no need to differentially weigh the items on the interview rating scale.

The final version of the interview rating scale (see Table 4.7) was developed based on the suggestions of two experts and the experience of the two interviewers. The latter suggested it was difficult to make decisions about whether an item was, for example, evident or very evident. The changes made to the final version of the rating scale included the number of items in the rating scale for rating students, as well as the range of the Likert scale. Firstly, the interview rating scale was reduced from the initial 16-item to a 10 item rating scale. The agreement by the judges on 11 of the initial 16 items suggested these items would be more
Table 4.7

*The revised interview rating scale.*

<table>
<thead>
<tr>
<th>Surface strategy</th>
<th>Use the nouns/keywords from the given question to decide what information to search for when conducting a library search.</th>
<th>Not evident</th>
<th>Moderately evident</th>
<th>Very Evident</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>The essay brings together the important bits of information from various articles without critical analysis. Presents others’ ideas.</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>Does not make links between different information. Reviews the material minimally.</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>Deep strategy</td>
<td>Uses predominantly own understanding of the question to decide what information to search for when conducting a library search.</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>Generates examples. Personalises the task. Applies own experiences.</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>Reads widely. Integrates the material into the broader context. Reviews material at different levels i.e. words and themes.</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>Surface motive</td>
<td>Desire to minimally pass and avoid failure.</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>Assignments chores that have to be done in order to pass.</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>Deep motive</td>
<td>Driven by interest or desire to gain knowledge.</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>Gain personal understanding. Personal growth.</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
</tbody>
</table>
appropriate for inclusion in the final rating scale. Further, feedback from the eight judges suggested it was unnecessary for items related to surface to have a corresponding deep item. For example, the surface item “The essay brings together the important bits of information from various articles without critical analysis…” originally corresponded to “The essay transforms the information obtained from the literature…” Thus the rating scale was reconsidered, removing those items simply included to provide a corresponding response in the other approach to learning and not agreed upon by all judges (i.e., two experts and six 4th-year students). The final version of the rating scale consisted of 10 items, two to measure each of the learning motives (surface motive, and deep motive) and three to measure each of the learning strategies (surface strategy and deep strategy). Secondly, the decision was made to use a three-point rather than a five-point Likert scale in the main study as raters suggested it was at times difficult to distinguish between not evident (1) and a little evident (2) or between evident (4) and very evident (5). Thus the final scale was not evident (1), moderately evident (2), very evident (3).

Interrater reliabilities were calculated between both interviewers’ ratings for the interview, using the SPSS programme CORRELATION (Norusis, 1998). The interrater reliability for the interviewers was highly significant at .87 (p<.01). Thus, it was concluded that the interview could be considered a reliable measure of deep and surface learning constructs.

Written task. Two judges rated each written assessment task using the modified SOLO taxonomy. The interrater reliability was significant at .75 (p<.01) for the specific task and .76 (p<.01) for the general task. The judges were also asked to provide qualitative information regarding the perceived difficulty of the two written tasks. Both suggested the tasks were of equal difficulty. Based on their feedback and the feedback of the stage two participants, it was decided to retain the more general question, as this was an indicator of the general predisposition to learning, the focus of this study.
The Main Study: Validation of the Study Process Questionnaire

Participants

Participants were randomly selected from the first-year psychology student pool to participate in the study as a partial requirement for course credit. All 50 agreed to participate (17 male, 33 female). The students participating in this study were all from English speaking backgrounds and were Australian by birth. Participants were aged between 17 and 47 (M = 26, SD = 9.16).

Materials

The SPQ, the interview and the general written task (What have you learned in the degree so far?) trialed in the pilot study were used in the main study. The SPQ and demographic are presented in Appendix A and the interview questions in Appendix B. The interviews were audio taped for rating at a later date.

Procedure

Prior to participation students were informed that they could terminate their involvement at any stage of the study. Further, they were informed data provided by them would be confidential and only accessed by the research team.

Two researchers, who were knowledgeable concerning approaches to learning, each conducted half the interviews. The primary researcher rated all interviews, whilst the second researcher rated a random sample of 19 interviews (38% of all interviews) as a reliability check.

The order of presentation for the three tasks was constant for all participants: the SPQ, interview, and finally the written task. The decision not to counterbalance the presentation of these tasks was a considered one. As the aim of the present study was to validate the SPQ it was important to limit any potential problems associated with the order of presentation of the three tasks. In particular the interview was considered to be a potential problem as questions in the interview may have influenced responses to the SPQ if it was undertaken first. However, it was considered that as the interview allowed for more in depth discussion of a topic, rather than a response to a single statement, it would not be adversely affected by the
SPQ. Therefore, the interview needed to occur after the SPQ. As it was considered necessary to “warm-up” participants prior to undertaking the written task, this could not occur first either. Therefore, the written task was completed last. Potential problems were considered minimal for the written task as, while the two other instruments required self-reported responses, the written task was a behavioural measure (i.e., the way in which participants responded to the task rather than the task itself was measured). The overall administration time for each participant was approximately one hour.

Results

Internal Reliability of Measures

Internal Consistency

The internal consistency of the three scales (deep, surface, achieving) and six subscales (i.e., motive and strategy) of the SPQ was assessed using the SPSS programme SCALE (Norusis, 1998). Comrey (1973) suggests .71 is a suitable criterion for indicating good internal consistency. Alpha coefficients for the present sample were moderate, ranging from .41 on the surface motive subscale to .80 on the achieving strategy subscale and from .69 on the surface scale to .83 on the deep scale (see Table 4.8). The internal consistency for the surface scale of the interview was .53, and for the deep scale .66. The pattern of internal consistency for the SPQ in the present study is similar to that from previous research findings (see Table 2.4). As previously discussed (chapter 2) the homogeneity of the subscales of the SPQ has been consistently questioned due to less – than – favourable reliability (see Albaili, 1995; Kember & Gow, 1989; O’Neil & Child, 1984; Volet et al., 1994; Watkins & Akande, 1994; Watkins & Dahlin, 1997; Watkins & Murphy, 1994; Zhang, 2000). Thus, while the results of the current study are moderate they are in line with previous research on the SPQ.

Interrater Reliability

Interrater reliabilities were calculated between interviewers’ ratings for the interview, using the SPSS programme CORRELATION (Norusis, 1998). The intrarater reliability for the interviews was highly significant at .99 (p < .01). Similarly, interrater reliability for the ratings of both judges of the written task was also highly significant at .91 (p < .01).
Table 4.8
*Cronbach’s alpha coefficients for the subscales and scales of the SPQ*

<table>
<thead>
<tr>
<th>Subscale</th>
<th>Scale</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>α</td>
</tr>
<tr>
<td>Surface Motive</td>
<td>.41</td>
</tr>
<tr>
<td>Surface Strategy</td>
<td>.72</td>
</tr>
<tr>
<td>Deep Motive</td>
<td>.63</td>
</tr>
<tr>
<td>Deep Strategy</td>
<td>.75</td>
</tr>
<tr>
<td>Achieving Motive</td>
<td>.71</td>
</tr>
<tr>
<td>Achieving Strategy</td>
<td>.80</td>
</tr>
<tr>
<td></td>
<td>.69</td>
</tr>
<tr>
<td></td>
<td>.83</td>
</tr>
<tr>
<td>Achieving</td>
<td>.81</td>
</tr>
</tbody>
</table>
Validity of Measures

A multitrait-multimethod matrix (MTMM) was used to measure the construct validity of the deep and surface constructs. The MTMM was developed from the SPQ (self-report), interview ratings and written task ratings. While it is acknowledged that the more appropriate procedure for analysing MTMM uses confirmatory factor analysis (Figueredo, Ferkerich & Knapp, 1991; Graham & Collins, 1991; Kenny & Kashy, 1992; Kumar & Dillon, 1992; Tabachnick & Fidell, 2001) the relatively small sample size for the current study (n = 50) precluded this analysis. A minimum sample size of 100 or a ratio of 10:1 for each parameter is considered to be appropriate for confirmatory factor analysis of MTMM (Kline 1998). Therefore, the more traditional procedure outlined by Campbell and Fiske (1959; see also Anastasi, 1990) was used. MTMM suggests the convergent validity (i.e., similarity) of the deep and surface construct is considered acceptable if the correlation of either construct is higher across the three measures than between the two constructs on a single measure.

The relationship between the three measures was examined using the SPSS programme CORRELATION (Norusis, 1998) to develop a multitrait-multimethod matrix. Correlation coefficients are presented in Table 4.9.

Deep Scale

As predicted, the correlation coefficients showed a significant positive relationship (p < .01) between the deep approach scale on the SPQ and the interview ratings on the deep scale (.56). Similarly, the correlation coefficients showed a significant positive relationship (p < .01) between the deep approach scale on the SPQ and the written task ratings on the deep scale (.39) and between the interview ratings and the written task ratings (.41). Tabachnick and Fidell (2001) suggest that correlations between .3 and .7 indicated a moderate relationship. Thus, hypothesis H4.1, H4.2 and H4.3 were confirmed.

Surface Scale

As predicted, the correlation coefficients showed a significant positive relationship (p < .01) between the surface approach scale on the SPQ and the interview ratings on the surface
Table 4.9  
*Correlations between responses to the SPQ, interview ratings and written task ratings*

<table>
<thead>
<tr>
<th></th>
<th>SD</th>
<th>SS</th>
<th>ID</th>
<th>IS</th>
<th>WD</th>
<th>WS</th>
</tr>
</thead>
<tbody>
<tr>
<td>SPQ Deep (SD)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>SPQ Surface (SS)</td>
<td>.01</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Interview Deep (ID)</td>
<td>.56**</td>
<td>- .38**</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Interview Surface (IS)</td>
<td>-.40**</td>
<td>.41**</td>
<td>-.40**</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Written Deep (WD)</td>
<td>.39**</td>
<td>-.16</td>
<td>.41**</td>
<td>-.34**</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Written Surface (WS)</td>
<td>-.18</td>
<td>.07</td>
<td>-.11</td>
<td>.18</td>
<td>-.47**</td>
<td></td>
</tr>
</tbody>
</table>

*Note.*  **p < .01*
scale (.41). Thus, hypothesis H4.4 was confirmed. Contrary to predictions, findings indicated non-significant correlations between the written task ratings on the surface scale and the SPQ surface approach scale (.07), and between the interview ratings on the surface scale and the written task ratings on the surface scale (.18). Thus, hypotheses H4.5 and H4.6 were not confirmed.

Relationship Between the Deep and Surface Scales

Finally, as predicted, there was a low non-significant correlation between the SPQ deep approach and the SPQ surface approach (-.01) (H4.7). Contrary to predictions, however, significant negative correlations (p < .01) were revealed between the deep and surface constructs on the interview ratings (-.40) and written task ratings (-.47). Thus, hypotheses H4.8 and H4.9 were not supported.

Discussion

Summary of Results

The aim of the present study was to validate the deep and surface approaches to learning as measured by the SPQ using a multimethod procedure. The results offer support to the convergent validity of the deep construct (H4.1, H4.2, and H4.3) and limited support to the convergent validity of the surface construct (H4.4). Discriminant validity for the SPQ is also supported (H4.7). There was no support for the remaining hypotheses, suggesting no relationship between the surface scale on the written task and the SPQ (H4.5) or the interview (H4.6). There also appears to be significant negative relationships between the deep and surface scales on the interview (H4.8) and the written task (H4.9) suggesting insufficient discriminant validity for these two measures.

Reliability of the Deep and Surface Constructs

Cronbach’s alpha was used to examine the reliability of the deep and surface constructs for the SPQ and the interview. The results indicate deep and surface scales of the SPQ have high internal consistency. The internal consistency of the scales of the SPQ is comparable with research to date (Burnett & Dart, 2000; O’Neil & Child, 1984; Kember & Gow, 1990). The internal consistency for the interview rating scale was moderate.
The interrater reliabilities for the interview and the written task were both high, suggesting the independent raters were consistently able to make adequate judgements on deep or surface in both instances. As the variability between the two raters in both instances was low, it can be concluded that these two instruments are reliable measures of deep and surface.

Validation of the Deep and Surface Constructs

The convergent validity of the deep and surface constructs was assessed using a multitrait-multimethod matrix. As discussed previously, a MTMM measures one or more constructs across different methodologies to assess whether the same underlying construct can be found in all instances. For the present study, the deep and surface constructs of the SPQ were compared to the deep and surface interview ratings and written task ratings.

Validation of the Deep Construct

The results of the present study suggest that the deep scale of the SPQ is an adequate measure of the underlying deep construct. In particular the results showed a significant positive relationship between the deep scales on the SPQ and the interview (.56, p<.01) and a moderate positive significant relationship between the deep scales on the SPQ and the written task (.39, p<.01). There was also a moderate significant positive relationship between the deep scale on the interview and the written task (.41, p<.01).

The SPQ and the interview. The significant relationship between the deep scale of the SPQ and the interview was as expected (H4.1). Previous research using interview methodology to examine approaches to learning has clearly identified a deep approach to learning (see chapter 2; also Dahlgren, 1984; Kember & Gow, 1990; Marton & Saljo, 1976b; Ramsden & Entwistle, 1981; Ramsden et al., 1986; Ridley et al., 1992; van Rossum & Schenck, 1984; Watkins & Hattie, 1985). Often these interviews were conducted in combination with the SPQ or the ASI. The results of these studies report on qualitative outcomes, without empirically testing the relationship between the interview data and SPQ scores. An innovative feature of the present study was the direct empirical testing of this relationship.
The SPQ and the written task. Similarly, the significant relationship between the deep scale of the SPQ and the written task was as expected (H4.2). Biggs (1985) developed the SOLO taxonomy as a measure of approaches to learning (see chapter 2). As such, it would be expected that there would be a reasonable relationship between scores on the SPQ and scores on the SOLO taxonomy. The moderate nature of this relationship in the current study suggests that while these two instruments both measure the deep scale, they do so in different ways. Once again, while there has been anecdotal work done on this relationship, it has not previously been empirically tested (see Biggs, 1985, 1999; Trigwell & Prosser, 1991, 1992; Watkins, 1983; Willis, 1993; van Rossum & Schenck, 1984). This is another innovative feature of the present study.

The interview and the written task. The relationship between the deep scale on the interview and the deep scale on the written task was also as expected (H4.3), though the correlations moderate. It appears that while the interview and written task are both designed to provide open-ended information about the deep approach to learning, they do so in different ways, and consequently capture different aspects of the underlying deep construct. While these two instruments initially appear to be quite similar, there are several differences. For example, while the interview questions required students to discuss the actual learning task of writing an assignment, the written task required students to review their overall learning in the degree programme. The interview question requires specific responses about the tasks that are undertaken in doing an assignment, while the written task asks students to recall a broader knowledge base. Also, the different skills involved in verbal and written tasks may have influenced the present results: some of the students may have been more adept at communicating their understanding of learning verbally, while other students may have had a preference for the writing task. Of course the opposite may also be true. Further, some students may have a preference for global concepts while others have a natural preference for concrete concepts. Obviously, there is the need for further development of these two instruments to further examine the validity of the deep construct.
Validation of the Surface Construct

The results of the present study suggest that the surface scale of the SPQ is an adequate measure of the underlying surface construct. In particular the results showed a significant positive relationship between the surface scales on the SPQ and the interview (.41, p<.01). However, the relationship between the surface scales on the SPQ and the written task was not significant, indicating that these two instruments do not measure the surface construct in a similar way. Similarly, the relationship between the surface scale on the interview and the written task was not significant. The results of the present study raise concerns regarding the validity of the surface rating scale for the written task.

The SPQ and the interview. The relationship between the surface scale of the SPQ and interview while expected (H4.4), was not as strong as this relationship on the deep construct. This may result from persistent problems associated with the surface scale of the SPQ. As examined in chapter 3, and apparent in the reliability results for the present study, the surface scale is not homogeneous and as such, may be measuring more than one construct. As with the deep construct, this is the first time the relationship between the surface construct as measured by the SPQ and an interview have been empirically tested.

The SPQ and the written task. The relationship between the SPQ surface approach and the surface scale on the written was not expected (H4.5). Given that both instruments were designed to measure the surface approach to learning it was expected that there would be a significant relationship. However, previous validation work (chapter 3; see also Andrews et al, 1994; Christensen et al., 1991; Hattie & Watkins, 1981; Kember & Gow, 1990; O’Neil & Child, 1984; Sachs & Gao, 2000; Watkins & Hattie, 1980) has consistently shown some instability in the surface construct, as operationalised by the SPQ. When the current result is considered in relation to the previous research it becomes apparent that the surface approach to learning is more complex than identified in the ratings for the written assessment task. In spite of the apparent instability consistently found in previous research - for example, that the factor structure of the surface scale does not load cleanly, with many items split-loading on to the achieving or deep scales - it would be expected that the current study would have
identified the key aspects of the surface approach to learning. The conceptual purity of the surface scale of the SPQ has previously been questioned (Christensen et al., 1991). Their research suggested that the surface construct is more complex than the deep construct and thus more difficult to operationalise. The result of the present study (see also chapter 3) and the Christensen et al. (1991) study suggest there is a need for further research to establish the various aspects of the surface approach to learning.

There is a need for further statistical analysis to establish whether a relationship exists between the SPQ and ratings on the SOLO taxonomy for the surface construct. As both instruments were developed by Biggs (see Biggs & Collis, 1982a) it would be appropriate to assume both operationalise the surface construct in a similar fashion. However, this relationship has not been established statistically in previous research (see Biggs, 1985; Trigwell & Prosser, 1991, 1992; van Rossum & Schenck, 1984; Watkins, 1983; Willis, 1993). Further, the SOLO taxonomy may not capture the degree of subtlety between individuals that can be achieved by a multi-dimensional instrument such as the SPQ. Thus, a second possible explanation for the results of this study is the relative simplicity of the SOLO taxonomy.

Changes made to the SOLO taxonomy for the present study may also have affected the relationship between the surface scale of the SPQ and SOLO taxonomy. For the purpose of the present study the SOLO taxonomy was separated into two distinct scales: one to measure the deep approach and one to measure the surface approach to learning. While this modification was undertaken to allow the SOLO taxonomy to be used in the multitrait-multimethod matrix, such a change may have affected the usefulness of this instrument in measuring the surface scale. Thus, there is a need for further research to establish the effect of these modifications on the instrument.

Problems associated with behavioural measures may also have affected the results of the written task. Individual perceptions of the purpose of this task may have influenced participants’ attitudes to completing this task. For instance, students who typically employ a surface approach to learning may have thought that the task required them to integrate information and as such used a more deep approach to the task. Students adopting a surface
approach to learning are able to gauge the minimal level of work required to pass a task and as such they would have determined and given the minimum requirement for the current task. This notion is supported in research by Biggs (1987a), which suggests that students will adopt a range of different strategies for learning depending on the learning environment and the task at hand.

Finally, there are some inherent limitations in self-report questionnaires that may have affected these results (Babbie, 1992). Often respondents will try to assess what is considered to be the most appropriate response for any given question, choosing to provide ideal responses in order to appear in a certain light. As the participants were psychology students who are taught questionnaire design and the questions on the SPQ are fairly transparent, participants in this study may have chosen to present their study behaviour in the most favourable light. Alternatively, students with a predisposition towards a surface approach to learning may have seen the task as of no consequence and may have simply used a response set to quickly complete the task.

The interview and the written task. The relationship between the surface scale on the interview and the surface scale on the written task was not significant, indicating the interview and the written task evaluate the surface construct in different ways (H4.6). It was expected that the relationship between the two would be relatively strong, given that the surface scale on both instruments was designed as a measure of the surface approach to learning. However, the explanations raised for the non-significant relationship between the SPQ and the written task are relevant here, as are the limitations of behavioural measures discussed previously.

It would appear that the surface construct is more difficult to measure than the deep construct. The results for the current study revealed a number of ways of construing or understanding the surface construct. For example, the results of the factor analysis in chapter 3 displayed three distinct factors for the surface motive subscale representing fear of failure (factor 1), the acknowledgement of study as a means to an end (factor 2), and goal attainment (factor 3). As suggested in the results of chapter 3, there is an apparent differentiation
between fear of study and the other two factors, which represent the negative and positive aspects of goal attainment. The interview items generated by students for the present study focussed on the negative aspects of surface motives concerning study as a means to an end, while the written task rated the content and complexity of students’ responses, capturing their learning across their whole degree programme. Perhaps because the surface approach to learning has been considered of less importance in learning, there is a general tendency to underestimate this construct. As has been shown in the current study, this can lead to a rather one-dimensional interpretation of the construct in the development of measurement instruments. Another consideration is the level of self- or meta-cognitive awareness of students who have a surface approach to learning. Perhaps, in the focus group, it was more difficult for students with a surface approach to learning to articulate their approach to learning, because of less self-awareness about the learning processes being used, than those with a deep approach to learning. Students with a surface approach to learning tend not to be introspective about their lives, and do not tend to integrate information; whereas students with a deep approach to learning generally are introspective and integrate new concepts into their own world view (Biggs, 1987a). This may have affected the way in which they responded to the questions posed in the focus group. Perhaps a better response would have been elicited from these students utilising a methodology such as convergent interviewing where concrete questions can be asked (Dick, 1993). Further research is needed on surface learning using a broad range of methodologies to understand the complexity of this construct.

**Validation of the Three Instruments**

The ability of each of the three instruments to differentiate between deep and surface was also examined using a multitrait-multimethod matrix. Low and non-significant discriminant validity is representative of good differentiation between constructs on the same instrument. In this instance the results suggest that while the SPQ discriminated well between the deep and surface constructs, the interview and written task did not.
The Study Process Questionnaire

The relationship between the SPQ deep approach and the SPQ surface approach was non-significant (-.01, p>.05). This suggested the two approaches, as measured by the SPQ, have good discriminant validity and measure two different constructs, deep and surface approaches to learning (H4.7). Biggs (1993b) argued that research undertaken by Christensen et al. (1991) on the SPQ was inappropriate as they had suggested deep and surface were dichotomous. The present findings differ, however, from the results in chapter 3. The inter-factor correlation between the deep and surface scales of the SPQ indicated a weak, but significant negative relationship (-.22, p<.01). Interestingly, Biggs et al. (2001) utilising the R-SPQ-2F also found a weak, but significant negative correlation (-.23, p<.05) between the deep and surface scales.

The Interview

In contrast, the relationship between the deep and surface scales of the interview was significant (-.40, p<.01), suggesting that these deep and surface constructs are dichotomous. Moreover, the moderate significant result suggests the two scales of the interview do not adequately discriminate between the deep and surface construct (H4.8). This result was not as expected. As stated above, Biggs (1993b) argues that deep and surface approaches are separate and distinctly different constructs, and that deep learning is qualitatively different from surface learning. However, the results of this study are similar to the concurrent research undertaken on the factor structure of the SPQ (see chapter 2) which found a significant negative correlation (-.22, p < .01) between the deep and surface scales of the SPQ. One possible explanation for this result is the way in which the interview was derived. The interview was qualitatively developed from the focus group, and it is possible that the individuals who participated in the session perceived deep and surface learning as being dichotomous, rather than separate entities. A second related explanation is that the interview rating scale may have influenced the results. While the majority of the rating categories are discrete, others are not. For example, students can either view the qualification as being of primary or secondary importance, suggesting an either/or rating. Conversely, students can be
motivated to gain “real world knowledge” and also be motivated to have personal growth. However, as these categories were derived from frequency counts conducted on the focus group material and refined after the pilot study, future research is needed to ascertain whether there are methodological problems with the interview, or whether deep and surface constructs are in fact separate constructs.

Written Task

Finally, there was a significant negative relationship (\(-.47, p < .01\)) between the deep scale and the surface scale on the written task (H4.9). Again, this result was unexpected, and contrary to Biggs’s (1993b) view that they are in fact two separate constructs. This result is of particular interest, as the surface scale of the written task did not correlate with the surface scale of either the SPQ or the interview. While the problems associated with behavioural measures and the development of two separate scales to measure deep and surface require consideration, the underlying issue of the stability of the surface construct warrants further investigation. Further research needs to be undertaken on the modified rating scale to assess its applicability within research on deep and surface learning. Possible changes include a return to the original SOLO taxonomy to classify students as either deep or surface and then to analyse the results for deep and surface students separately in relation to the SPQ and an interview protocol. Another possibility would be to further develop the initial work undertaken by Christensen et al. (1991) or to either develop or utilise other taxonomies.

Summary of Strengths and Limitations of the Present Study

The previous sections have presented a discussion of the results obtained for the nine hypotheses of the present study. The focus was on explaining various issues that may have influenced the obtained results. This section shifts the focus to a discussion of the general strengths and limitations of the present study.

Strengths

A particular strength of the present study was the innovative use of a multitrait-multimethod matrix to examine the construct validity of the deep and surface constructs. This methodology allowed for a combination of qualitative and quantitative measures to be used.
While qualitative research has been undertaken on approaches to learning in the past it has not been empirically tested in relation to the SPQ (see chapter 2). Further, the use of the different sampling techniques (viz. self-report questionnaire, interview and behavioural measure) to measure the same constructs enhances the robustness of the study. For example, the ability to gather detailed responses to questions in an interview, contrasts with the ability of the questionnaire to gather information about a broad range of issues. By combining the two, research can achieve both breadth and depth. The inclusion of a behavioural measure as an external evaluation of approaches to learning is a particularly useful means of information gathering to complement an understanding of complex constructs (Liebert & Speigler, 1990).

The methodology employed for developing the interview is also a strength of the present study. This is in line with Christensen et al.’s (1991) criticism of previous validation studies for their inappropriate use of Biggs’s own theoretical understanding of approaches to learning as the starting point. By going back to first principles and asking students to provide information regarding their learning strategies and motives, the present study avoided contamination of the interview by Biggs’s own understanding of the deep and surface constructs. This was done by the independent expert selection of students whose behaviour over a period of three years consistently identified them as either deep or surface learners. This process also eliminated any problems associated with the use of other questionnaire data (i.e., ASI) or self-selection. By then asking the nominated students to participate in a focus group, the basic tenets of the SAL framework were employed in this study. Thus, the interview and associated rating scale developed from the information obtained in the focus group could be used with confidence as a measure of the deep and surface approaches to learning.

Limitations

Some of the possible limitations of the present study were discussed in earlier sections of this chapter, and included limitations of self-report questionnaires, the limitations of interviews, and the adaptation of the SOLO taxonomy. Another limitation to the general application of the present study, the use of psychology students, was discussed in chapter 3.
Once again it is important to state that further research needs to be conducted using psychology students to ascertain whether the results of the present study can be supported.

A second limitation was that the confirmatory factor analysis methodology for analysing MTMM could not be used due to the relatively small sample size of the current study. Although, the sample size of 50 in the present study indicates 97 percent confidence for the results obtained and thus can be confidently used, it is of interest for future research to use a larger sample to assess the results of the present study utilising the newer analytical method.

Summary and Conclusions of Section 1

Overall, the results of the present study offer support to the validity of both the deep and surface constructs of the SPQ. This further supports the findings of the previous study, which demonstrated a two-factor model of the SPQ (surface-achieving-motive, deep-achieving) was the most suitable factor structure to utilise in further research. The pattern of findings in the present study is in accord with previous research (see Christensen et al., 1991), with both studies suggesting the surface scale of the SPQ is problematic. This appears to be an inherent problem, as indicated by the results of the previous study where some instability was evident in the surface subscales and scales (see chapters 2 and 3). It should be noted that the results of the current study and the Christensen et al.’s (1991) study have both provided support for the stability of the deep scale of the SPQ. Overall the results from the two present studies examining the validity of the SPQ, suggest the SPQ is a useful measure of approaches to learning, particularly when the higher order deep-achieving and surface-achieving-motive scales are considered. Concerns regarding the surface scale and subscale of the SPQ should be considered when interpreting the results of studies utilising the SPQ.

This, the first section of this thesis, has examined the factor structure of the SPQ and the constructs deep and surface learning. Overall, it has been established that the factor structure of the SPQ is more stable at the second- and third-order levels than at the first-order level. The results of the first study (chapter 3) suggest the third-order level to be the most appropriate level for undertaking further research utilising the SPQ. Further, findings indicate that the two higher-order factors of deep-achieving and surface-achieving-motive, appear to
be the more suitable for undertaking research within the homogeneous sample of students participating in the current research programme. As such, these two factors will be the primary level at which the SPQ will be used in the second section of this research programme.
CHAPTER 5
DEVELOPMENT AND MEASUREMENT OF THE 3P MODEL OF LEARNING

Overview

What influences how a student learns? Approaches to learning, as discussed in chapter 2 and validated in chapters 3 and 4, do not occur in isolation. Rather, a number of factors influence whether a student typically adopts a deep or surface approach to learning. Research has found personal factors such as self-concept (Biggs, 1982; Cokley, 2000; Watkins & Regmi, 1996), intelligence (Biggs, 1987a; Biggs & Kirby, 1984; Saljo, 1981), locus of control (Cassidy & Eachus, 2000; Rose et al, 1996; Schmeck et al, 1991; Watkins & Akande, 1994), conceptions of learning (Dart et al., 2000) and personal style (Biggs, 1970b; Gordon, 1999; Ziegert, 2000) can influence a student’s approach to learning. Further, findings suggest the context in which learning occurs can influence a student’s approach to learning (see Biggs, 1987a; Dart & Clarke, 1991; Newble & Clarke, 1996; Prosser & Trigwell, 1999a; Tan & Thanaraj, 1993; Wakeford & Southgate, 1992). In turn, personal and situational factors and approaches to learning have been linked with learning outcomes (Dart et al., 2000; Drew & Watkins, 1998; Hall et al., 1995, Wong & Watkins, 1998). Biggs (1978, 1987a, 1992) devised the 3P (presage, process, product) model of learning to explain the interaction of these various factors. Thus, the 3P model identifies the relationships between personal and situational factors (presage), approaches to learning (process) and learning outcomes (product).

The purpose of this second section of the current research programme is to empirically test the 3P model of learning. To this end, a series of studies focussing on specific aspects of the model and one study focussing on the complete model itself are proposed. This chapter reviews the available literature on the 3P model, reviewing in turn the components of the model, followed by a discussion of the evolution of the 3P model of learning. Finally, this chapter will establish the framework for the four remaining studies of this research programme.
Development of the 3P Model of Learning

The 3P model of learning has reflected evolutions in Biggs’s (1987a; 1999) conceptualisation of approaches to learning. The present survey of the evolution of the model is general in nature. The initial version of the 3P model is discussed in detail and relevant changes to subsequent versions of the model are highlighted. The earliest and most recent versions of the model are discussed and compared. Other intermediary versions of the 3P model are presented in Appendix C.

The earliest published version of the 3P model (Biggs, 1978), illustrated in Figure 5.1, described Biggs’s understanding of the Lewinian model, namely, the notion that behaviour is an interactive function of the person and the environment. In Biggs’s model personal and situational factors constitute the presage component of the model. The presage factors lead to the development of values, which influence the reasons an individual has for performing a given behaviour. As Biggs’s model focuses on learning, the values of interest are those that influence the reasons students have for undertaking further education. In turn, these reasons or motives for continuing education are proposed to determine the strategies that are adopted for undertaking the desired behaviour, in this instance to further their education. The strategy or strategies chosen by the student, in turn, impact on their performance. This suggests a linear relationship between the presage, process and product factors. Biggs also proposed the presage factors directly affect the academic performance of the student (product).

In 1984, an updated and more complex version of the 3P model was proposed which attempted to further explicate the learning process. The earlier linear relationship between values, motives and strategies was replaced; integrating the SPQ subscales into the model itself (refer to Figure C1 in Appendix C). Biggs (1984) postulated that the strategies students select and use when approaching an academic task will depend on their perceptions of that task. In order to explore this notion further, Biggs (1984) extrapolated the process component of the 3P model. Emphasising the importance of how a student perceives the task in the learning process, Biggs (1984) suggested that an individual’s perception of the task will influence the way in
Figure 5.1. General model of study processes (Biggs, 1978).
Chapter 5  135

which they approach the task. However, the model does not suggest any direct link between these two components of the model.

Around the same time, a more simplified version of the 3P model also appeared (Biggs & Kirby, 1984). This version of the 3P model simplifies the learning process complex (see Figure C2). Personal and situational factors and performance are proposed to be partially mediated by the motives and strategies an individual uses. Thus, the motives influence the strategies an individual adopts. Essentially individuals are predisposed by their personality to adopt one approach in preference to others, but at the same time certain situations encourage or inhibit the use of particular approaches.

Comparisons of the personal variables in the 1984 and 1985 models are similar (see Figures C2 and C3). Changes to the model include the inclusion of home background (presage) and the amalgamation of the situational factors from the two 1984 models. The 1985 model also expands the product component of the model, expanding the affective aspect of academic performance by suggesting academic satisfaction is an important factor for consideration in an understanding of student learning.

Similarly in 1987 (see Figure C4), Biggs addresses the product component of the model in some detail, clearly dividing the affective aspects of learning outcomes from the more traditional methods for examining knowledge and performance ability. There is also a return to the earlier clear division of motives and strategies in the process component of the model.

By 1989 however, Biggs changed situational factors into teaching context, providing a much broader scope for both this and the newly named student characteristics (see Figure C5). For the first time, Biggs’s growing understanding regarding the actual nature of the learning process complex begins to appear in the model. Biggs had suggested for some time that approaches to learning were both characteristics the student brings to the learning, and the mediating factor between the presage and product components of the model. This relationship was clearly displayed for the first time in the 1989 model.

Another important change is evident in the model of learning published in 1990 (see Figure C6), where for the first time Biggs suggests the relationship between the presage,
process, and product components of the model is not linear. Rather, the relationship between
the components of the model is systemic, with feedback being provided from the product to
the presage component of the model. Essentially, Biggs’s 3P model of learning is changing to
a systemic model, emphasising the role of feedback in learning. Further, Biggs for the first
time incorporates the interaction between the teaching context and student characteristics into
this model, suggesting there may be some effect on these presage factors based on this
interaction.

Similarly, the model provided by Biggs in 1992 (see Figure C7) echoes the need to
understand the interaction between the various components of the model, and expands the
feedback to include the interaction between the process and presage components. At this
time, Biggs does not suggest any direct impact of the product on process. Perhaps, because
Biggs has firmly placed approaches to learning in the presage component of the 1992 model
as preferred ways of learning, this interaction between outcome and approach to learning can
be inferred for a more generic model where approaches to learning comprise the process
component of the model. The process component of this version of the model focuses on the
immediate learning task being undertaken by the student. This involves metalearning; a term
developed by Biggs (1985) to explain the task processing activities of what and how to learn
for any given activity.

The most recent model (Figure 5.2) does consider a relationship between the product and
the process components of the model, suggesting the 3P model of learning is an interactive
system (Biggs, 1993a, 1999). This version of the model does not place the learning process
complex (i.e., approaches to learning) as a presage factor, but returns it to the more common
placement as the process component of the model. This is interesting, as Biggs used the
presage quality of the approaches to learning to argue for the inappropriateness of studies of
approaches to learning which are not context specific. This return to an earlier conception of
approaches to learning would suggest credence for this particular argument is not as relevant.
Figure 5.2. Systems model of study processes (Biggs, 1999).
Differences between the 1978 and 1999 versions of the 3P model of learning reflect Biggs’s conceptualisation of approaches to learning. Of particular note is the change from a linear to a systemic model. Further, Biggs has removed the notion of values from the process component of the model. Other changes between the models generally reflect cultural changes of the day. For instance, the term institutional in the initial model is replaced by teaching context.

**Summary**

The challenge for researchers undertaking empirical work on the 3P model of learning is twofold. Firstly, there is a need to ascertain which of the many proposed factors within the presage and product components of the model are suitable variables for analysis. This thesis will examine the personal and situational components of the model in two separate studies (see chapters 7 and 8 respectively). These studies form the basis for decisions regarding the development of the model for analysis in this thesis (see chapter 9). Secondly, a choice needs to be made regarding whether a linear or systems version of the model should be considered. The progression from a linear to a systemic model over time suggests the latter is more appropriate for analysis. This is supported in other research on approaches to learning, which suggests an interaction between previous learning outcomes and current learning experiences (Prosser & Trigwell, 1999a). However, there are problems associated with the measurement of a systemic model. These are discussed in relation to previous research examined next and in chapter 9.

**Previous Research on the 3P Model of Learning**

Conceivably, the choice between the linear and systems models should be easily solved, with researchers utilising the most recent version of the model to test the theory. However, this is not a simple task. Each researcher that has chosen to examine the 3P model has focussed on specific elements of the model to assess how the components of the model link. For example, Dart et al. (2000) and Zhang (2000) examined the relationship between personality factors and process factors (i.e., approaches to learning). Zhang, also separately examined the relationship between process and product factors. A further three studies
undertaken on the 3P model of learning (see Drew & Watkins, 1998; Hall et al., 1995, Wong & Watkins, 1998) examined the whole model (i.e., presage $\Rightarrow$ process $\Rightarrow$ product). Each of these analyses has been linear, rather than systemic in nature. One reason for this paring down of the model may be that until fairly recently, statistical analyses capable of exploring models of this type were limited. The development of structural equation modelling (SEM) techniques provides a useful methodology for examining the 3P model of learning. Whatever the reason, there has been limited empirical research undertaken on the 3P model of learning.

The complexity of the body of research undertaken on the 3P model of learning is suggested by the diverse manner that researchers have used in their examination of the model. As can be seen in Table 5.1, researchers examining the 3P model of learning have chosen a variety of measures in the presage component of their model. Not surprisingly, the SPQ or the LPQ are used as the process component of each of these models. Similarly, academic achievement measured by grade-point-average (GPA) or an equivalent measure is the predominant product component of these models.

Regression or SEM statistical methods were predominantly used in three of the five studies in previous research (see Table 5.1). SEM has been identified as a more appropriate statistical method for analysing the 3P model as it allows for the estimation of both direct and indirect structural effects, whereas regression does not (Mueller, 1996). Tabachnick and Fidell (2001) suggest where possible SEM should be utilised instead of classical path analysis in this type of research as it provides a more appropriate model fit. While path analysis is an appropriate methodology for undertaking this analysis, it assumes the factors in the model are measured with negligible error and there is perfect measurement of observed factors (Mueller, 1996). Interestingly, the three studies (see Dart et al., 2000, Drew and Watkins, 1998; Wong and Watkins, 1998) utilising SEM to examine the 3P model of learning have each undertaken classical path analysis rather than SEM to examine the model. So, although statistical theory suggests SEM is the more appropriate analysis, path analysis has been selected as more appropriate for this analysis. Perhaps, this decision has been made because the pivotal components of SEM, latent variables, do not make sense in relation to the 3P model of
Table 5.1

*Comparison of previous research undertaken on the 3P model of learning*

<table>
<thead>
<tr>
<th>Researcher(s)</th>
<th>Year</th>
<th>Presage Measure(s)</th>
<th>Process Measure</th>
<th>Product Measure(s)</th>
<th>Analysis</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hall, Bolen &amp; Gupton</td>
<td>1995</td>
<td>SAT scores</td>
<td>SPQ</td>
<td>GPA</td>
<td>Regression</td>
</tr>
<tr>
<td>Drew &amp; Watkins</td>
<td>1998</td>
<td>Locus of control;</td>
<td>SPQ</td>
<td>Standardised overall end of year results</td>
<td>Structural Equation Modelling (SEM)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Academic self-concept</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Wong &amp; Watkins</td>
<td>1998</td>
<td>Classroom environment scale</td>
<td>LPQ</td>
<td>Attitude towards mathematics;</td>
<td>SEM</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Attainment test scores</td>
<td></td>
</tr>
<tr>
<td>Dart et al.</td>
<td>2000</td>
<td>Conceptions of learning;</td>
<td>LPQ</td>
<td>N/A</td>
<td>SEM</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Perceptions of classroom environment</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Zhang</td>
<td>2000</td>
<td>Abilities</td>
<td>SPQ</td>
<td>GPA or equivalent</td>
<td>Multiple Regression</td>
</tr>
</tbody>
</table>

*Note.* SPQ = Study Process Questionnaire; LPQ = Learning Process Questionnaire; SAT = Scholastic Aptitude Tests; GPA = Grade Point Average.
learning. The observable variables within the 3P model of learning do not combine to make three latent variables called presage, process and product. Rather, much research has been undertaken on the different way in which the different personal characteristics, for example, interact in different ways with the three approaches to learning. As such, it would not be prudent to group deep, surface and achieving together as a single latent variable called process.

Drew and Watkins (1998) used path analysis within LISREL (Joreskog & Sorbom, 1993) to investigate their model. They tested the linear path between two presage variables (locus of control and academic self-concept), two process variables (deep and surface) and a single product variable (academic achievement). The results provided a good fit $\chi^2 (30, N = 162) = 38.83, p>.05$ GFI = .95, TLI=.96 for the final version of their model, indicating paths between locus of control and surface approach (-.35), academic self-concept and deep approach (.39), surface approach and academic achievement (-.25) and finally between deep approach and academic achievement (.31). Drew and Watkins’ model suggests personal characteristics influence the approach to learning utilised by students, which in turn influences learning outcomes. This supports Biggs’s (1987a) assertions regarding the nature of learning.

Similarly, Dart et al. (2000) focussed on the presage and process relationship in their research. They tested the relationship between two presage variables (conceptions of learning and perceptions of the classroom environment) and two process variables (deep and surface) as measured by the LPQ. The results suggested a good fit $\chi^2 (63, N = 457) = 153.07, p<.001$ GFI = .953, TLI=.942 for the final version of their model, indicating students differed in their approach to learning, based on whether their conceptions of learning were qualitative or quantitative. Students with qualitative conceptions of learning are likely to utilise deep approaches to learning. Further, students with quantitative conceptions of learning will use both surface and deep approaches to learning. These results highlight the multifaceted nature of approaches to learning.
Finally, Wong and Watkins (1998) utilised SEM (LISREL - Joreskog & Sorbom, 1993) to consider the relationship between presage ⇒ process ⇒ product over time, with an emphasis on environmental factors. The LPQ was used to measure approaches to learning. The results of their study, while suggesting various points regarding the perceptions of classroom environment for deep and surface learners, do not provide clear results regarding the process ⇒ product relationship.

These three studies undertaken on the 3P model of learning provide three different approaches to examining this model. There are three issues associated with these studies undertaken on the 3P model of learning which suggest limitations. Firstly, two of the studies (Drew & Watkins, 1998; Wong & Watkins, 1998) were undertaken utilising Hong Kong students. Issues regarding the cultural specificity of the SPQ/LPQ have been discussed elsewhere in this thesis (chapter 2). Secondly, two of these studies were undertaken on the high school equivalent of the SPQ. Thirdly, all three studies used only deep and surface approaches to learning as the process variables. As such, it is evident that further research needs to be undertaken to examine the 3P model of learning, utilising an Australian sample, the SPQ, and all of the second-order, as well as the third-order approaches to learning. An aim of this thesis is to examine the 3P model of learning, accounting for these limitations, as this has not been done to date, to see whether this model is an appropriate framework for understanding learning. It is expected the process factors deep, surface and achieving will mediate between the presage and product factors in the model. It is also expected that the process factors deep-achieving and surface-achieving-motive will mediate between the presage and product factors in the model. In order to do this, there is a need to examine the 3P model in more detail and the broader range of research undertaken on the components of the 3P model of learning, to assess variables appropriate for inclusion in an investigation of the model.
Chapter 5

Biggs’s 3P Model of Learning

Initially, Biggs (1978b) adapted a model from Dunkin and Biddle (1974) to explain the interrelationship between personal and environmental factors on the study process and the resulting outcomes obtained from the different approaches to learning. Biggs (1985, 1987a, 1992, 1999) distinguished three sets of factors, which include, characteristics of the student, the environment, and the learning task that are important in academic learning. He conceptualised learning not as a passive process, but rather as an interaction between the learner and learning environment. Thus, the 3Ps in the model refer to the presage, process and product factors of learning. As mentioned in chapter 2, the 3P model of learning proposed by Biggs provides a framework for understanding the importance and function of approaches to learning. This model has undergone many semantic changes in the last thirty years. For example, the presage factors within the model were referred to as personal and situational, but have more recently been labelled student factors and teaching context (Biggs, 1999). To simplify the body of work undertaken by Biggs on the model for the current research programme, the labels used in the 1987a model will be utilised (see Appendix C).

Presage Factors

Presage factors are those present before learning takes place. The two types of presage factors Biggs (1987a) identified are personal and situational. Personal factors are those characteristics the individual brings to the learning environment. Biggs (1987a) identified five types of personal factors, which may influence the approach to learning adopted by a student - prior knowledge, abilities, intelligence, personality and home background (see also Biggs, 1985; Biggs & Telfer, 1987). Situational factors are those factors creating the climate in which the learning tasks are undertaken. Situational factors identified as important by Biggs include subject area, teaching method, course structure and time on task. Research on the presage factors has provided mixed results, with greater consistency of findings in relation to situational, compared to personal factors. This outcome is due in part to the much broader scope of the personal factors, each of which can be considered a broad research field within
The next two sections will review research conducted on personal and then situational factors.

**Personal Factors**

Table 5.2 presents the scope of research undertaken on personal factors and learning approaches, and in some instances also learning outcomes. A variety of personal characteristics has been studied in relation to learning approaches. For instance, in his earlier work Biggs (1972, 1987a) investigated the role demographic variables such as country of birth, father’s education and prior knowledge, had on the approach to learning of a student. Results of this research suggest students born outside Australia have a lower surface score than Australian born students, although Biggs suggests this result is mitigated by the tendency for the latter group to be younger than the first. This alludes to another of Biggs’s (1987a) suggestions that depth of learning is related to age. The results for father’s education indicated level of education affected approach to learning. Prior knowledge, also proposed as a factor influencing approach to learning, has consistently indicated no direct link with any approach to learning (Beckwith, 1991; Hallden, 1993; Prosser & Trigwell, 1999a). Research on the relationship between personal characteristics and approaches to learning has been prolific.

**Age.** The available findings for age and approaches to learning are relatively consistent, with most researchers (Biggs, 1987a; Gow & Kember, 1990; Hall & Marchant, 2000; Justice & Dornan, 2001; Richardson, 1998; Richardson & King, 1998; Sheehan, McMenamin & McDevitt, 1992) evidencing a relationship between age and approaches to learning. For example Biggs (1987a), utilising ANOVA (n=2365), found strong effects between age and the three approaches to learning (deep, surface, achieving), suggesting a decrease in the surface approach to learning and a corresponding increase in deep and achieving approaches to learning as a student gets older. Gow and Kember (1990) utilising REGRESSION analysis (n=1043) investigated the relationship between the subscales of the SPQ and several demographic variables including age. They found age was a significant predictor of the deep motive and deep strategy subscales, suggesting older students had a deeper approach to
Table 5.2

*Research undertaken on the relationship between personal characteristics and approaches to learning.*

<table>
<thead>
<tr>
<th>Researcher(s)</th>
<th>Year</th>
<th>Sample</th>
<th>Measures</th>
</tr>
</thead>
<tbody>
<tr>
<td>Biggs</td>
<td>1972</td>
<td>394</td>
<td>SBQ; Demographics (incl. Religion, Father’s education, course area, repeating years at school); Satisfaction with study methods; Willingness to devote time to improving; performance data; Satisfaction with study methods; Willingness to devote time to improving; Performance data</td>
</tr>
<tr>
<td>Biggs</td>
<td>1987</td>
<td>2365</td>
<td>SPQ; Demographics (incl. faculty, year, status, gender, Date of Birth, country of birth, fathers SES); educational plan; performance self-ratings</td>
</tr>
<tr>
<td>Gadzella et al.</td>
<td>1987</td>
<td>132</td>
<td>Study skills test; Inventory of Learning Processes; Grade Point Average (GPA)</td>
</tr>
<tr>
<td>Rose et al.</td>
<td>1996</td>
<td>202</td>
<td>SPQ; Locus of Control; GPA; Course Grades; Scholastic Aptitude Tests (SAT)</td>
</tr>
<tr>
<td>Saljo</td>
<td>1981</td>
<td>30</td>
<td>Interviews; Ravens Progressive Matrices; Vocabulary Test; Text retention test; Free recall</td>
</tr>
<tr>
<td>Biggs</td>
<td>1982</td>
<td>2000</td>
<td>SPQ; Academic Self-Concept Scale</td>
</tr>
<tr>
<td>Biggs &amp; Kirby</td>
<td>1984</td>
<td>321</td>
<td>LPQ; Ravens Progressive Matrices; Figure copying; Serial recall; Visual short-term memory</td>
</tr>
<tr>
<td>Speth &amp; Brown</td>
<td>1990</td>
<td>383</td>
<td>ASI; Test Preparation Activities; Academic Ability</td>
</tr>
<tr>
<td>Watkins &amp; Hattie</td>
<td>1990</td>
<td>1274</td>
<td>How I study (LPQ-short-form); self-esteem; Quality of School-life scale.</td>
</tr>
<tr>
<td>Dart &amp; Clarke</td>
<td>1991</td>
<td>67</td>
<td>Locus of control; SPQ; impressions of programme</td>
</tr>
<tr>
<td>Gow et al.</td>
<td>1991</td>
<td>1033</td>
<td>SPQ; English language scale; Semi-structured interviews</td>
</tr>
<tr>
<td>Schmeck et al.</td>
<td>1991</td>
<td>129</td>
<td>ILP-R; Taylor Manifest Anxiety Scale; Rotter Locus of Control Scale; Coopersmith Self-Esteem Scale</td>
</tr>
<tr>
<td>Beyler &amp; Schmeck</td>
<td>1992</td>
<td>300</td>
<td>ILP; Holist and Serialist scales; Human Information Processing Survey (HIPS); Myers-Briggs Type Indicator (MBTI); Eysenck Personality Questionnaire (EPQ)</td>
</tr>
<tr>
<td>Trigwell &amp; Prosser</td>
<td>1992</td>
<td>122</td>
<td>Higher School Certificate (HSC) score, ASI, SOLO taxonomy</td>
</tr>
<tr>
<td>Wilding &amp; Hayes</td>
<td>1992</td>
<td>51</td>
<td>SPQ-revised; EPQ; demographics; lecture notes</td>
</tr>
<tr>
<td>Boulton-Lewis</td>
<td>1994</td>
<td>1249</td>
<td>SPQ; Beliefs about learning</td>
</tr>
<tr>
<td>Watkins &amp; Akande</td>
<td>1994</td>
<td>150</td>
<td>LPQ; Interview; Locus of Control</td>
</tr>
<tr>
<td>Watkins &amp; Regmi</td>
<td>1996</td>
<td>302</td>
<td>ASI; Causal Dimension Scale; Personal and Academic Self Concept Inventory</td>
</tr>
<tr>
<td>Klimidis et al.</td>
<td>1997</td>
<td>110</td>
<td>Adelaide Diagnostics Learning Inventory; Reasons for enrolment; Cultural dimensions; Interaction with patients; Anxiety</td>
</tr>
<tr>
<td>McLean</td>
<td>1997</td>
<td>124</td>
<td>School Attitude Measure</td>
</tr>
<tr>
<td>Summerfield &amp; Youngman</td>
<td>1999</td>
<td>364</td>
<td>Self perception; Locus of Control</td>
</tr>
<tr>
<td>Cassidy &amp; Eachus</td>
<td>2000</td>
<td>130</td>
<td>Locus of Control; Self efficacy; Achievement; ASI</td>
</tr>
<tr>
<td>Dart et al.</td>
<td>2000</td>
<td>457</td>
<td>Conceptions of learning inventory (COLI), Individualised Classroom Environmental Questionnaire (ICEQ), LPQ</td>
</tr>
</tbody>
</table>
learning than younger students. Similarly, Hall and Marchant (2000) utilising REGRESSION
(n=291) found age to be a significant predictor of academic performance, with older students
having higher performance levels, but did not examine the direct relationship between age
and approaches to learning as measured by the ASI. Further, Justice and Dornan (2001),
utilising MANOVA (n=95) found older female students were more intrinsically motivated
than younger or male students in their learning. Also, Sheehan et al. (1992), utilising
MANOVA (n=169) found differences in the manner traditional (younger) and non-traditional
(older) students learn across five dimensions such as concept of the learner and motivation to
learn. Overall, older students were found to be more andragogical in their approach to
learning than younger students. Only Richardson (1998) utilising ANOVA (n=77) found no
difference between younger/older students and approaches to learning as measured by ASI
scores. The results of this study might be explained by the use of two samples, one
undergraduate and one postgraduate, which may have confounded the results regarding age.
As a whole there is support for age as a predictor of approaches to learning, particularly as
measured by the ASI. Thus, it is important to include age as one of the predictors in the
present study, as little work has been undertaken on the relationship between this
demographic variable and approaches to learning as measured by the SPQ (see chapter 8).

**Gender.** While gender has also been a focus of research on approaches to learning,
research on the relationship between these two variables has provided inconclusive results
(Baxter Magolda, 1989; Biggs, 1987a; Gledhill & van Der Merwe, 1989; Gow & Kember,
1990; Hazel, Logan & Gallagher, 1997; Miller et al., 1990; Richardson, 1997; Richardson &
King, 1991; Sadler-Smith, 1996; Severiens & Ten Dam, 1998; Speth & Brown, 1990;
and Ten Dam (1998) undertook a meta-analysis of 22 studies on gender differences in
approaches to learning and found 11 of the 16 scales of the ASI evidenced some differences.
Overall, women scored higher on the reproducing orientation, while men scored higher on the
non-academic orientation. Results were similar for men and women for the meaning
orientation, and there were no differences for the achieving orientation.
Baxter Magolda (1989) utilising CHI-SQUARE analysis (n=101) discovered no gender difference for learning styles as measured by the Learning Styles Inventory (LSI). In addition, Tomlinson Clarke and Clarke (1996) utilised the ASI to assess gender differences in approaches to learning amongst other variables and found no differences on characteristics of student effort as measured by approaches to learning. Wilson et al. (1996) demonstrated there were no gender differences in approach to learning as measured by either the SPQ or the ASI.

Conversely, Biggs (1987a) found females were significantly more organised than males in their approach to learning. Further, males were higher on surface approach than females. Gledhill and van der Merwe (1989) utilising the Mann Whitney U-test (n=176) found different cluster groupings for males and females, suggesting learning styles as measured by the LSI are different for women and men. In addition, Gow and Kember (1990) utilising REGRESSION analysis (n=1043) investigated the relationship between the subscales of the SPQ and several demographic variables including gender. They found gender was a significant predictor of the deep strategy and achieving motive subscales. Miller et al. (1990) analysed the relationship between gender and approaches to learning (n= 1507), finding significant gender differences for 16 of the 26 subscales on a combined administration of the ASI, ILS and SPQ. In addition, Richardson (1997) utilising discriminant analysis (n=90) found a majority of male students were regarded as having a meaning orientation as measured by the ASI, whereas female students were regarded as having a reproducing orientation to their learning. Sadler-Smith (1996) utilising a modified version of the ASI undertook ANOVA (n=130) and found females were more achievement oriented than males. Further, Speth and Brown (1990) utilised the ASI to investigate the relationship between gender and approaches to learning as measured by the ASI. Utilising MANCOVA (n=383) they found there were some gender differences in approach to learning. Finally, Watkins and Hattie (1981) investigated the relationship between gender and approaches to learning as measured by the SBQ, an earlier version of the SPQ, and found male students scored significantly higher on reproducing strategy than females, while females scored significantly higher on the internalising approach than males.
Richardson and King (1991) in their review of the literature suggest the Watkins and Hattie (1981) results may simply be a reflection of the course of study (Arts/Sciences), rather than a true gender difference. A similar conclusion can be made regarding the initial work undertaken by Biggs (1987a). Inconclusive findings such as those discussed highlight the ongoing problems into research associated with approaches to learning. There have also been methodological issues in the design and analysis of research undertaken on approaches to learning and gender (see Wilson et al., 1996 for a review).

There can be no clear decision made regarding the relationship between gender and approaches to learning. The present study will investigate whether, for the student population under consideration, there are reported differences between men and women’s approaches to learning.

Year of study. Of the three demographic variables, year of study has received the least attention in the available literature (Biggs, 1987a; Gow & Kember, 1990; Newble & Clarke, 1986; Richardson, 1998; Watkins & Hattie, 1985). Biggs (1987a) investigated the relationship between year of study and approaches to learning, finding a decline in the deep approach to learning, particularly in the third year of study, with an increase again in the honours year. Gow and Kember (1990) utilising REGRESSION analysis (n=1043) investigated the relationship between the subscales of the SPQ and several demographic variables including year of study. They found year of study was a significant predictor of the deep and achieving motive and strategy subscales, suggesting first-year students were more likely to report themselves using deep and achieving approaches to learning than final-year students. In addition, Newble and Clarke (1986) investigated the relationship between year of study and approaches to learning as measured by the LSI. The results of their study appear to suggest some differences in approach to learning based on year of study. These differences may be due though, to the teaching methods of the two different medical faculties participating in the research. Richardson (1998) compared the approaches to learning of undergraduate and postgraduate students and generally found no difference in approach to learning as measured by the ASI between the two levels. Finally, Watkins and Hattie (1985)
undertook a longitudinal study of the approaches to learning of students as measured by the ASI. The results of their study provide little evidence for changes in approach to learning, between the first- and third-year of study. Interestingly, Watkins and Hattie’s study was the only study utilising a within-subjects design to consider changes in approaches to learning over time. Perhaps, then the results of the other studies examining the relationship between year of study and approaches to learning may reflect other factors, or perhaps the natural attrition of students in the Watkins and Hattie study may have affected their results. In this thesis, the relationship between year of study and approaches to learning will be examined. As already identified, faculty differences may complicate the results of such a study, therefore this thesis will use a homogeneous student population to examine the influence of year of study on approaches to learning (see chapter 8).

Locus of control. Beyond demographic variables, the majority of the research on the relationship between personal factors and approaches to learning has tended to focus on locus of control (Biggs, 1997; Cassidy & Eachus, 2000; Dart & Clarke, 1991; McLean, 1997; Rose et al., 1996; Schmeck et al., 1991; Summerfield & Youngman, 1999; Watkins & Akande, 1994). The notion of locus of control is based on Rotter’s (see 1966; 1981) work suggesting all human behaviour occurs within a context. Rotter proposed two ways of looking at this context. Either an individual can view events as happening within themselves and are within their control (internal locus of control), or, conversely, events happen to them and are outside of their control (external locus of control). It is understandable that this theory fits conceptually with the theory on approaches to learning, and as such has been the focus of some research. Intuitively there is a link between an internal view of the world and deep learning, as this involves making connections between previous knowledge and current learning, whereas an external view of the world and surface learning both appear to place the onus for events or learning onto someone or something outside the self. Further, research on locus of control has shown individuals with an internal locus of control (internals) are more likely to seek information than those with an external locus of control (externals) (Phares,
1984), and internals are higher achievers in an academic context than externals (Ashkanasy & Gallois, 1987).

Not surprisingly, the research findings on approaches to learning and locus of control are consistent with the general findings relating to locus of control. For example, Watkins and Akande (1994) found high school students identified as having an internal locus of control evidenced a significant negative correlation with the surface motive and surface strategy subscales of the LPQ. Further, the surface scale of the ASI showed a moderate significant positive correlation (.37, p < .001) with external locus of control. Conversely, the deep scale on the ASI revealed a moderate correlation (.36, p < .001) with internal locus of control (Cassidy & Eachus, 2000). Biggs (1987a) demonstrated significant but weak relationships between internal locus of control and the deep (ranging from .9 to .12) and achieving (ranging from .15 to .24) scales, as measured by the LPQ, and a significant but weak negative relationship between internal locus of control and the surface scale (ranging from -.15 to -.22) as measured by the LPQ. Although these results support the link between approaches to learning and locus of control, there has been little work undertaken using the SPQ to look specifically at this link. For instance, Rose et al. (1996) found a significant, but weak (.17, p<.05) correlation between locus of control and achieving approach. Biggs (1997) critiqued the Rose et al. study, suggesting the results are an anomaly and are either the result of an atypical class, or the result of poor data. However, as such limited work has been undertaken on the relationship, it is difficult to ascertain whether Biggs’s comments are justified. Dart and Clarke (1991) state that they examined the relationship between approaches to learning and locus of control, but did not report the results. One aim of this thesis is to examine the relationship between locus of control and approaches to learning (see chapter 8).

**Intelligence.** Although Biggs’s (1987a) highlights intelligence as a factor influencing a student’s approach to learning, there has been little research undertaken on the link between the two. There is a plethora of research on intelligence, which is constantly evolving to include new concepts such as emotional intelligence (EQ). Commonly, in the Weschlerian tradition, global intelligence and the two subtypes of verbal and performance are the types of
intelligence referred to in the literature (Groth-Marnat, 1990). In this tradition, intelligence is defined as a global concept involving an individual’s ability to act with purpose, think rationally and deal with the environment around them effectively. Another way of considering types of intelligence in relation to learning approaches is to refer to the work by Catell (1963) on fluid and crystallised intelligence. Fluid intelligence relates to the individuals ability to find relationships and patterns, is not culturally specific, and is measured using such tools as the Ravens Progressive Matrices (Raven, Raven & Court, 1991). In relation to approaches to learning, there are similarities between fluid intelligence and the concept of deep approach to learning, as both focus on the integration of information. Crystallised intelligence, on the other hand, is the aspect of intelligence measured most commonly in intelligence tests, and is based on an individual’s experience, such as education and culture. Crystallised intelligence is measured using such tools as the AL vocabulary test (ACER, 1982). The relationship between approaches to learning and crystallised intelligence is less clear, as crystallised intelligence is believed to be in part influenced by fluid intelligence. However, as crystallised intelligence is also content driven, it is more likely to demonstrate a relationship with the surface approach to learning. While both fluid and crystallised intelligence have been measured in relation to approaches to learning (Biggs & Kirby, 1984; Saljo, 1981) this research has been limited.

Only two studies have specifically analysed the relationship between approaches to learning and intelligence. Saljo (1981) found no significant difference between 30 university students classified as deep and surface, based on their interview responses, and scores on the Raven’s Standard Progressive Matrices (sets A-E) or scores on a vocabulary test (not identified) utilising t-tests. As Saljo did not specify the gender mix of these students, it is difficult to ascertain whether the results reflect the actual nature of the relationship, or whether these results have been confounded by the influence of gender differences on tests of intelligence. For example, research on intelligence testing suggests males may have a small intelligence advantage over females (Furnhan & Rawles, 1995) and it has been demonstrated that males are better at certain spatial abilities than females (Voyer, Voyer & Bryden, 1995).
Further, while interviews were conducted to ascertain whether students used predominantly deep or surface approaches to learning, such a process may have not classified all students accurately. Similarly, Biggs and Kirby (1984) utilised measures such as Raven’s Standard Progressive Matrices and Serial Recall to differentiate between students who were high and low on simultaneous and successive processing respectively. Correlations between simultaneous processing and the subscales of the LPQ were not significant. Similarly, there was no significant correlation between successive processing and the subscales of the LPQ. Again, these results may be due to gender differences, as Biggs and Kirby used a mixture of male (n = 176) and female (n = 145) students in their research. Although both studies suggest there is no link between approaches to learning and intelligence, it is important to ascertain whether this holds true for the SPQ, as neither of the previous studies utilised this instrument. This thesis will examine the relationship between intelligence and approaches to learning.

Personal style. The personal characteristic theoretically described as personal style in Jungian typology (Myers & Myers, 1991) has also been discussed in relation to approach to learning, with very little empirical research undertaken on the relationship. Jungian theory (Borg & Shapiro, 1996) suggests different personality types prefer to receive and process information in different ways. This notion of an interaction with the environment mediated by a preferred approach has many similarities with approaches to learning. Thus, it is not surprising that a number of researchers have attempted to make the link between the four dichotomous preference scales from Jungian psychology as measured typically by the Myers-Briggs Type Indicator (Myers & Myers, 1991) or the Personal Style Inventory (Hogan & Champagne, 1980).

The four preference scales are introversion (I) – extroversion (E), sensing (S) – intuition (N), thinking (T) – feeling (F), and judging (J) – perceiving (P). Each preference scale focuses on a different aspect of information processing. The I – E scale refers to an individuals’ source of energy. People with a preference for introversion find their energy in their ideas and concepts whereas those with a preference for extraversion find their energy in the world around them. The S – N scale refers to the way in which individuals naturally
notice and gather information. People with a preference for sensing focus on details and specifics, often work sequentially, and prefer experience-based learning. Conversely, intuitive individuals rely on their intuitions and are more focused on the “big picture” rather than the details. The T – F scale refers to the way people evaluate information and make decisions. An individual with a thinking personal style makes objective judgements, whereas someone with a feeling personal style makes subjective judgements. Finally the J – P scale refers to the way in which the individual relates to their environment. Judging individuals prefer an orderly and structured environment, whereas perceiving individuals prefer a spontaneous and flexible environment.

Although there is awareness of the similarities between personality types and approaches to learning, empirical research undertaken on the link between the two has been relatively limited. Biggs (1970b) suggested introverts, as measured by the Maudsley Personality Inventory, would be more susceptible to intrinsic motivation than extroverts. As intrinsic motivation is linked with deep learning, it can be extrapolated then, that there would be a relationship between introversion and deep learning. However, the results of this study by Biggs did not support this notion. The primary objective of this research had been the cross-validation of the subscales of the SBQ, not to examine the relationship between the two constructs. Beyler and Schmeck (1992) investigated, amongst other things, the relationship between the Inventory of Learning Processes (ILP) and the MBTI utilising factor analysis (n=300). While providing support for holistic-analytic scale for the ILP, the findings offer little to explain a relationship between personal type and approaches to learning. The appropriateness of factor analysis for this investigation must be questioned. Perhaps a more appropriate methodology, designed to examine the relationship directly between variables, may have produced more interpretable results. Sadler-Smith (1999) also examined the relationship between personal style and approaches to learning. Her work focussed on the S – N scale as measured by the Cognitive Style Index (CSI) and approaches to learning as measured by a modified version of the ASI. The results suggest sensate individuals report a higher score on meaning orientation (i.e., deep) than intuitive individuals. This is interesting,
as based on an understanding of personality type and learning approach it would be presumed there would be a link between intuitive and deep, as both tend to focus on the “bigger picture”, and trying to understand the links between things rather than looking at the specific details or facts of the information or learning task. One aim of the current research programme is then, to establish if there is a link between personality type and deep or surface learning. In particular the current research will focus on the sensing – intuition and thinking – feeling scales. These scales relate respectively to the preferences individuals have for obtaining information and making decisions. These are arguably two of the main tasks involved in learning.

Other personal characteristics. Many other personal characteristics have been considered in relation to approaches to learning, for example self-esteem (Schmeck et al., 1991; Watkins & Hattie, 1990), self efficacy (Cassidy & Eachus, 2000), educational plans (Biggs, 1987a), motivation (Fransson, 1977; Lokan & Biggs, 1982; McCombs, 1992; Manzano, 1999), beliefs about learning (Cantwell, 1998; Crawford, Gordon, Nicholas & Prosser, 1994; Dahlin & Regmi, 1997; Meyer & Parsons, 1989) and self-concept (Biggs, 1982; Cokley, 2000; Watkins & Regmi, 1996). The personal characteristics mentioned in this and the preceding sections are not an exhaustive list of personal characteristics considered in relation to approaches to learning. Rather, this review has focussed on those characteristics that appear more often in the research. As can be seen from the above critique, aside from the demographic variables of age and gender, many of these personal characteristics have received limited attention in the research on approaches to learning.

Summary. While a range of research has been undertaken into the relationship between personal characteristics and approaches to learning, as measured by the LPQ or SPQ, little clear evidence of the relationship between the two has been produced. There are however, some consistent findings; specifically, greater age and internal locus of control being associated with deeper processing. More research needs to be undertaken on the relationship between personal characteristics and approaches to learning. In particular, there is a need to consider a range of personal characteristics together to ascertain the best predictors of
approaches to learning. One aim of this study is to consider whether gender, age, year of study, locus of control, fluid and crystallised intelligence and personal type, are predictors of approaches to learning. While gender is included in the study, there are no specific hypotheses made regarding this variable, as there are no consistent findings regarding whether men or women are higher deep or surface learners. It is expected lower age, earlier year of study, an external locus of control, sensing and thinking functions of personal style will positively predict a surface approach to learning and a surface-achieving-motive approach to learning. It is also expected that lower intelligence will positively predict a surface approach to learning and a surface-achieving-motive approach to learning. Conversely, it is expected higher age, later year of study, an internal locus of control will positively predict, and sensing and thinking functions of personal style will negatively predict, a deep approach to learning and a deep-achieving approach to learning. It is also expected that higher intelligence will positively predict a deep approach to learning and a deep-achieving approach to learning.

In the next section consideration is given to the second set of presage factors, relating to situational influences on approaches to learning.

Situational Factors

Research on the relationship between situation factors and approaches to learning has focussed on a number of aspects of the learning environment such as the subject content (Crooks, 1988), teaching methods and assessment (Hattie & Watkins, 1988; Prosser & Trigwell, 1999a; Scouller, 1998; Thomas & Bain, 1984; Wong & Watkins, 1998), course structure (Dart & Clarke, 1991; Newble & Clarke, 1986; Tooth, Tonge & McManus, 1989; Wittrock, 1991), and physical environment (Fisher & Parkinson, 1998; Hebert, 1998). Previous research has found, for example, that students can be encouraged to shift from a predominantly deep approach to learning, to a surface approach simply by increasing the amount of assessment student’s perceive they must complete in a particular course (see Entwistle & Entwistle, 1991; Ramsden, 1984; Ramsden & Entwistle, 1981). Findings also show that situational changes in the learning approach a student adopts tend to be temporary, rather than long-term, as individuals are predisposed to adopt one approach over another.
(Miller, Alway & McKinley, 1987; Kember & Gow, 1989; Entwistle, 1991). This raises questions regarding the stability of the deep and surface constructs.

There are three schools of thought regarding the stability of approaches to learning. One suggests the approach to learning adopted by the individual is stable across all teaching environments (Eley, 1992; Schmeck, 1983; Svensson, 1977; Thomas & Bain, 1982), whereas a second suggests the approach to learning a student adopts changes depending on the teaching context (Marton & Saljo, 1976b). A third suggests approach to learning is both stable and changeable (Biggs, 1999; Entwistle et al., 1979; Kember & Gow, 1989; Kember et al, 1997). This discourse about whether approach to learning is a trait or a state has parallels in personality theory. Traits are enduring characteristics, whereas states are relatively changeable (Hertzog & Nesselroade, 1987). Recent personality literature suggests traits are independent of environmental influences, which has been shown in both longitudinal studies of personality (Costa & McCrae, 1994) and in twin, family, and adoption studies (Riemann, Angleitner & Strelau, 1997). Further, it has been suggested trait measures should display a high degree of stability over time (Hong, 1998). Thus, if approach to learning is a trait, it is unlikely to be influenced by environmental factors and consequently could be expected to evidence no changes as a result of different learning environments. However, Biggs (1999, see also Biggs & Rihn, 1984) suggests that while students have a predisposition for either a deep or a surface approach to learning, this is mediated by the learning context the student faces at any given time. Thus, according to Biggs, students can be influenced to adopt either a deep or a surface approach to learning by changing aspects of the learning environment. Biggs (1990) further suggests that the surface approach to learning is more strongly related to situational factors than the deep approach to learning. Thus, Biggs essentially supports the notion of a mixed approach, where, although there is a predisposition for one learning approach over another, there is also an ability to shift to an appropriate learning approach for any given situation. Perhaps this is why Biggs (1987b) suggests that the SPQ should be used “in situ”.
The learning environment can be defined in terms of the curriculum, teaching methods and assessment requirements (Ramsden, 1992). A number of researchers have found that students’ perceptions of the learning environment promote either deep or surface learning. If students perceive that there are clear goals (Trigwell & Prosser, 1991; Wilson et al., 1997), choice (Ramsden & Entwistle, 1981), autonomy (Ramsden et al., 1989) and problem-based learning (PBL) (Mergendoller, Maxwell & Bellisimo, 2000; Newble & Clarke, 1986; Newble & Hejka, 1991), then they are more likely to adopt a deep learning approach. Whereas, the perception of heavy workload (Dahlgren, 1978, 1984; Entwistle, Kozeki & Tait, 1989a, 1989b; Kember & Leung, 1998; Wilson et al., 1997), factually-oriented (Gow & Kember, 1984), reproductive assessment (Berkel, Nuy & Geerligs, 1995; Entwistle & Ramsden, 1983; Thomas & Bain, 1984), overly formal academic department (Ramsden & Entwistle, 1981), focus on information transmission (Gow & Kember, 1993; Kember & Gow, 1994), and little opportunity to pursue subjects in depth (Spencer & Jordan, 1999), are associated with a surface approach to learning. The perception the student has of the learning environment is also considered a major factor in influencing approach to learning (Lee & Lodewijks, 1995). For instance, an enjoyable learning environment has been shown to be related to deep learning (Watkins & Akande, 1993, 1994).

**Stability of approaches to learning.** If approaches to learning are traits, then an individual student’s approach to learning would remain stable, in spite of changes within the environment designed to promote deep learning in students. There have been relatively few studies that have examined the stability of approaches to learning. These studies have taken two forms. Firstly, there have been four longitudinal studies (Coles, 1985; Fox et al., 2001; Tooth et al., 1989; Zeegers, 2001) that have tested one or more cohorts on their approaches to learning across time. Of these studies, Tooth et al. (1989) found an increase in the surface learning of first-year medical students and corresponding decrease in the deep and achieving approaches to learning. This was attributed, in part to the students’ assessment, which rewarded surface rather than deep learning strategies. Further, the reported stress level of students rose significantly over the course of the year, suggesting high levels of stress are
associated with an increase in a surface approach. Similarly, Coles (1985) found an increase in the surface approach to learning of medical students during the first year of study. However, this was more evident for students in a traditional medical programme compared to those in a problem-based learning programme. Zeegers (2001) also found an increase in the surface approach to learning of science students during the first year of study, which subsequently declined by third-year to slightly below the initial level. There was also an initial decline in the deep approach, with a return to the original level by the third year of study. There was also a consistent decline in the achieving approach from the first- to third-year of study. Fox et al. (2001) treated the question of stability differently, using repeated measurement of the SPQ to assess the stability of the factor structure of the instrument, rather than changes in the approaches to learning of students per se (see chapter 2). They suggest that while the factor structure of the instrument is reasonably stable, non-attenuated variance in the factor scores reflected the influence of the environment. Given that Zeegers (2001) is the only researcher, to date, to examine changes in the approaches to learning of students over a multi-year timeframe, it is difficult to draw conclusions on patterns of shifts in approaches to learning over the longer term. However, it is evident from the research to date that there is an increase in the surface approach to learning during the first year of study.

Longitudinal studies are difficult to undertake due to the attrition of participants over time. Perhaps then, this is why researchers have typically adopted a cross-sectional methodology that is concurrently examining a cross-section of students from all years of an undergraduate degree. Two studies (Gow & Kember, 1990; Newble & Clarke, 1986) used such a cross-sectional design to examine the stability of approaches to learning. Gow and Kember (1990) found the deep approach to learning of second-year students was higher than for third-year students. Conversely, Newble and Clarke (1986) found an increase in deep learning for first- and third-year medical students in a problem-based learning programme in comparison to students in a traditional programme. Differences in the results of these two studies may be due, in part, to their respective research designs. Gow and Kember (1990) used the SPQ to examine the approaches to learning of students from different faculties and
different years of study, whereas, Newble and Clarke (1986) used the ASI to examine medical students from different years across different styles of teaching (viz. traditional and problem-based). The potential confounds (viz. students’ personal characteristics, field of study etc.) associated with comparing these studies, perhaps is reflected in the contrasting results.

An innovative feature of the current research programme is the design of a longitudinal study to examine the stability of approaches to learning to compare approaches to learning of students in the first- and third- or final-year of their undergraduate programme. This research will allow direct comparison with Zeegers’s (2001) research undertaken with chemistry students to assess whether the approaches to learning of psychology students provide different results. Secondly, this timeframe was selected, to allow for some comparison with findings from the cross-sectional studies.

The research on the stability of approaches to learning to date suggests perceptions of the learning environment play a role in the approach to learning adopted by the student. Although the shift between deep and surface approaches is not consistent across the studies mentioned, many found significant changes across a given period of time. If, as Biggs (1987a) argues, the approach to learning of an individual is influenced by both personal and situational factors, then either may contribute to changes in approach to learning. For instance, if research had found either a steady incline (or decline) in one of the approaches to learning between year of study, then it could be considered the result of a personal factor, such as age, which on average is higher in the latter years of study. However, the finding of no established pattern of approaches to learning across years of study suggests other factors may be influencing approach to learning. As has been shown in research (Entwistle et al, 1989a, 1989b; Kember & Leung, 1998), the perception of an increased workload, for example, will result in the reported utilisation of surface learning by the majority of students. Thus, available research findings indicate that approaches to learning are subject to situational variation, depending on the year of study and particular learning environment.

Traditional Vs non-traditional learning environments. To investigate the influential nature of situational perceptions, researchers have compared traditional and non-traditional
learning environments. If approaches to learning are traits, changes in the perception of the teaching environment will not influence approaches to learning. However, if approaches to learning are states, changes in the perception of the teaching environment will reflect changes in approaches to learning.

Several researchers (Biggs & Rihn, 1984; Dart & Clarke, 1991; De Volder & De Grave, 1989; Hilliard, 1995; Newble & Clarke, 1986; Sheehan et al., 1992; Vermetten et al., 1999) have compared traditional and non-traditional learning environments to ascertain whether there is a link between teaching method and the fostering of a specific approach to learning. Newble and Clarke (1986) define traditional learning environments as relying on a lecture and tutorial format, with the majority of assessment objective tests undertaken at the end of the course. Non-traditional or problem-based learning environments are defined by small group work, the opportunity for individual study, and have ongoing assessment that is essay-based. Newble and Clarke found medical students within a non-traditional learning environment reported a deeper approach to learning than similar students attending a traditional medical programme. Similarly, Hilliard (1995) found students in a traditional learning environment had higher surface scores than students in a problem-based learning environment.

Much of the research comparing traditional and non-traditional courses has used a between subjects rather than a within subjects design. Methodologically, it is more rigorous to measure the same participants across different environments when the research aim is to compare the two environments, for example traditional and non-traditional learning environments. A between-subjects design uses two different samples of students (between - subjects design), one in a traditional learning environment and the other in a non-traditional environment to ascertain whether the approach to learning found in the different programmes is a result of the teaching method, or whether students who prefer a certain teaching method choose to attend that programme. A more appropriate methodology for this type of research is a within-subjects design where, to continue with the above example, students are concurrently exposed to traditional and non-traditional learning environments in different subjects. Thus, the majority of studies undertaken to compare traditional and non-traditional
learning environments, although useful in broadening the debate surround the stability of approaches to learning, cannot be directly used to ascertain whether approaches to learning are traits or states.

Several studies (Biggs & Rihn, 1984; Dart & Clarke, 1991; De Volder & De Grave, 1989; Kember et al, 1997; Vermetten et al., 1999; Zeegers, 2001) have used a within-subjects design to examine this relationship. Biggs and Rihn (1984), for example undertook a pre- and post-test study of students participating in a study skills training course. Their results suggested small shifts from a surface approach to a deeper approach to learning, at the conclusion of the training course. Dart and Clarke (1991) compared the results of four classes undertaking the same educational course on their pre- and post-test results on the SPQ. Again, this research focussed on the impact of one teaching environment on different students. The results of this study demonstrated the impact different groups of students in interaction with the learning environment could have on approaches to learning. Overall, the students increased their deep motive, achieving strategy, deep approach and deep-achieving approach scores, although the differences were not statistically analysed. Similarly, De Volder and De Grave’s (1989) research focussed on first-year medical students in a problem-based learning environment. The results suggested the approaches to learning of students could be influenced by training in problem-based learning methods, resulting in an increase in meaning orientation and associated decrease in reproducing orientation. Kember et al. (1997) demonstrated through a series of case studies that approaches to learning are changeable, over a period of three years. The results suggested innovative project-based learning encourages the development of deep learning. Vermetten et al. (1999) involved students from different university departments in their research to ascertain what changes in learning occurred over the course of the first year of study. The results demonstrated a shift toward deeper learning, as measured by the Inventory of Learning Styles (ILS), from the beginning to the end of the first year. Finally, Zeegers (2001) undertook a longitudinal study of 200 chemistry students over a period of two and a half years, and found an initial decline in the achieving and deep approaches and an initial increase in the surface approach to learning.
However, there appeared to be little overall change in the surface approach over time, and the deep approach regained its initial position by the end of the programme of study. The achieving approach however, did consistently decline throughout the two and a half years of study.

None of these studies has directly compared traditional and non-traditional or problem-based learning (PBL) teaching environments. Kember et al. (1997), for example, compared two cohorts in a new degree programme with two cohorts from the preceding diploma course and found the students in the new more innovative programme developed into deeper learners over a three-year period. However, directly comparing this result with the results for the remaining students from the diploma course can not be directly compared as suggested by Kember et al. As mentioned above there are a range of potential confounds in conducting between-subjects research designs to measure differences in deep learning across different course structures.

Researchers need to exercise care when attempting to directly compare the deep approach to learning of different groups of students, in different teaching contexts, as the results may vary simply as a function of individual student differences and not because of differences in teaching contexts. To alleviate these problems, research needs to be undertaken using a within-subjects design to directly compare students in traditional and non-traditional teaching environments before it can be determined that either influence approaches to learning. An aim of the current research programme is to ascertain whether when traditional and non-traditional learning environments are compared, the latter will result in deeper learning by the student.

Approaches to learning are not established as either a stable trait or changeable state. As such it is timely to directly compare the same students in these two teaching contexts. This thesis assumes given the research findings that approach to learning varies according to teaching environment (chapter 7). Based on the available research, it is expected that a non-traditional or problem-based learning environment will result in higher deep approach scores than a traditional learning environment and conversely higher surface learning scores will be
evidenced in the traditional learning environment. Thus, it is expected that the SPQ will be sensitive to situational changes in learning styles.

Process Factors

The process component of the 3P model of learning consists of approaches to learning (i.e., deep, surface and achieving). These have been discussed in detail in the first section of this thesis (see chapters 2, 3 and 4). In summary, deep, surface and achieving approaches to learning are each comprised of motive and strategy components. These motives and strategies describe the way in which students undertake learning tasks and their reasons for undertaking these learning tasks. The achieving approach to learning is often combined with the deep and/or surface approaches to learning for two higher-order approaches to learning.

Chapter 3 assessed the psychometric properties of the SPQ. The results of both exploratory and confirmatory factor analyses identified problems in the subscale and scale structures of the SPQ. At the subscale level the deep motive and achieving strategy subscales appear to be the only two subscales that measure a single construct. There are problems associated with the surface motive, achieving motive, surface strategy, and deep strategy subscales (see pp. 86-87). At the scale level there was no support for a three-factor (surface, deep, achieving) model of the SPQ. Overall the results of chapter 3 suggest the higher-order approaches to learning (deep + achieving, surface + achieving) are the most appropriate level at which to use the SPQ. The results of chapter 3 indicated the achieving approach should be combined with the deep approach to learning to form a deep-achieving approach and the achieving motive subscale combined with the surface approach to form a surface-achieving-motive approach (see p. 88). The remainder of this research programme utilises the two higher-order approaches to learning identified in chapter 3.

Product Factors

The final component of the 3P model of learning is the product factors, or more commonly referred to learning outcomes. These factors relate to the interaction between the approach an individual adopts to the learning task influences and their success at learning.
Students using a surface approach tend to acquire detailed information about factual content, but do not integrate this into a cohesive structure (Biggs, 1987a). Conversely, students using a deep approach tend to integrate information into the broader context and conceptualise the meaning underlying the task (Biggs).

Generally, research has focussed on establishing a link between approaches to learning and available outcome measures, usually academic achievement (e.g., grade-point-average (GPA)) (Albaili, 1995; Duckwall et al., 1991; Eley, 1992; Gadzella et al., 1987; Miller et al., 1990; Rose et al., 1996) or the Scholastic Aptitude Test (SAT) (Hall et al., 1995; Rose et al., 1996). Other academic achievement measures examined include exam (Biggs, 1973a, 1973b; Cantwell & Millard, 1994; Clarke, 1986; Hazel et al., 1997; Thomas & Bain, 1984; Tooth et al., 1989) and assignments or essay results (Biggs, 1973b; Thomas & Bain, 1984; Trigwell & Prosser, 1991; van Rossum & Schenck, 1984). As a rule, research on the relationship between approaches to learning and quantitative outcomes indicates a positive relationship for the deep and achieving approaches, and a negative link for the surface approach. Eley (1992) for example, found significant, but relatively weak correlations between GPA and each of the three approaches to learning: deep \( r = .22, p < .01 \), surface \( r = -.23, p < .01 \) and achieving \( r = .35, p < .01 \). However, it would be expected that a GPA heavily weighted by examinations would provide a different result to academic achievement that is more dependent on essay or group based tasks, thus raising again the question as to whether approaches to learning are relational (Prosser & Trigwell, 1999a).

Qualitative learning outcomes relate to the integration of newly learned information with previously learned information and are measured by such instruments as the SOLO taxonomy (Biggs & Collis, 1982b). Research investigating the outcomes of learning has been limited (see Biggs, 1995; 1999; Biggs & Collis, 1982a, 1982b, 1989; Boulton-Lewis, 1994, 1995; Burnett, 1999; Trigwell & Prosser, 1991, 1992; van Rossum & Schenck, 1984). Boulton-Lewis (1994, 1995), in an investigation of assessment and approaches to learning, found a higher SOLO taxonomy level (refer to chapters 2 and 4) corresponded with a higher deep score and, conversely a higher surface score corresponded with a lower SOLO level.
Similarly, Trigwell and Prosser (1991, 1992), utilising the ASI to measure approaches to learning, found students who adopted a deep approach to learning had higher quality learning outcomes than those who adopted a surface approach. Burnett (1999) used an expanded version of the SOLO taxonomy to measure the effectiveness of counselling on clients. The results, while preliminary, indicated that the SOLO taxonomy might be a useful tool for such work.

Finally, affective involvement relates to such factors as the students’ motivation, satisfaction with the course of study and liking for the learning task. Affective learning outcomes differ from the quantitative and qualitative learning outcomes focussing on the students’ feelings, rather than the cognitive outcomes in terms of what was learned. Biggs (1987a) suggests a learning task is successful if the outcome for the student includes positive feedback about the completed task, as well as an understanding of the purpose underlying the learning task. Again, research on the students’ feelings about the course have been relatively limited (Biggs, 1999).

While the three types of learning outcomes examined in this section of the paper are all worthy of consideration, the current thesis will focus on academic achievement as the product variable in the model for two reasons. Firstly, GPA is a substantive measure of a student’s global learning, rather than a class or subject specific measure and as the aim of the final study in this thesis is to test the 3P model of learning for a student’s general, rather than specific approach to learning for any given task, a global measure of learning outcomes was considered most appropriate. Secondly, much more is known about the relationship between GPA and approaches to learning, than about any of the other measures. Thus, it was considered more robust, as well as allowing for direct comparisons with previous research findings on the 3P model.

Summary and Purpose of Section 2 of the Thesis

The preceding literature review suggests that while there has been a considerable amount of work undertaken on the components of the 3P model of learning over the past 30 years, there has been limited work undertaken on the model as a whole. Reasons for this limited
research have been examined. Firstly, until recently there have not been the appropriate statistical tools for undertaking an examination of the model. Secondly, there has been no formula regarding the form the model should take, with Biggs’s providing a range of different versions of the model. Finally, the choice of variables for possible inclusion in the model is vast, and as such requires the researcher to make choices regarding the components of the model. Three researchers (Dart et al., 2000; Drew & Watkins, 1998; Wong & Watkins, 1998) to date have examined the model as a whole, with each of these researchers providing a different answer to the puzzle of how to most effectively investigate the 3P model of learning.

The available research suggests a need for a thorough and systematic examination of the 3P model of learning. Firstly, the stability of approaches to learning needs to be assessed. The first aim of this section is to examine the stability of approaches to learning. An understanding of the stability of approaches to learning is also requisite for examining the impact of perceptions of the learning environment on approaches to learning (see chapter 7). The second aim of this section is to examine whether perceptions of traditional and non-traditional learning environments influence the adoption of different approaches to learning. A unique feature of this study is a within-subjects design, where students concurrently enrolled in traditional and non-traditional subjects, complete the SPQ for both learning environments. Such a methodology limits potential confounds associated with individual differences.

Thirdly, an examination of the research on the relationship between personal characteristics and approaches to learning provides a broad range of variables for inclusion in an analysis of the 3P model of learning (see chapter 8). As such, the third aim of this section is to examine a range of personality and demographic variables to ascertain which the most appropriate variables for inclusion in a systematic analysis of the 3P model of learning.

Finally, a version of the 3P model of learning based on the findings of the previous studies in this thesis will be tested. Two versions of the model will be assessed to reflect the second- and third-order structures of the SPQ (see chapter 9). Such an examination of the model has not been undertaken to date.
CHAPTER 6

THE STABILITY OF APPROACHES TO LEARNING

Overview

There is an ongoing debate as to whether deep and surface learning are stable traits (Eley, 1992; Schmeck, 1983; Svensson, 1977; Thomas & Bain, 1982), changeable states (Marton & Saljo, 1976b) or some combination of the two (Biggs, 1999; Entwistle et al., 1979; Kember & Gow, 1989; Kember et al., 1997). As discussed in chapter 5, research on the stability of approaches to learning has been limited. Six studies to date have examined the stability of the SPQ, and of these, four have used a longitudinal research design (Coles, 1985; Fox et al., 2001; Tooth et al., 1989; Zeegers, 2001) and two a cross-sectional design (Gow & Kember, 1990; Newble & Clarke, 1986). Coles (1985) and Tooth et al. (1989) found an increase in the surface approach to learning from the beginning to the end of first year of study for medical students. Zeegers (2001) found a similar result for first year science students, but this subsequently decreased to just below the initial level by third-year. Fox et al. (2001) tested a short-form of the SPQ using path analysis over a period of seven years. The results of their study suggested, in accordance with Biggs (1999) that approaches to learning are partially stable and partially influenced by environmental factors over the years of a degree programme, in this instance medicine. The cross-sectional studies provided mixed results. Gow and Kember (1990) found the deep approach to learning peaked in the second year of study, whereas Newble and Clarke (1986) found the opposite with the deep approach to learning being higher in both the first- and third-year cohorts. Based on the results of the previous studies, it was considered of interest in the current thesis to assess the relative position of students’ approaches to learning over the course of their degree programme in psychology.

The purpose of the present study is to analyse the stability of approaches to learning as measured by the SPQ to establish whether approaches to learning are stable traits or changeable states over a period of two years and eight months. As indicated by previous research (see chapter 2) and the results of chapter 3, there is a need to examine the stability of
approaches to learning at three levels (viz. motive/strategy, approaches, and higher-order approaches). It is expected that:

H6.1. There will be significant differences between the means of the subscales (i.e., motive/strategy), scales (deep, surface, achieving) and higher order scales (deep achieving and surface-achieving-motive) between the administrations of the SPQ undertaken two years and eight months apart.

Method

Participants

Eighty-seven first-year psychology students (22 male, 65 female) volunteered to participate in the study as a partial requirement for course credit (Time 1). After two and a half years in their degree programme, the same students were approached to complete the SPQ as a component of their in-class activities (Time 2). Sixty-four third year students (19 male, 45 female), representing 73.6 percent response rate from Time 1, volunteered to participate in the Time 2 administration. These same 64 students were then approached and volunteered to participate three months later in the Time 3 administration. Ten students were recruited to complete a follow-up questionnaire after their graduation from the fourth year of the degree programme (Time 4). Three responded to the questionnaire. The age of participants ranged from 17 to 47, with a mean age of 26 (SD = 9.16) at Time 1, from 19 to 54, with a mean age of 26.49 (SD=8.74) at Time 2 and from 21 to 35, with a mean age of 26 (SD = 7.81). Demographic information was not collected at Time 3 or Time 4. The students participating in this study were all from English speaking backgrounds and were Australian by birth.

Materials

In all instances students completed a questionnaire package that included the SPQ and demographic information such as age and gender. A copy of the SPQ and the demographic questions are included in the appendix (Appendix A). The students participating after graduation were also asked to complete a range of qualitative questions, initially asked of students during the first year of their degree programme (see Appendix B).
Procedure

For the Time 1 administration, first-year students were contacted in their first week of university study. Students were asked to complete the SPQ during lecture time or to return it to the university within a week (Time 1). Students were asked to include their name on the survey if they wished to be contacted for further participation. They were informed that they could choose to remain anonymous if they wished. Kember and Gow (1991) examined the effect of identifiability on responses to the SPQ and found no significant differences for these students on the means of the SPQ scales and subscales. Further, there were no apparent differences in the factor structure of the SPQ for anonymous and identifiable samples. Students were informed participation in the research was voluntary and they could stop their involvement at any stage of the project. They were further informed no one outside of the research team would be provided with any identifying information for any of the participants.

For the Time 2 administration, this same cohort of students was again asked to participate in the research in their third year of study. The students completed the SPQ again as an in-class activity after two and a half-years in their degree programme. The students were asked to complete the questionnaire at both the beginning (Time 2) and end of semester (Time 3), approximately 12 weeks apart. Again students were informed that participation was voluntary.

Of these students, the remaining 10 students who had enrolled in a fourth year of study and had completed all three previous administrations of the SPQ in years one and three were asked to participate in a further follow-up study at the completion of their degree. Only three of the potential ten students responded to this follow-up request. Therefore, this data was qualitatively analysed as part of the research programme.

Results and Discussion

Internal Consistency – Cronbach’s Alpha

Prior to examining the stability of the SPQ, the internal consistency of the SPQ was assessed using Cronbach’s alpha via the SPSS program SCALE (Norusis, 1998). The alpha coefficients for the three administrations of the SPQ are displayed in Table 6.1.
Table 6.1
*Cronbach’s alpha coefficients for the subscales and scales of the SPQ*

<table>
<thead>
<tr>
<th>Subscale</th>
<th>1st administration (α)</th>
<th>2 ½ years (α)</th>
<th>2 years 8 months (α)</th>
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<tr>
<td>Surface Motive</td>
<td>.49</td>
<td>.67</td>
<td>.60</td>
</tr>
<tr>
<td>Surface Strategy</td>
<td>.67</td>
<td>.72</td>
<td>.79</td>
</tr>
<tr>
<td>Deep Motive</td>
<td>.53</td>
<td>.56</td>
<td>.69</td>
</tr>
<tr>
<td>Deep Strategy</td>
<td>.78</td>
<td>.78</td>
<td>.84</td>
</tr>
<tr>
<td>Achieving Motive</td>
<td>.71</td>
<td>.77</td>
<td>.73</td>
</tr>
<tr>
<td>Achieving Strategy</td>
<td>.77</td>
<td>.72</td>
<td>.71</td>
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<table>
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<tbody>
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<td>.81</td>
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</tr>
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<td>.81</td>
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<td>.79</td>
<td>.77</td>
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<td>.78</td>
<td>.84</td>
<td>.81</td>
</tr>
<tr>
<td>Deep-Achieving</td>
<td>.87</td>
<td>.81</td>
<td>.82</td>
</tr>
</tbody>
</table>
For the first data collection (Time 1), the results indicated Cronbach’s alpha coefficients ranging from .49 on the surface motive subscale to .78 on the deep strategy subscale and from .72 on the surface scale to .81 on the deep scale. For the second data collection (Time 2) the results indicated Cronbach’s alpha coefficients ranging from .60 on the surface motive subscale to .84 on the deep strategy subscale and from .76 on the surface scale to .86 on the deep scale. Finally the results for the third administration (Time 3) indicated Cronbach’s alpha coefficients ranging from .56 on the deep motive subscale to .78 on the deep strategy subscale and from .79 on the achieving scale to .81 on the surface scale. These findings indicate moderate to high levels of internal consistency for both the subscales and scales of the SPQ. An interesting pattern within the results was that the deep and surface motive subscales were consistently lower than the associated strategy subscales. This pattern of results highlights a phenomenon found in an earlier study (see chapter 4), where it was apparent that students are more adept at understanding the tangible strategies they use for completing tasks than the intrinsic motives they have for learning.

The higher-order scales surface-achieving-motive and deep-achieving were consistently high across both administrations. The reliability of the surface-achieving-motive scale increased slightly, the deep-achieving scale decreased slightly across administrations of the SPQ. Overall though there was less variability at the higher-order scale level than at either the subscale or scale level. The Cronbach’s alpha coefficients are in a similar range to previous studies conducted on the SPQ (see chapter 2).

**Stability of the Study Process Questionnaire**

There has been limited research to assess whether approaches to learning are stable traits or changeable states. The aim of this study was to assess the relative stability of approaches to learning between the first- and third-years of an undergraduate degree using a longitudinal sample of students.

Exploration of any differences between the first and third administrations of the SPQ was undertaken to examine whether there had been any significant changes in the means of the scores on the scales and subscales over the period of two years and eight months. Three one-
way repeated measures multivariate analysis of variance analyses were conducted on the data using the SPSS programme MANOVA (Norusis, 1998). There were no univariate or multivariate within-cell outliers at p < .001. Results of evaluation of assumptions of normality, homogeneity of variance - covariance matrices, linearity, and multicollinearity were satisfactory. As a component of these analyses eta squared ($\eta^2$) values were calculated for all significant results to ascertain the strength of association and to assist in the interpretability of the results, as significance alone only suggests there are differences between the groups under consideration (Tabachnick & Fidell, 2001). A weak relationship is indicated by a low $\eta^2$ value of .2 or less, a moderate relationship by an $\eta^2$ of .5 and strong relationship by a high of $\eta^2$.7 or more. The means and standard deviations for the deep and surface subscale and scale scores for the two administrations of the SPQ can be found in Table 6.2.

**Stability of the SPQ Subscales**

The first MANOVA was performed on the subscales for two administrations of the SPQ conducted two years and eight months apart (i.e., Students in year 1 and again in year 3 of their degree). The dependent variables were surface motiveT1, surface motiveT3, surface strategyT1, surface strategyT3, deep motiveT1, deep motiveT3, deep strategyT1, deep strategyT3, achieving motiveT1, achieving motiveT3, achieving strategyT1, and achieving strategyT3. The independent variable was time between administrations of the SPQ. There was a strong and significant main effect for time on the scales of the SPQ: $F (12, 52) = 718.56, p < .001, \eta^2 = .99$. Univariate t-tests revealed significant differences for mean scores on the surface strategy subscale ($p = .037$) and the achieving strategy subscale ($p = .008$), but not for either of the deep subscales (deep strategy, deep motive) or for the surface motive or achieving motive subscales. During the period between the first and second administrations of the SPQ: the mean scores decreased for the surface strategy subscale from 21.53 (surface strategy1) to 20.25 (surface strategy3); and for the achieving strategy subscale from 23.75 (achieving strategy1) to 21.58 (achieving strategy3). The results suggest that while students
Table 6.2
*Means and standard deviations for the two administrations of the SPQ.*

<table>
<thead>
<tr>
<th>Subscale</th>
<th>First Administration (Time 1)</th>
<th>Second Administration (Time 3)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>X</td>
<td>SD</td>
</tr>
<tr>
<td>Surface Motive</td>
<td>23.09</td>
<td>4.38</td>
</tr>
<tr>
<td>Surface Strategy</td>
<td>21.53</td>
<td>4.85</td>
</tr>
<tr>
<td>Deep Motive</td>
<td>24.66</td>
<td>4.37</td>
</tr>
<tr>
<td>Deep Strategy</td>
<td>24.03</td>
<td>4.63</td>
</tr>
<tr>
<td>Achieving Motive</td>
<td>23.48</td>
<td>5.04</td>
</tr>
<tr>
<td>Achieving Strategy</td>
<td>23.75</td>
<td>5.41</td>
</tr>
<tr>
<td>Scale</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Surface</td>
<td>44.63</td>
<td>7.99</td>
</tr>
<tr>
<td>Deep</td>
<td>48.69</td>
<td>8.35</td>
</tr>
<tr>
<td>Achieving</td>
<td>47.23</td>
<td>8.66</td>
</tr>
<tr>
<td>Surface-Achieving-motive</td>
<td>95.92</td>
<td>10.97</td>
</tr>
<tr>
<td>Deep-Achieving</td>
<td>68.11</td>
<td>15.42</td>
</tr>
</tbody>
</table>
report using fewer surface and achieving strategies toward the end of their undergraduate degree, there was no corresponding increase in the utilisation of deep strategies. The results partially support the hypothesis that there would be changes in students’ approaches to learning over time.

*Stability of the SPQ Scales*

A second MANOVA was conducted on the scales for two administrations of the SPQ conducted two years and eight months apart. The dependent variables were surfaceT1, surfaceT3, deepT1, deepT3, achievingT1, and achievingT3. The independent variable was time between administrations of the SPQ. Again there was a strong and significant main effect for time on the scales of the SPQ: $F(6, 58) = 1511.84$, $p < .001$, $\eta^2 = .99$. Univariate t-tests revealed a significant difference for mean scores on the achieving scale ($p = .019$), but not for either the deep or surface scales. The mean score for the achieving scale decreased from 47.23 (achieving1) to 44.03 (achieving3) during the period between the first and second administrations of the SPQ. Again this result offers partial support to the hypothesis, and suggests deep and surface approaches, but not the achieving approach to learning, are stable over two years and eight months.

*Stability of the Higher-Order SPQ Scales*

A third MANOVA was undertaken on the higher-order scales for the two administrations of the SPQ conducted two years and eight months apart. The dependent variables were surface-achieving-motiveT1, surface-achieving-motiveT3, deep-achievingT1, and deep-achievingT3. The independent variable was time between administrations of the SPQ. While a strong significant main effect for time on the scales of the SPQ was revealed $F(1, 63) = 268.71$, $p < .001$, $\eta^2 = .81$, univariate t-tests revealed no significant differences for mean scores on either surface-achieving-motive or deep-achieving. The results of this analysis were not as expected, suggesting no difference over time for either of the higher-order scales of the SPQ.
The results of the current study are mixed. Approaches to learning appear to change to some extent over the course of a degree programme. In particular self-reported use of the surface strategy and achieving strategy subscales and the achieving approach to learning appear to decrease between the first and third years of an undergraduate degree programme in psychology. These findings have some similarity with Zeegers (2001), who found a decrease in the achieving approach over a period of three years in a science degree programme, but relative stability in the deep and surface approaches to learning. Fox et al. (2001) also found stability in the deep and surface approaches across seven years in a medical degree programme.

In contrast, findings from the cross-sectional studies suggest apparent shifts between the deep and surface approaches to learning between the first and third years of study. This was only apparent at the subscale level of analysis in the present study. In the present study there was a decrease in the reported use of surface strategies from first- to third-year of study. Newble and Clarke (1986) also found the surface approach to learning decreased between the first and third year of study. However, they also found a corresponding increase in the deep approach to learning that was not evident in the present study. Gow and Kember (1990) also found the deep approach to learning, increased from first- to second-year, but then fell during the third year of study. They also found older students reported fewer surface strategies and motives than younger students. Newble and Clarke (1986) found some increase in one of the achieving approach subscales on the ASI (negative attitudes to studying) from first to third year; however, using the SPQ, Gow and Kember (1990) found the achieving approach to learning subscales declined from first to third year, as did the results of the present study.

Of interest to the present study is the relative stability of the deep-achieving and surface-achieving-motive higher-order approaches to learning. As discussed in chapter 3, using CFA the higher-order approaches to learning provided a better model fit than either the scale or subscale approaches to learning. There is obviously a need for further research to examine the stability of these higher-order approaches to learning as this has not been undertaken in previous research. At the same time there is a need to continue to examine approaches to
learning at the scale and subscale level of analysis. For instance, the results of Cole (1985) and Tooth et al. (1989) suggest changes occur in the first year of study. There is evidently a need for further research, especially longitudinal, on the reported use of approaches to learning by students.

There are various different ways of interpreting the present results. For example, if the viewpoint of the relational theorists (see Prosser & Trigwell, 1999a, 199b) is considered, research of this type is inappropriate because it does not take perceptions of the learning environment into account, and thus should not be expected to provide insight into changes in approaches to learning. If, on the other hand, Biggs’s (1987a) model of 3P learning is used to interpret the findings of this study, it would seem that the maturity of students in the final year of their degree should influence their self-reported approaches to learning.

**Anecdotal Evidence on Changes in Approaches to Learning**

The three students who completed a final questionnaire package after the completion of their degree programme highlight the increased maturity level of fourth year students and provide some insight into the development of an understanding of approaches to learning in students. In response to the question “How do/did you go about writing assignments?” these students displayed limited awareness of their approaches to learning in their first year. While more articulate regarding the process of writing an assignment after the completion of their studies, the general approach to the task did not appear to differ compared to their original approach. An examination of the responses of these three students is included in appendix D.

While no strong conclusions can be based on the findings of three students, their comments suggest certain patterns that warrant further investigation. For instance, it is possible that students are more able to articulate their approach to writing an assignment as they develop academically. For these students, there was an increased awareness of the role of their friends as a resource after the completion of their degree, and a general acknowledgement that their approach to writing assignments was not those of the archetypal model student. Two research questions arise from this pattern. Firstly, research on the role of peers in the learning process needs to ascertain whether students are aware of the importance
to their learning of their peers earlier in their studies, or whether students consider it
inappropriate to be seen to be collaborating with their friends. Fears of allegations of
plagiarism and collusion may inhibit students from working collectively. Research needs to
examine whether students understand the role of peer learning, and if so why do they appear
to minimise this role. Secondly, as the written responses of these three students displayed
almost no change in their underlying choice of learning strategies used in writing
assignments, then perhaps the conjecture that students are more articulate regarding their own
behaviours at the completion of their studies has merit. Of course, this may be an anomaly,
particular to psychology students, where much of their study involves increasing their self-
awareness. Research will need to be undertaken to ascertain whether this phenomenon occurs
across different fields of study.

**Summary of Strengths and Limitations of the Present Study**

A particular strength of the present study was the longitudinal research design, utilising a
single cohort of psychology students. As discussed in chapter 5, there are potential confounds
associated with a cross-sectional research design to examine the stability of approaches to
learning, such as individual differences, the nature of the coursework being undertaken, and
the group dynamics of the cohort. These confounds may mask any real changes in
approaches to learning. A second strength of the present study was the choice of psychology
students. Previous research on the stability of approaches to learning has generally focussed
on medical, or more recently science students. As suggested by the cross-sectional studies
undertaken by Newble and Clarke (1986), Gow and Kember (1990) and by Biggs (1987a),
faculty differences can influence approaches to learning. As such there is a need to undertake
research with students from different academic disciplines. A third strength of the present
study was the inclusion of the higher-order approaches to learning, as previous research has
tended to focus on the scale and subscale approaches to learning. As the higher-order factors
appear to be gaining credence with researchers (see Kember & Leung, 1998; Sachs & Gao,
2000; Wong et al., 1996) it is important that research into other aspects of approaches to learning includes this level of analysis.

A potential limitation of the current study was the choice of a two year and eight month interval between testing students. A more rigorous methodology would have been to test the participants over an increasing time schedule. However, this is difficult to undertake when a homogeneous sample of students is the subject of the study. As the attrition rate of the current study was 26 percent, it is possible that increasing the amount of testing would have resulted in fewer complete results for the study. Further, as, by design, the study was limited to a single cohort, the maximum number of initial participants could not be increased to accommodate possible larger attrition rates. An associated limitation of the current study is the choice of a homogeneous sample as discussed in chapter 3.

The results of the present study and previous longitudinal research (Fox et al., 2001; Zeegers, 2001) suggest the self-reported use of deep and surface approaches to learning are relatively stable between the commencement of the first year of study and the conclusion of the third year of study. The results of this study indicate that the achieving approach to learning decreases between the first- and third-year of study for psychology students. There is also some indication that the surface strategies utilised between the first- and third-year of study decreases. While more research is evidently needed to assess the stability of approaches to learning, the results of this study suggest that the deep and surface approaches to learning can be considered relatively stable, and as such can be used with confidence in research on approaches to learning where there is a need to assess the influence of other factors, such as perceptions of the learning environment, on approaches to learning.
CHAPTER 7
ENVIRONMENTAL INFLUENCES ON APPROACHES TO LEARNING

Overview

The context in which learning occurs has been identified as influencing learning by many researchers (Biggs, 1970a; Biggs, Fitzgerald & Atkinson, 1971; Busato, Prins, Elshout & Hamaker, 1998; Ferguson-Hessler & de Jong, 1993; Tynjala, 1997). Biggs (1987a, 1999) identifies the teaching-learning environment as a presage factor in the 3P model of learning. Others, such as Prosser and Trigwell (1999a) and Meyer and Watson (1991), have suggested the teaching-learning environment needs to be understood within the context of the role played by study orchestration in the understanding of approaches to learning.

One means of examining whether approaches to learning are situationally sensitive (i.e., that approaches are relational) has been for researchers to explore whether students’ approaches to learning adopted within different learning environments differ significantly. Much of the research on the supposed changeability of approaches to learning has utilised a between-subjects research design to directly compare students enrolled in a traditional degree programme with students enrolled in a non-traditional degree programme (for example, Hilliard, 1995; Newble & Clarke, 1986; Sheehan, et al., 1992; Vermetten et al., 1999).

Traditional learning environments refer to those courses that use a lecture tutorial format and have predominantly exam and essay-based assessment. Whereas, non-traditional learning environments use a combination of small group work and problem-based learning activities designed to create an interactive learning environment (Prosser & Trigwell, 1999a). While both the traditional and non-traditional subjects involved teacher-student and student-student interaction, the non-traditional subject involved an additional number of interactive features, namely self-managed learning groups, participant workshops, and staff-student consultation on an action project. Not surprisingly, the results of these studies found students in a traditional learning environment reported higher surface approach to learning scores than those in a non-traditional learning environment, and, conversely those students in the non-
traditional environment reported higher deep scores than those in the traditional environment. The results of these studies, however, provide little information about whether approaches to learning are stable traits or changeable states, because they do not directly compare the same students in different learning environments. Further, students were not matched on age or gender, so potential differences associated with these demographic variables are not accounted for in these studies. It is feasible that the above mentioned studies may be confounded, as students who are predisposed to utilise deep learning strategies may apply to study in less traditional programmes. Therefore, it may be this predisposition, rather than the teaching methods employed, that are actually reflected in the findings of this research.

A more rigorous methodology for answering research questions of this nature is to utilise a within-subjects research design. Few studies have utilised such a research design to examine approaches to learning (for example, de Volder & de Grave, 1989; Kember et al., 1997). However, the majority of this research has tended to focus on the usefulness of a range of teaching skills programmes (for example, Dart & Clarke, 1991) in changing approaches to learning, rather than directly comparing students concurrently undertaking courses utilising traditional and non-traditional teaching methods within the one degree programme.

The purpose of the present study is to ascertain whether approaches to learning shift as a result of differences in the teaching-learning environment utilising a within-subjects research design. If differences in approaches to learning are reported between the traditional and non-traditional learning environments, then support is offered for the view that approaches to learning must be considered to be changeable states. In accord with previous findings in the literature it is expected that:

H7.1. Non-traditional teaching environments, compared to traditional teaching environments will result in a significant decrease in students’ surface subscale scores (surface motive and surface strategy).
H7.2. Non-traditional teaching environments, compared to traditional teaching environments will result in a significant decrease in students’ surface scale scores (surface and surface achieving motive).

H7.3. Non-traditional teaching environments, compared to traditional teaching environments will result in a significant increase in students’ deep subscale scores (deep motive and deep strategy).

H7.4. Non-traditional teaching environments, compared to traditional teaching environments will result in a significant increase in students’ deep scale scores (deep and deep-achieving).

H7.5. Surface learners (i.e., students who report generally greater use of surface approaches to learning), compared to deep learners, will significantly increase their deep strategy and deep motive scores for learning in the non-traditional teaching environment.

H7.6. Surface learners (as above), compared to deep learners will significantly increase their deep approach and deep-achieving approach scores for learning in the non-traditional teaching environment.

Method

Participants

Forty-eight third-year psychology students (male = 10, female = 38) volunteered to participate in the study. These students were selected on the basis of their concurrent enrolment in both traditional and non-traditional subjects (teaching environments) in the same semester of study. The age of the participants ranged from 19 to 54 years, with a mean age of 26.29 years (SD = 9.06 years). The students participating in this study were all from English speaking backgrounds and were Australian by birth.

Materials

The SPQ was used to measure students’ self-reported approaches to learning at the beginning and end of the semester. In the pre-test, students were asked to complete the SPQ for their “general approach to learning”. In the post-test students were asked to complete the
SPQ twice, reporting on their approach to learning in the traditional subject and secondly on their approach in the non-traditional subject. Both the traditional and non-traditional subjects were chosen based on several criteria related to their teaching environment. Table 7.1 provides a summary of the differences in structure and teaching methods between the traditional and non-traditional subjects. The two versions of the SPQ utilised in the present study can be found in the appendices (Appendix E).

_Procedure_

A baseline measure of approach to learning was taken in the first week of the semester (i.e., pre-test measure), with students completing the SPQ in a lecture. Students were informed participation in the research was voluntary and they were able to discontinue their participation at any stage of the project. Students were asked to provide their name if they were comfortable doing so, in order to match their pre- and post-test data. All students were willing to provide their names. It should be noted that, Kember and Gow (1991; see also Biggs 1987a) found that providing responses that were not anonymous did not significantly influence either the means or factor structure of the SPQ. Students also completed questionnaires in the final week of classes (i.e., post-test measure).

The SPQ was used to measure students’ self-reported approaches to learning at the beginning and end of the semester. In the pre-test, students were asked to complete the SPQ for their “general approach to learning”. In the post-test students were asked to complete the SPQ twice, reporting firstly on their approach to learning in the traditional subject, and secondly on their approach to learning in the non-traditional subject.

Both the traditional and non-traditional subjects were chosen based on several criteria related to their teaching environment. Table 7.1 provides a summary of the differences in structure and teaching methods between the traditional and non-traditional subjects. The two versions of the SPQ utilised in the present study can be found in the appendices (Appendix E). It should also be noted that all lectures in the traditional subject were presented by a
Table 7.1

*Structure and teaching methods for traditional and non-traditional subjects.*

<table>
<thead>
<tr>
<th>Subject components</th>
<th>Traditional</th>
<th>Non-traditional</th>
</tr>
</thead>
<tbody>
<tr>
<td>Structure</td>
<td>3 hour lecture/week</td>
<td>4 hours lectures/workshops each week</td>
</tr>
<tr>
<td></td>
<td>1 hour tutorial/week</td>
<td>25 hours field work undertaken in small groups</td>
</tr>
<tr>
<td>Teaching methods</td>
<td>Didactic lectures</td>
<td>Interactive lectures/workshops</td>
</tr>
<tr>
<td></td>
<td>Tutorials</td>
<td>Field work</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Self-managed learning teams</td>
</tr>
</tbody>
</table>
single person, while the tutorials for the traditional classes were conducted by a team of three staff, including the lecturer. The non-traditional subject was facilitated by a different team of three staff. The present study does not take into account the potential confound of differing personalities and/or teaching styles of lecturing staff.

Results

The internal consistency of the SPQ was assessed using the SPSS programme SCALE (Norusis, 1998). Cronbach’s alpha for the three administrations of the SPQ were calculated and are displayed in Table 7.2. Cronbach’s alpha coefficients for the pre-test scales ranged from .78 (achieving) to .85 (deep), and for the subscales from .58 (surface motive) to .82 (deep strategy). Alpha coefficients for the post-test scores for the traditional course ranged from .78 achieving) to .81 (deep) for the scales and from .56 (deep motive) to .78 (deep strategy) for the subscales. Finally, the alpha coefficients for the post-test scores for the non-traditional course ranged from .48 (surface) to .86 (deep) for the scales and from .20 (surface motive) to .82 (deep strategy) for the subscales.

The means and standard deviations for the deep and surface subscale and scale scores for the three administrations of the SPQ can be found in Table 7.3. The use of third-order approaches to learning (deep-achieving, surface-achieving-motive) was based on the results of the confirmatory factor analysis (see chapter 3), indicating this was the most appropriate structure of the SPQ for further analysis. The mean difference scores were calculated for the pre-test and the post-test scores for the traditional subject. Similarly the mean difference scores between the pre-test and the post-test for the non-traditional subject were also calculated. These mean difference scores formed the basis of the following analyses.
Table 7.2

*Reliability data for three administrations of the SPQ*

<table>
<thead>
<tr>
<th></th>
<th>Pretest</th>
<th>Traditional</th>
<th>Non-traditional</th>
</tr>
</thead>
<tbody>
<tr>
<td>Surface</td>
<td>.58</td>
<td>.67</td>
<td>.20</td>
</tr>
<tr>
<td>Deep</td>
<td>.68</td>
<td>.56</td>
<td>.68</td>
</tr>
<tr>
<td>Achieving</td>
<td>.70</td>
<td>.77</td>
<td>.75</td>
</tr>
<tr>
<td>Surface Motive</td>
<td>.79</td>
<td>.72</td>
<td>.64</td>
</tr>
<tr>
<td>Deep Motive</td>
<td>.82</td>
<td>.78</td>
<td>.82</td>
</tr>
<tr>
<td>Achieving Motive</td>
<td>.75</td>
<td>.72</td>
<td>.74</td>
</tr>
<tr>
<td>Surface Strategy</td>
<td>.79</td>
<td>.81</td>
<td>.48</td>
</tr>
<tr>
<td>Deep Strategy</td>
<td>.85</td>
<td>.80</td>
<td>.86</td>
</tr>
<tr>
<td>Achieving Strategy</td>
<td>.78</td>
<td>.78</td>
<td>.79</td>
</tr>
</tbody>
</table>
Table 7.3

*Means and standard deviations for three administrations of the SPQ.*

<table>
<thead>
<tr>
<th></th>
<th>Pretest</th>
<th>Traditional Subject</th>
<th>Non-traditional Subject</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>X</td>
<td>SD</td>
<td>X</td>
</tr>
<tr>
<td>Surface motive</td>
<td>22.19</td>
<td>4.67</td>
<td>18.65</td>
</tr>
<tr>
<td>Surface strategy</td>
<td>19.98</td>
<td>5.62</td>
<td>21.02</td>
</tr>
<tr>
<td>Deep motive</td>
<td>25.08</td>
<td>5.16</td>
<td>25.40</td>
</tr>
<tr>
<td>Deep strategy</td>
<td>24.52</td>
<td>4.87</td>
<td>24.10</td>
</tr>
<tr>
<td>Surface</td>
<td>42.17</td>
<td>9.26</td>
<td>39.67</td>
</tr>
<tr>
<td>Deep</td>
<td>49.60</td>
<td>9.41</td>
<td>49.50</td>
</tr>
<tr>
<td>Surface Achieving motive</td>
<td>64.75</td>
<td>12.37</td>
<td>60.79</td>
</tr>
<tr>
<td>Deep Achieving</td>
<td>94.56</td>
<td>13.87</td>
<td>92.23</td>
</tr>
</tbody>
</table>
A series of repeated measures MANOVA's were conducted on the data to examine the hypotheses of interest. There were no univariate or multivariate within-cell outliers at \( p < .001 \). Results of evaluation of assumptions of normality, homogeneity of variance – covariance matrices, linearity, and multicollinearity were all satisfactory.

**Surface Approach to Learning**

The surface subscales were analysed using 2 x 2 repeated measures MANOVA (GLM – Norusis, 1998). The dependent variables were the SPQ surface approach subscale difference scores (surface motive, surface strategy) and the independent variable was subject participation (traditional, non-traditional). The multivariate F was significant, \( F(2,46) = 21.00, p< .001, \eta^2 = .48 \), indicating the combined dependent variables (surface motive and surface strategy) had a moderate significant relationship, and were affected by subject participation. Univariate analyses revealed a weak significant result for surface strategy \( F(1, 47) = 42.81, p<.001, \eta^2 = .18 \) and a non-significant result for surface motive \( F(1, 47) = .01, p> .05 \). This finding suggests that the surface strategy subscale was significantly affected by course participation, while surface motive was not. An examination of the means indicated that scores on surface strategy were significantly lower in the non-traditional subject (see Table 7.3). This result offers only limited support to hypothesis 7.1, as the strength of the relationship for surface strategy across the two teaching environments was weak.

The surface scales were also analysed using a 2 x 2 repeated measures MANOVA (GLM – Norusis, 1998). The dependent variables were the SPQ surface approach scale difference scores (surface, surface-achieving-motive) and the independent variable was subject participation (traditional, non-traditional). The multivariate F was significant, \( F(2,46) = 5.08, p< .05, \eta^2 = .18 \) revealing a weak significant relationship affected by subject participation. Univariate analyses revealed a weak significant result for the third-order surface-achieving-motive scale \( F(1, 47) = 6.23, p< .05, \eta^2 = .12 \), and a non-significant result for the second order surface approach \( F(1, 47) = 1.98, p> .05 \). This suggests the combined surface-achieving-motive scale was affected by course participation but the surface scale by
itself was not, with means indicating that scores on surface-achieving-motive were significantly lower in the non-traditional subject (see Table 7.3). Again, the results of this MANOVA offer only limited support to hypothesis 7.2, as the strength of the relationship for surface-achieving-motive across the two teaching environments while significant, was weak.

Deep Approach to Learning

The deep subscales were again analysed using 2 x 2 repeated measures MANOVA (GLM – Norusis, 1998). The dependent variables were the SPQ deep approach subscale different scores (deep motive, deep strategy) and the independent variable was subject participation (traditional, non-traditional). The multivariate F was not significant, F (2, 46) = 1.83, p> .05, indicating the combined dependent variables (deep motive and deep strategy) were not significantly affected by subject participation. Thus, hypothesis 7.3 was not supported.

The deep scales were analysed using a 2 x 2 repeated measures MANOVA (GLM – Norusis, 1998). The dependent variables were the SPQ deep approach scale difference scores (deep, deep-achieving) and the independent variable was the subject participation (traditional, non-traditional). The multivariate F was significant, F (2,46) = 12.64, p< .001, \( \eta^2 = .36 \), indicating the combined dependent variables (deep, deep achieving) had a moderate significant relationship and were affected by subject participation. Univariate analyses however revealed non-significant results for deep F (1, 47) = 3.53, p>.05, and for deep-achieving F (1, 47) = .05, p>.05. This suggests that while there was main effect between the combined deep and deep-achieving approaches to learning between the traditional and non-traditional subjects, these were not significant when examined separately. This result offers limited support to hypothesis 7.4.

Differences between Deep and Surface Learners

Two further 2 x 2 MANOVA’s were performed to examine whether the shifts in learning were similar across deep and surface learners. Pre-test scores for deep and surface approaches were used to identify deep and surface learners. Participants whose surface score was higher than their deep score were classified as surface learners. Conversely, participants
with a higher deep score were classified as deep. Of the 48 participants in the current study, 15 were classified as surface, 32 as deep and one was unclassified (equal scores on deep and surface). Tabachnick and Fidell (2001) state that if the sample is unequal and the Box’s M test is significant at $p < .001$, then the robustness of the analysis can not be guaranteed.

The first $2 \times 2$ MANOVA was conducted on the deep subscales. The dependent variables were the SPQ deep approach subscale difference scores (deep motive, deep strategy) calculated for the non-traditional subject. The between subjects independent variable was learner approach (deep, surface). The Box’s M test for this analysis was not significant, $F (3, 16433) = 2.47, p > .05$, thus the analyses could be performed. The multivariate $F$ was significant, $F (4, 88) = 7.41, p < .001$, $\eta^2 = .25$, indicating surface learners, compared to deep learners, significantly increased their deep subscale scores. Univariate tests revealed moderate significant results for both deep motive $F (2, 45) = 15.18, p < .001$, $\eta^2 = .40$ and for deep strategy $F (2, 45) = 13.27, p < .001$, $\eta^2 = .37$, suggesting surface learners had a greater shift in their deep motive and deep strategy utilised in the non-traditional subject compared to the deep learners. Thus hypothesis 7.5 was supported.

The second $2 \times 2$ MANOVA was conducted on the deep scales. The dependent variables were the SPQ deep approach scale difference scores (deep, deep achieving) for the non-traditional subject. The between subjects independent variable was learner approach (deep, surface). The Box’s M test for the second repeated measures MANOVA was not significant $F (3, 16433) = 1.93, p > .001$, thus the analyses could be performed. The multivariate $F$ was significant, $F (4, 88) = 9.92, p < .001$, indicating surface learners significantly increased their deep scale scores compared to deep learners. Univariate tests revealed a moderate significant result for deep $F (2, 45) = 17.39, p < .001$, $\eta^2 = .44$ and a weak significant result for deep-achieving approach scores $F (2, 45) = 3.77, p < .05$, $\eta^2 = .14$. An examination of the means indicated that surface learners demonstrated a greater shift in their deep and deep-achieving approaches to learning in the non-traditional subject compared to the deep learners. Thus, hypothesis 7.6 was supported.
Discussion

The purpose of the current study was to assess whether approaches to learning can be influenced by differences in the teaching-learning environment. Overall, results of the current study suggest surface strategies and the surface-achieving-motive and some aspects of the deep and deep-achieving approaches to learning as measured by the SPQ are all situationally sensitive. As hypothesised, there was a significant difference for surface strategy between the traditional and non-traditional courses. More surface strategies were reportedly used in the traditional, than the non-traditional course, thus offering partial confirmation to hypothesis 7.1. Similarly, there was a significant difference for the surface-achieving-motive approach to learning, again with the surface-achieving-motive higher-order approach to learning evidenced in the traditional than in the non-traditional course, thus confirming hypothesis 7.2. As expected, there was a significant increase in the overall deep and deep-achieving approaches to learning in the non-traditional course, compared with the traditional course, confirming hypothesis H7.4. Finally, both hypotheses regarding the role of a student’s predisposition to either a deep or surface approach to learning was confirmed (H7.5 and H7.6). Students predisposed to be surface learners reported a larger shift towards deep motives and strategies in the non-traditional subject than those predisposed to be deep learners (H7.5). Similarly, students predisposed to surface learning reported a larger shift towards the deep and deep-achieving approaches to learning in the non-traditional subject than those predisposed to deep learning (H7.6). Contrary to expectations there were no differences between the traditional and non-traditional courses for surface motive (H7.1), deep motive or deep strategy subscales (H7.3).

Moderate effect sizes indicate that the findings also have practical significance and suggest that students can be influenced to reduce their surface strategies by using non-traditional teaching methods. However, as there is not a corresponding increase in deep learning strategies using non-traditional teaching methods, the present findings also suggest that teaching methods alone are not responsible for altering learning strategies. The present
results also suggest that students can be influenced by their perceptions of the learning
environment to adopt a more surface approach to learning. This is supported in the literature
where students generally displayed higher surface approach to learning scores in traditional
courses than in non-traditional courses (Kember et al., 1997; Tooth et al, 1989). Further the
results of the current study suggest students identified as surface learners evidence a greater
shift than deep learners towards deep learning when they are introduced to teaching methods,
which emphasise deep learning approaches. Thus, the suggestion can be made that, at least
in part, the surface approach to learning is a changeable state.

There are several issues meriting consideration in light of the present results. Firstly, this
pattern of results suggests the surface strategy subscale and the higher-order surface-
achieving-motive approach to learning can be influenced by students’ perceptions of the
learning environment. Previous research (Biggs, 1999; Kember et al., 1997; Vermetten et al.,
1999) also has a range of situational factors that can be used to promote the surface approach
to learning. Kember et al. (1997), for example, found that students undertaking project-based
learning were more likely to shift from a surface approach to learning when compared with a
group of students undertaking traditional learning tasks. In the current study students were
concurrently enrolled in both traditional and non-traditional subjects. This concurrent
enrolment illustrates how the learning environment can impact on approaches to learning.
Even though students were exposed to both learning environments at the same time, there
was no apparent carry over effect between these environments, suggesting students may be
adept at orchestrating their approach to learning for any particular teaching-learning
environment. This suggests that a student’s approach to learning is directly related to their
perception of a specific teaching environment, but that this is mediated by the student’s
inclination to either deep or surface processing. While the current results show a weak
significant relationship between surface strategies and learning environment, results of the
study in chapter 6 suggest the basic approach to a task such as writing an assignment does not
change much over time.
As mentioned above, it appears that deep learning, as measured by the SPQ, may not be as sensitive to environmental changes as surface learning. Previous research has tended to focus on techniques for promoting the development of deep learning such as training in problem-based learning (De Volder & De Grave, 1989) and study skills training (Biggs & Rihn, 1984). These studies found small shifts for students involved in the training programmes when compared with a comparison group. However, there has been no work undertaken to discover whether one teaching environment will mediate the effects of another teaching environment in which the student is also participating. As expected, the results of the current study indicate that students identified as surface learners report a greater shift in their deep approach to learning in the non-traditional subject than do deep learners, but what about the converse relationship? Perhaps deep learners are not inclined to “fall back on” surface learning in traditional subjects, but are more likely to utilise achieving approaches to learning. Biggs (1987a) considered surface processing to be of lesser value than deep processing. Perhaps, the point he was trying to make is that students using surface processing have a smaller range of strategies available than do deep learners. When deep learners are not motivated by interest they may simply use whichever, of the more comprehensive strategies they have available to them, depending on the educational task and learning environment. These questions were outside the scope of this thesis but should be considered in further research examining the situational sensitivity of approaches to learning. The qualitative information discussed in the previous chapter suggests that while students may have changed in their overall approach to learning following the completion of a four year degree programme, the basic strategies they appear to use remain fairly consistent.

Further, the results of the present study suggest that the higher order approaches to learning can be influenced by perceptions of the teaching environment. This finding is interesting, as the results of the previous study (see chapter 6) suggested surface-achieving-motive was the most stable approach to learning over a period of two and a half years. The results of this research programme offer support for the views that approaches to learning
may be stable traits, and are also able to be influenced by environmental changes. The inclusive results of this thesis suggest the need for future research to explore the trait/state nature of approaches to learning. The surface scale and subscales of the SPQ continue to be of concern. In conjunction with broader research on the stability of the constructs of the SPQ, specific attention needs to be paid to the surface subscales and scales in an effort to determine whether the results of this study can be supported. Additional investigation of students’ capacity to recognise and utilise appropriate learning strategies for different environments would appear to be useful.

A particular strength of the present study is the choice of a within-subjects research design to concurrently examine traditional and non-traditional teaching environments. As discussed previously, this research design has not been utilised before to test the influence of the perceptions of the learning environment on approaches to learning. The results of the current study indicate that this is a useful methodology for further examination of environmental influences in different learning environments. The findings also support the sensitivity and capacity of the SPQ to measure changes in approaches to learning in different learning environments.

In conclusion, the results of this study cautiously suggest student perceptions of teaching environments may hold the key to understanding the state/trait nature of approaches of learning. The next study focuses on the other aspect of the presage component of the 3P model of learning, namely personal characteristics.
CHAPTER 8
PREDICTING STUDENTS’ APPROACHES TO LEARNING FROM A KNOWLEDGE OF PERSONAL CHARACTERISTICS.

Overview

The role of personality in approaches to learning has received some attention in the educational research literature (see chapter 5). Of particular interest have been factors such as locus of control. Generally, a link has been found between an external locus of control and surface learning, and between an internal locus of control and deep learning (see for example Biggs, 1987a; Cassidy & Eachus, 2000; Dart & Clarke, 1991; Rose et al., 1996; Watkins & Akande, 1994). Similarly, demographic variables such as age (Biggs, 1987a; Newble & Clarke, 1986; Sheehan et al., 1992), year of study (Gow & Kember, 1990; Newble & Clarke, 1986) and gender (see for example Baxter Magolda, 1989; Gledhill & van Der Merwe, 1989; Hazel et al, 1997; Miller et al., 1990; Richardson & King, 1991; Speth & Brown, 1990; Wilson et al., 1996) have been analysed to ascertain their relationship with approaches to learning. Of these, the most consistent relationship appears to be between age and approaches to learning, with older students reportedly having a deeper learning approach than younger students. Other personality variables such as intelligence and personality type have received limited attention in the research. While links between these personality variables and approaches to learning have not been widely investigated, the limited findings to date do not reveal a relationship between intelligence and approaches to learning (Biggs & Kirby, 1984; Saljo, 1981).

The purpose of the current study is to identify suitable personal characteristics for inclusion in the analysis of the 3P model (see chapter 9). The aim is to ascertain whether the personality variables of locus of control, personality type, intelligence, and demographic variables of age, gender and year of study are significant predictors of deep and surface approaches to learning. A concurrent examination of these personality variables has not been undertaken previously. Given the inconsistent findings to date on gender and approaches to
learning, no hypotheses were formulated for this variable. Based on the available literature it is expected that:

H8.1. Lower age, earlier year of study, external locus of control, sensing and thinking functions of personal style will significantly and positively predict to a surface approach to learning.

H8.2. Lower intelligence will significantly and positively predict to a surface approach to learning.

H8.3. Lower age, earlier year of study, external locus of control, sensing and thinking functions of personal style will significantly and positively predict to a surface-achieving-motive approach to learning.

H8.4. Lower intelligence will significantly and positively predict to a surface-achieving-motive approach to learning.

H8.5. Higher age, later year of study, and internal locus of control, will significantly and positively, while sensing and thinking functions of personal style will significantly and negatively, predict to a deep approach to learning.

H8.6. Higher intelligence will significantly and positively predict to a deep approach to learning.

H8.7. Higher age, later year of study, and internal locus of control, will significantly and positively, while sensing and thinking functions of personal style will significantly and negatively, predict to a deep-achieving approach to learning.

H8.8. Higher intelligence will significantly and positively predict to a deep-achieving approach to learning.

Method

Participants

One-hundred and eighty-five undergraduate psychology students (36 male, 149 female) volunteered to participate in the study. The age of the students ranged from 17 to 52 with a mean age of 22.98 years (SD = 7.81). These students were recruited across the three levels of the same undergraduate degree programme in psychology at the beginning of semester 2
(first-year = 86; second-year = 45; third-year = 54). A sub-sample of 25 female first-year students was selected to participate in the intelligence-testing component of the project as a partial requirement for course credit. Female students were selected for the intelligence testing because they are more prevalent within a psychology degree programme and there are several issues related to gender differences in tests of intelligence (see chapter 5) that may have confounded the study if a mixed gender sample was selected. The age range for these students was 17 to 47 with a mean age of 23.80 (SD = 9.13). The students participating in this study were all from English speaking backgrounds and were Australian by birth.

**Materials**

All students completed a questionnaire package that included the SPQ (Biggs, 1987a), Personal Style Inventory (PSI) (Hogan & Champagne, 1980), Study Control Questionnaire (SCQ) (Trice, 1985) and demographic information. The order of presentation for the questionnaires was alternated to avoid possible response bias. The SPQ has been discussed in detail elsewhere.

The Personal Style Inventory (PSI) is a 32-item instrument developed by Hogan and Champagne (1980) to measure Jungian typology. Reliability analyses have not been undertaken on the PSI in the literature to date. The appropriate analyses will be conducted on the dimensions of the PSI used in the subsequent analyses of the present study. However the validity of the PSI has been tested using a multitrait-multimethod matrix (Ware, Yokomoto & Morris, 1985). These results of studies suggest the PSI is a suitable substitute measure for the constructs of the MBTI. The PSI has four scales representing (1) attitude toward the environment (Extraversion – Introversion), (2) perception (Sensing – Intuitive), judgement (Thinking – Feeling), and (4) interaction with the external world (Judging – Perceiving).

Each item comprises two statements A and B, and requires participants to allocate a proportion of five available “votes” to each statement. Strength of preference is determined by this voting procedure; for example, a rating of 5 for statement A and a corresponding 0 for statement B would suggest a strong preference for statement A in that item. If there is no strong preference for either statement, then one statement will receive a 3 and the other a 2.
The scores for A and B must always add up to 5 for any one item. Responses are transferred to a scoring sheet and totals are calculated for each of the four scales of the PSI. A copy of the PSI and scoring sheet can be found in appendix F. For the purpose of the present study only two scales, Sensing – Intuitive and Thinking – Feeling were utilised. As discussed in chapter five, these two dimensions of the PSI have been linked to academic performance.

The Study Control Questionnaire (SCQ) represents a modification of the Academic Locus of Control Scale (Trice, 1985, Trice, Ogden, Stevens & Booth, 1987) for Australian university conditions. For example, “University grades most often reflect the effort you put into classes” replaces “College grades….” The SCQ is a 28-item scale developed to measure beliefs about personal control in academic settings. Responses are true/false with 16 items combining to create the external locus of control scale and 12 items combining to create the internal locus of control scale. Retest reliability was high (.92) over a period of three weeks (Trice, 1985). Concurrent validity was also found to be good when compared with generalised locus of control (Trice et al., 1987). A copy of the SCQ and scoring sheet can be found in Appendix G.

The two intelligence tests utilised in the present study were the Ravens Advanced Progressive Matrices (APM) (Raven, Raven & Court, 1991) and the ACER advanced test AL (ACER, 1982). The APM is composed of a series of 48 perceptual analytic reasoning problems, each in the form of a matrix. The first set of problems (12 items) comprises the practice component of the test, while the second set comprises the actual test. This is a standardised test suitable for group administration. Forty minutes are allocated for the completion of Set II. The reliability and validity of the instrument are good and Australian norms are available (Raven et al., 1991). The AL is a 29-item standardised test of linguistic skills. Items include verbal analogies, vocabulary, similarities and verbal reasoning designed to be utilised with first-year university students. The AL is a timed test suitable for group administration. The reported reliability and validity of the instrument are good (ACER, 1982).
**Procedure**

Students who were not participating in the intelligence component of the testing were provided with a copy of the questionnaire package during lectures. They were informed that participation in the study was voluntary and they could stop their participation at any time. Students were requested to return the completed questionnaires to a secure box provided within the university within a week. All instructions for completing the various questionnaires were provided with the package.

Students participating in the intelligence component of the research were asked to attend a two-hour group session in exchange for course credit. Two sessions were held. For the first session students were given a brief outline of the testing and then were asked to complete the questionnaire package. After completion of the package, they were given a short break and then the two IQ tests were administered. The order of presentation was reversed for the second group.

**Results**

**Overview**

Before analysing the data, a Pearson’s moment correlation was conducted on the PSI scales as there was expected to be a strong relationship between the two dimensions of each scale. A high correlation between variables indicates they are not suitable for inclusion in regression analysis (Tabachnick & Fidell, 2001). There was a perfect negative correlation between the sensing and intuitive dimensions of the perception scale (-1.00, p < .001) and between the thinking and feeling of the judgement scale (-1.00, p<.001). This suggested only one dimension from each scale should be included in each of the subsequent regression analyses. Thus, sensing and thinking were used for all analyses. Cronbach’s alpha was calculated for the two dimensions of the PSI used in the present study. The results indicated good reliability for these four scales ranging from 0.80 (thinking and feeling) to 0.81 (sensing and intuitive). A single locus of control score was also calculated for the analyses; thus a negative score represents an internal locus of control and positive scores an external locus of control on this single scale.
Eight regression analyses were undertaken to ascertain whether, as hypothesised, a range of personality variables predicted to the surface, deep, surface-achieving-motive and deep-achieving approaches to learning. Prior to these regression analyses SPSS FREQUENCIES (Norusis, 1998) for evaluation of assumptions were conducted. The results of the evaluation of assumptions suggested the independent variables age and gender were skewed. Age was positively skewed without transformation. The transformed data revealed a negative skew, and thus a decision was made not to transform the data. No outliers were found utilising the p < .001 criterion for Mahalanobis distance. No cases had missing data and no suppresser variables were found. All analyses were performed using SPSS REGRESSION.

**Surface Approach to Learning (H8.1 and H8.2)**

A standard multiple regression was performed with surface approach to learning as the dependent variable (DV), and age, gender, year of study, locus of control, sensing and thinking as independent variables (IV).

Table 8.1 displays the summary statistics for the regression analysis. R for regression was significantly different from zero, F (6, 172) = 10.24, p < .001. Three regression coefficients differed significantly from zero, and 95 percent confidence limits were calculated. The confidence limits for age were −.32 to -.07, those for locus of control were .33 to .79, and those for sensing were .17 to .53. Three of the IV’s contributed significantly to predicting surface approach to learning, age ($r^2 = .04$), locus of control ($r^2 = .10$) and sensate function ($r^2 = .06$). The IV’s in combination contributed another .06 in shared variability. Overall 26 percent (24 % adjusted) of the variability in surface approach to learning was predicted by knowing scores on these six IV’s. The results of this regression analysis offer partial support to the first hypothesis (H8.1) that these variables would positively predict to a surface approach to learning.

A second standard multiple regression was performed with surface approach to learning as the dependent variable and intelligence1 (APM) and intelligence2 (AL) as independent variables. R for regression was not significantly different from zero, F (2, 22) = .26, p > .05,
### Table 8.1

*Multiple regression of personality variables on the surface approach to learning*

<table>
<thead>
<tr>
<th>Variable</th>
<th>Surface</th>
<th>Age</th>
<th>Gender</th>
<th>Ed</th>
<th>S</th>
<th>T</th>
<th>LoC</th>
<th>B</th>
<th>β</th>
<th>se²</th>
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<td></td>
<td></td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>.09</td>
<td>.12</td>
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<tr>
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<td>-.15</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>.10</td>
<td>.02</td>
<td></td>
</tr>
<tr>
<td>Sensing (S)</td>
<td>.28</td>
<td>.08</td>
<td>.07</td>
<td>.08</td>
<td></td>
<td></td>
<td></td>
<td>.35</td>
<td>.26</td>
<td>.06</td>
</tr>
<tr>
<td>Thinking (T)</td>
<td>-.09</td>
<td>.20</td>
<td>-.10</td>
<td>.07</td>
<td>.29</td>
<td></td>
<td></td>
<td>-.11</td>
<td>-.09</td>
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<td>Locus of Control</td>
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<td>.09</td>
<td>-.02</td>
<td>-.05</td>
<td>-.07</td>
<td></td>
<td>.56</td>
<td>.32</td>
<td>.10</td>
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(LoC)

<table>
<thead>
<tr>
<th>X</th>
<th>44.40</th>
<th>22.84</th>
<th>1.80</th>
<th>1.99</th>
<th>18.91</th>
<th>17.85</th>
<th>-.94</th>
<th>R² =</th>
<th>.26</th>
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<tbody>
<tr>
<td>SD</td>
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<td>7.78</td>
<td>.40</td>
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<td>5.68</td>
<td>4.05</td>
<td>Adjusted R² =</td>
<td>.24</td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>R =</td>
<td>.51</td>
</tr>
</tbody>
</table>

** p < .01; *** p < .001  
unique variability = .20 ; shared variability = .06
thus offering no support to the second hypothesis (H8.2) that students of lower intelligence would positively predict to a surface approach to learning.

Surface-Achieving-Motive Approach to Learning (H8.3 and H8.4)

A standard multiple regression was performed with surface-achieving-motive approach to learning as the dependent variable and age, gender, education, locus of control, sensing and thinking as independent variables. Table 8.2 displays the summary statistics for the regression analysis. $R$ for regression was significantly different from zero, $F(6, 172) = 8.29$, $p < .001$. Three regression coefficients differed significantly from zero, and 95 percent confidence limits were calculated. The confidence limits for age were -.42 to -.08, those for locus of control were .18 to .80, and those for sensing were .20 to .69. Three of the IV’s contributed significantly and positively to the prediction of surface approach to learning, age ($sr^2 = .04$), locus of control ($sr^2 = .04$) and sensing ($sr^2 = .06$). The IV’s in combination contributed another .06 in shared variability. Overall 22 percent (20 % adjusted) of the variability in surface-achieving-motive approach to learning was predicted by knowing scores on these six IV’s, thus offering partial support to the third hypothesis (H8.3) that these variables would positively predict to a surface-achieving-motive approach to learning.

A second standard multiple regression was performed with surface-achieving-motive approach to learning as the dependent variable and intelligence1 (APM) and intelligence2 (AL) as independent variables. $R$ for regression was not significantly different from zero, $F(2, 22) = .09$, $p > .05$, offering no support to the fourth hypothesis (H8.4) that a lower intelligence would positively predict to a surface-achieving-motive approach to learning.

Deep Approach to Learning (H8.5 and H8.6)

A standard multiple regression was performed with deep approach to learning as the dependent variable and age, gender, education, locus of control, sensing and thinking as independent variables. Table 8.3 displays the summary statistics for the regression analysis. $R$ for regression was significantly different from zero, $F(6, 172) = 5.59$, $p < .01$. Three regression coefficients differed significantly from zero, and 95 percent confidence limits were calculated. The confidence limits for age were .05 to .35, for locus of control were -.72 to
Table 8.2

Multiple regression of personality variables on the surface-achieving-motive (SAM) approach to learning

<table>
<thead>
<tr>
<th>Variable</th>
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<th>Gender</th>
<th>Ed</th>
<th>LoC</th>
<th>S</th>
<th>T</th>
<th>B</th>
<th>β</th>
<th>sr²</th>
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<td></td>
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<td>-.25**</td>
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<td>.04</td>
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<tr>
<td>Gender</td>
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<td>.00</td>
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<td>4.58</td>
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<tr>
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<td></td>
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<td>-.51</td>
<td>-.05</td>
<td></td>
</tr>
<tr>
<td>Sensing (S)</td>
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<td>.07</td>
<td>.08</td>
<td></td>
<td></td>
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<td>.25</td>
<td>.06</td>
</tr>
<tr>
<td>Thinking (T)</td>
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<td>-.10</td>
<td>.07</td>
<td>.29</td>
<td></td>
<td></td>
<td>-.03</td>
<td>-.02</td>
<td></td>
</tr>
<tr>
<td>Locus of Control (LoC)</td>
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<td>.09</td>
<td>-.02</td>
<td>-.05</td>
<td>-.07</td>
<td></td>
<td>.49**</td>
<td>.22</td>
<td>.04</td>
</tr>
</tbody>
</table>

X̄                  | 65.82 | 22.84 | 1.80   | 1.99 | 18.91| 17.85| -.94 | R² = .22 |

SD                 | 9.26  | 7.78  | .40    | .99  | 5.26 | 5.68 | 4.05 | Adjusted R² = .20 |

** p < .01; *** p < .001
unique variability = .14; shared variability = .06
Table 8.3

*Multiple regression of personality variables on the deep approach to learning*

<table>
<thead>
<tr>
<th>Variable</th>
<th>Deep</th>
<th>Age</th>
<th>Gender</th>
<th>Ed</th>
<th>S</th>
<th>T</th>
<th>LoC</th>
<th>B</th>
<th>β</th>
<th>sr²</th>
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<td>.20**</td>
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<tr>
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<td>.08</td>
<td>.07</td>
<td>.08</td>
<td></td>
<td></td>
<td></td>
<td>-.30**</td>
<td>-.20</td>
<td>.04</td>
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<td>-.07</td>
<td></td>
<td>-.45**</td>
<td>-.23</td>
<td>.05</td>
</tr>
</tbody>
</table>

** X 45.88  22.84  1.80  1.99  18.91  17.85  -.94  R² = .16

** SD 7.83  7.78  .40  .99  5.26  5.68  4.05  Adjusted R² = .13

R = .40

** p < .01

unique variability = .13; shared variability = .03
.17, and for sensing were -.30 to .11. Three of the IV’s contributed significantly to prediction of deep approach to learning, age ($sr^2 = .04$), locus of control ($sr^2 = .05$) and sensing ($sr^2 = .04$). The IV’s in combination contributed another .03 in shared variability. Overall 16 percent (13 % adjusted) of the variability in deep approach to learning was predicted by knowing scores on these six IV’s, thus offering partial support to hypothesis H8.5 (i.e. that higher age, internal locus of control and a low score on the sensing dimension of the S-N scale would predict to a deep approach to learning).

A second standard multiple regression was performed with deep approach to learning as the dependent variable and intelligence1 (APM) and intelligence2 (AL) as independent variables. R for regression was not significantly different from zero, $F (2, 22) = .67, p > .05$, offering no support to the sixth hypothesis (H8.6) that higher intelligence would predict to a deep approach to learning.

**Deep-Achieving Approach to Learning (H8.7 and H8.8)**

A standard multiple regression was performed with deep-achieving approach to learning as the dependent variable and age, gender, education, locus of control, sensing and thinking as independent variables. Table 8.4 displays the summary statistics for the regression analysis. R for regression was significantly different from zero, $F (6, 172) = 3.99, p < .01$. One regression coefficient differed significantly from zero, and 95 percent confidence limits were calculated. The confidence limits for locus of control were $-1.45$ to $-.51$. One of the IV’s contributed significantly to prediction of deep-achieving approach to learning locus of control ($sr^2 = .08$). Overall 12 percent (8 % adjusted) of the variability in deep-achieving approach to learning was predicted by knowing scores on these six IV’s, thus offering partial support to hypothesis H8.7 (i.e. that internal locus of control would predict to a deep-achieving approach to learning).

A second standard multiple regression was performed with surface approach to learning as the dependent variable and intelligence1 (APM) and intelligence2 (AL) as independent variables. R for regression was not significantly different from zero, $F (2, 22) = .15, p > .05$, offering no support to the final hypothesis (H8.8) that higher intelligence would predict to a deep-achieving approach to learning.
Table 8.4

*Multiple regression of personality variables on the deep-achieving (DA) approach to learning*

<table>
<thead>
<tr>
<th>Variable</th>
<th>DA</th>
<th>Age</th>
<th>Gender</th>
<th>Ed</th>
<th>S</th>
<th>T</th>
<th>LoC</th>
<th>B</th>
<th>β</th>
<th>se²</th>
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<tbody>
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<td>.18</td>
<td>.11</td>
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<td></td>
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<td></td>
<td></td>
<td></td>
<td>1.77</td>
<td>.05</td>
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<tr>
<td>Education (Ed)</td>
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<td>.23</td>
<td>-.15</td>
<td>-.11</td>
<td></td>
<td></td>
<td></td>
<td>-1.46</td>
<td>-.11</td>
<td></td>
</tr>
<tr>
<td>Sensing (S)</td>
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<td>.07</td>
<td>.08</td>
<td></td>
<td></td>
<td></td>
<td>-.14</td>
<td>-.06</td>
<td></td>
</tr>
<tr>
<td>Thinking (T)</td>
<td>-.01</td>
<td>.20</td>
<td>-.10</td>
<td>.07</td>
<td>.29</td>
<td></td>
<td></td>
<td>-.04</td>
<td>-.02</td>
<td></td>
</tr>
<tr>
<td>Locus of Control (LoC)</td>
<td>-.31</td>
<td>-.21</td>
<td>.09</td>
<td>-.02</td>
<td>-.05</td>
<td>-.07</td>
<td></td>
<td>-98***</td>
<td>-.30</td>
<td>.08</td>
</tr>
</tbody>
</table>

\[ X = 88.11 \quad 22.84 \quad 1.80 \quad 1.99 \quad 18.91 \quad 17.85 \quad -.94 \quad R^2 = .12 \]

\[ SD = 13.20 \quad 7.78 \quad .40 \quad .99 \quad 5.26 \quad 5.68 \quad 4.05 \quad \text{Adjusted } R^2 = .08 \]

\[ R = .35 \]

*** p < .001

unique variability = .08; shared variability = .04
Discussion

The aim of the current study was to ascertain whether the personality variables of locus of control, personality type, and intelligence as well as demographic variables of age, gender and year of study are predictors of deep and surface approaches to learning. The results offer partial support to four of the eight hypotheses. Three personality variables (locus of control, sensing, age) were found to be significant predictors of a surface approach to learning (H8.1). Similarly, locus of control, sensing and age were significant predictors of surface-achieving-motive approach to learning (H8.3). Locus of control, sensing and age were also found to be significant predictors of deep approach to learning (H8.5). However, only locus of control was found to be a good predictor of deep-achieving approach to learning (H8.7). The remaining three personality variables (intelligence, gender and year of study) were found to be non-significant predictors of deep and surface approaches to learning.

Locus of Control

Locus of control was found to be a good predictor across the four approaches to learning. In the current study, positive confidence limits for locus of control (i.e. external locus of control) were related to the surface and surface-achieving-motive approaches to learning, whereas negative confidence limits for locus of control (i.e. internal locus of control) were related to the deep and deep-achieving approaches to learning. Previous research provides similar results for the relationship between locus of control and approaches to learning. Cassidy and Eachus (2000), for example, found a moderate significant correlation (.37, p<.001) between external locus of control and the surface scale of the ASI. Other researchers (Biggs, 1987a; Watkins & Akande, 1994) found weak, but significant relationships between external locus of control and surface learning and between internal locus of control and deep learning. The current findings offer support for a consistent pattern of relationships and extend previous correlational research. While correlational analysis measures the association between two variables, it does not suggest whether one variable can be predicted from another (Tabachnick & Fidell, 2001). Given Biggs (1987a) proposed that approaches to learning
result from the presage factors, regression procedures are a more appropriate methodology for examining this relationship.

**Personality Type**

The second personality variable found to be a good predictor of surface, surface-achieving-motive and deep approaches to learning was the perception (Sensing – Intuitive) scale of the PSI. Research undertaken on the relationship between personality type and approaches to learning has been limited with only two studies directly examining this relationship. Biggs (1970) suggested, on theoretical grounds, that there was likely to be a relationship between the first dimension of the MBTI and approaches to learning. Sadler-Smith (1999) using the CSI (Cognitive Style Index) and the ASI undertook a series of two-way ANOVA’s between intuition-analysis style (CSI) and approaches to learning (ASI). The results suggested students identified as analysts (i.e. sensing) scored higher on the meaning orientation than those identified as having an intuitive style. This result is in contrast to the current findings, where students with a preference for the sensing function were found to report higher surface and surface-achieving-motive scores. Further, this study found students identified as having a preference for an intuitive style reported higher deep scores. Differences between the results of these two studies may be because the two instruments measure the S – N dimension differently. However, the results of these two studies identify the need for more research to be undertaken on the relationship between approaches to learning and personal style. Based on this study, the results suggest the perception scale of the PSI is appropriate for inclusion in the examination of the 3P model of learning (see chapter 9).

**Age**

Younger students reported higher scores on the surface and surface-achieving-motive scales of the SPQ, while older students reported higher scores on the deep scale of the SPQ. This result is not surprising, as the literature has consistently demonstrated a relationship between the age and approaches to learning. The direction of findings is consistent with the
current results, with younger students reporting utilising a more surface approach to learning than their older counterparts (Biggs, 1987a; Newble & Clarke, 1986; Sheehan et al., 1992).

Based on the current findings, the remaining personal variables, intelligence, gender and year of study, were not significant predictors of the surface, surface-achieving-motive, deep or deep-achieving approaches to learning.

**Intelligence**

Neither of the intelligence variables were significant predictors of deep or surface learning. The results of the current study actually support the previous findings of Biggs and Kirby (1984) and Saljo (1981) who also found no relationship between the Ravens Progressive Matrices and approaches to learning. The current study chose to investigate further the relationship between intelligence and approaches to learning for two reasons. Firstly, neither previous study utilised the SPQ. Saljo utilised an interview to measure approaches to learning while Biggs and Kirby (1984) utilised the LPQ. Secondly, because of possible confounds in the previous research, it was considered appropriate to include intelligence in the current research. Biggs and Kirby included males and females in their study, which may have compromised the results, as there are clear gender differences in the results of intelligence tests (Groth-Marnat, 1990). Further research utilising a similar methodology needs to be undertaken on the relationship between intelligence and approaches to learning before it can be confidently concluded that there is no relationship. For example, the Ravens Progressive Matrices might provide a broader spread of intelligence than was found in the current study, even though the Advanced Matrices were designed specifically for use with a university population.

**Gender**

Overall gender was found to be a non-significant predictor of approaches to learning. Previous research has been inconclusive regarding gender differences in approaches to learning (see chapter five). For example, while Speth and Brown (1990) found gender differences in approaches to learning, Wilson et al. (1996), using a similar methodology did
not. As the results of the current study have found gender is not a predictor of approaches to learning it will not be considered for inclusion in the testing of the 3P model.

-Year of Study-

Finally, year of study was also a non-significant predictor of approaches to learning. This result is interesting as previously research suggests approaches to learning are influenced by the year of study being undertaken. For example Gow and Kember (1990) found deep approach to learning increased in the second year of a degree programme but declined in third year to a level lower than that initially found in first year. Conversely, Newble and Clarke (1986) found there was an increase in deep learning from first to third year, but not second year. Differences between the current study and previous research can be accounted for in part by the different methodology being utilised. For instance Gow and Kember undertook their research with a Chinese sample, and as has been highlighted previously, the SPQ is sensitive to cultural differences. Further, their research was undertaken on the subscales of the SPQ while the current study examined the scales and higher-order scales of the SPQ. Newble and Clarke undertook a comparison of students enrolled in two different medical programmes and compared the results for these students using the Lancaster Approaches to Study Inventory (LASI). Limited statistical analysis employing t-tests was used to compare the students at the two universities. Thus differences found between this study and previous studies may simply be the result of these sampling and measurement differences. Further research needs to be undertaken on the relationship between year of study and approaches to learning. It is recommended that longitudinal research be used, such as that undertaken by Zeegers (2001).

- Summary of Strengths and Limitations of the Present Study -

A particular strength of the present study was the examination of a range of different personality and demographic variables within a single study. Such research has not been undertaken to date and provides the opportunity to examine how these various characteristics affect approaches to learning. An associated strength is the use of a homogeneous sample. As discussed elsewhere in this thesis, the use of a single cohort of students minimises the
potential confounds associated with using a range of different students. Therefore the results of this study can be used with confidence to answer questions regarding the predictive nature of the different personality characteristics.

Another strength of the present study was the decision to examine intelligence using a female sample of students to avoid any potential gender biases in intelligence testing. Both previous studies (Biggs & Kirby, 1984; Saljo, 1981) examining the relationship between intelligence and approaches to learning had used both male and female students and had found no relationship between the two. Thus, it was important to re-examine the relationship using a more rigorous methodology.

However, there were also two limitations of the intelligence component of this study. Firstly, the decision to use the more advanced intelligence tests while considered may have unintentionally minimised differences between students. As discussed earlier in this chapter, a better choice may have been to use the high school, rather than university level tests. A second associated concern is the sample size for the intelligence testing. While 25 is an acceptable sample size for regression analysis (Tabachnick & Fidell, 2001), perhaps this also affected the results for this section of the study.

Conclusions

In summary, the present study has examined a range of individual variables to ascertain which, if any are significant predictors of approaches to learning. As examined in chapter 5, research on the relationship between personality variables and approaches to learning, while extensive, has been more varied than other research on approaches to learning. The strengths of the current study include the use of regression analysis to test the relationships between a range of personality variables and approaches to learning. Further, the current study has concurrently analysed variables utilised in previous research in order to build a more coherent body of knowledge regarding the role of individual differences in approaches to learning. In addition, the current study examined key demographic variables, such as age, gender and year of study, repeatedly discussed in relation to approaches to learning, but not often examined utilising a within-subjects methodology. As the results of this study suggest, there is clearly a
need for more concentrated research on the predictive nature of personality variables in relation to approaches to learning. Further, this research would be well advised to utilise homogeneous student populations in order to minimise potential confounds. As examined in chapter 7, approaches to learning can be influenced by perceptions of different teaching contexts and as such these influences need to be minimised when considering other factors influencing approaches to learning such as personality. Relational theorists (see Prosser & Trigwell, 1999a, 1999b) argue the separation of the world from the individual is inappropriate, as previous experiences influence current experiences. Perhaps this is another individual variable meriting consideration in future research.

However, the results of the current study suggest three variables are suitable for inclusion in the personal characteristics component of the 3P model of learning. The results clearly identify external locus of control as a significant predictor of surface, and internal locus of control as a significant predictor of deep approach to learning. Two further variables age and sensing function were also identified as significant predictors of all but the deep-achieving approach to learning. The contribution of these variables, as components of the presage component of the 3P model of learning, will be further examined in the next study.
CHAPTER 9

AN EXAMINATION OF THE 3P MODEL OF LEARNING USING STRUCTURAL EQUATION MODELLING

Overview

As discussed in chapter 5, the 3P model of learning developed by Biggs (1978) evolved in response (Biggs et al., 2001; see also chapter 5) to changes in the understanding of learning processes. Initially, the 3P model of learning suggested a linear relationship between the presage, process and product components of the model. More recently, this has been changed to reflect a systemic or organic model, conceived as a contextual environment in which to understand Biggs’s conceptions of deep and surface approaches to learning. As such, the 3P model of learning as a whole, while central to the interpretation of the body of research surrounding Biggs’s approaches to learning, has conceptually, to date, received scant attention. There have been only five studies that have attempted to specifically use a conceptual understanding of the 3P model to empirically assess components of this model of learning (see chapter 5).

The focus of these empirical studies on the 3P model of learning has been to test specific linear relationships between the different components of the model. For example, the linear relationship between personality factors and approaches to learning has been examined (Dart et al., 2000; Zhang, 2000), as has the linear relationship between process and product factors (Zhang, 2000). The remaining three studies tested the whole model (i.e., presage ⇒ process ⇒ product) to determine whether relationships existed between these components (Drew & Watkins, 1998; Hall et al., 1996; Wong & Watkins, 1998). However, this body of research has not reflected more recent understanding of interrelationships between the components of the model. Why?

In attempting to account for this situation, the mathematical theory of structural equation modelling needs to be considered. While it is possible to theoretically relate every possible variable to every other possible variable in a model (i.e., 1999 version of the 3P model), this
does not make sense mathematically. Mathematically, a path model based on this version of the 3P model would be unstable (Hair et al., 1998; Tabachnick & Fidell, 2001). Such a model indicates nonrecursive relationships between each variable in the analysis. Thus, the model would be under identified and any results would be questionable. Under identification of a model occurs when the model attempts to analyse more parameters than possible with the input matrix (i.e., the degrees of freedom in this model would be negative).

As it is presently impossible to empirically examine the 1999 version of the 3P model of learning, this study examines the linear version of the 3P model of learning. However, based on the findings of the previous studies in this thesis, modifications have been made to this model. Firstly, the results of chapter 7 suggest there are many problems associated with the environmental aspect of the presage component of the model. For example, the results of that chapter suggest students change their approach to learning based on their perceptions of the learning environment. As the focus of this study is on the general approaches to learning of students, rather than specific learning tasks, it was considered prudent that environmental factors not be included. Further, the ongoing discussion in the literature regarding the stability of approaches to learning across different teaching contexts (see chapter 5) brings into question the suitability of this aspect of the model for general research on approaches to learning. Secondly, research to date has not established a clear pattern of relationships between approaches to learning and personal characteristics (see chapter 5). As identified in chapter 8, some personal characteristics are better indicators of approaches to learning than other personal characteristics. Thus, only those characteristics identified as sound indicators in this thesis will be included in modified 3P model examined in this chapter.

Thirdly, the decision was made to include the achieving scale in the analysis. The arguments regarding the exclusion of the achieving scale from many of the studies in this research programme have been discussed elsewhere in this thesis. Similarly, Biggs et al.’s (2001) decision to phase out the achieving approach has also been discussed. While these are both sound arguments for excluding the achieving approach to learning, it was decided to include this approach in the first model to assess its contribution. Further, as no other path
analysis to date (Dart et al., 2000; Drew & Watkins, 1998; Wong & Watkins, 1998) undertaken on the 3P model of learning has included the achieving approach, it was considered important to do so in this instance.

Two models are proposed for testing in this study. The first model examines the relationships between the three personal characteristics (age, sensate function and locus of control) identified in the previous chapter, the three approaches to learning (deep, surface, achieving) and one product factor (grade-point-average (GPA)). The second model examines the relationships between the three personal characteristics, the higher-order approaches to learning (deep-achieving, surface-achieving-motive), and the product factor. The hypothesised models are presented in Figures 9.1 and 9.2. Further it is expected that:

**Model 1**

H9.1. The process factors deep, surface and achieving will mediate between the presage and product factors as described in Figure 9.1.

**Model 2**

H9.2. The process factors deep-achieving and surface-achieving-motive will mediate between the presage and product factors as described in Figure 9.2.

**Method**

**Participants**

Three hundred and ninety-four students volunteered to participate in the present study. Their ages ranged from 17 to 54, with a mean age of 24.52 (SD = 8.23). The majority of the participants were female (300, m = 94), but this was not considered problematic, as gender did not significantly predict to approaches to learning in chapter 8, suggesting there were no gender differences in approaches to learning, at least with this population of psychology students. The age of participants ranged from 17 to 52, with a mean age of 22.08 (SD=7.55). The students participating in this study were all from English speaking backgrounds and were Australian by birth. Approximately 100 of the students participating in this study had participated in the study in chapter two of this research programme. As the current study
Figure 9.1. The hypothesised 3P model of learning with three approaches to learning.

Note. SENSATE = sensing function; LOC = locus of control; SURF = surface approach; DEEP = deep approach; ACH = achieving approach; GPA = grade point average
Figure 9.2. The hypothesised 3P model of learning with two higher-order approaches to learning.

<table>
<thead>
<tr>
<th>PRESAGE</th>
<th>PROCESS</th>
<th>PRODUCT</th>
</tr>
</thead>
<tbody>
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<td>SAM</td>
</tr>
<tr>
<td>GPA</td>
<td>DA</td>
<td>GPA</td>
</tr>
</tbody>
</table>
investigates different research questions to those that these students had participated in previously, this was not considered problematic.

Participants were informed the research was voluntary and they could discontinue their participation at any time. Participants were further informed the results would remain confidential and were asked to give permission for their GPA to be used in the study. GPA was obtained from students’ official academic records.

Materials

All students completed a questionnaire package that included the SPQ, Personal Style Inventory (PSI), Study Control Questionnaire (SCQ), and demographic information. The order of presentation for the questionnaires was counter-balanced to reduce the possibility of an order effect. Copies of the questionnaires are provided in Appendices A, E and F.

Procedure

Students were provided with a copy of the questionnaire package during lectures. They were informed that participation in the study was voluntary and they could stop their participation at any time. Students were requested to return the completed questionnaires to a secure box provided at the university within a week. All instructions for completing the various questionnaires included in the package were provided with the package.

Results

The Hypothesised Models

Using EQS version 5.7b (Bentler, 1998), the first model examined the relationships between three presage variables (age, sensing and locus of control) and three process variables (surface, deep, achieving) and between these process variables and one product variable (grade point average). The second model examined the relationships between three presage variables (age, sensing and locus of control) and two process variables (surface-achieving-motive, deep-achieving) and between these process variables and one product variable (grade point average). The hypothesised models are presented in Figure 9.1 and Figure 9.2 respectively.
Figure 9.1 illustrates the hypothesis that the relationship between the presage variables and the product variable is mediated by the process variables (H9.1). Similarly, Figure 9.2 illustrates the hypothesis that the relationship between the presage variables and the product variable is mediated by the process variables (H9.2).

Assumptions

The assumptions of multivariate normality and linearity were evaluated through SPSS and EQS. There were no univariate outliers and no multivariate outliers were found using the \( p < .001 \) criterion for Mahalanobis distance. Nine cases had missing data and were dropped, thus the analysis was performed on 385 cases in both instances.

Model Estimation

Prior to the SEM the inter-correlations for the six observed factors for consideration were calculated using Pearson’s Product Moment correlations (see Table 9.1). As expected, a significant negative correlation was found between age and surface-achieving-motive, significant positive correlations between sensing and surface-achieving-motive, and between locus of control and surface-achieving-motive. There was a weak, but significant positive correlation between age and deep-achieving approach, and a significant negative correlation between locus of control and deep-achieving approach. There was weak but significant positive correlation between deep-achieving approach and GPA.

Two initial models were tested using both the three (deep, surface, achieving) and two (surface-achieving-motive and deep-achieving) process factor models. As neither model provided a better initial fit, both were further analysed.

Model 1.

The independence model testing the hypothesis that the factors are uncorrelated was rejected, \( \chi^2 (21, N = 385) = 369.44 \). The hypothesised model was then tested. The initial three process factor model was not supported, \( \chi^2 (9, N = 385) = 124, p<.001 \) CFI = .67, RMSEA = .18.
Post hoc modifications were performed to develop a better fitting model. On the basis of the Lagrange Multiplier (LM) test, the Wald test and theoretical relevance, modifications were made to the model. Several paths were added and deleted, and after three revisions were made, the best fit to the model was established. In the final version of the model three paths were removed (AGE and ACHIEVING; SURFACE and GPA; DEEP and GPA). Two paths were also added (LOC and GPA; SURFACE and ACHIEVING). The modified model fits the data well, $\chi^2 (8, N = 385) = 11.82, p > .05$ CFI = .99, RMSEA = .04. The final version of model 1 with significant coefficients is presented in Figure 9.3.

As revealed in the Figure 9.3, there were significant paths between sensing function and surface ($\beta = .29, p < .05$), locus of control and GPA ($\beta = .24, p < .05$), locus of control and surface ($\beta = .25, p < .05$) deep and achieving ($\beta = .38, p < .05$) and weak significant paths between age and deep ($\beta = .19, p < .05$), sensing function and achieving ($\beta = .15, p < .05$), achieving and GPA ($\beta = .13, p < .05$) and surface and achieving ($\beta = .20, p < .05$). There were also significant negative paths between age and locus of control ($\beta = -.24, p < .05$), age and surface ($\beta = -.25, p < .05$), locus of control and deep ($\beta = -.28, p < .05$), locus of control and achieving ($\beta = -.30, p < .05$), and a weak significant negative path between sensing function and deep ($\beta = -.17, p < .05$).

Model 2

The independence model testing the hypothesis that the factors are uncorrelated was rejected, $\chi^2 (15, N = 385) = 259.66, p < .01$. The hypothesised model was tested next. The initial two process factor model was not supported, $\chi^2 (6, N = 385) = 50.44, p < .001$ CFI = .82, RMSEA = .14.

Post hoc modifications were performed to develop a better fitting model. On the basis of the Lagrange Multiplier (LM) test, the Wald test and theoretical relevance, modifications were made to the model. Several paths were added and deleted and after three revisions were made, the best fit to the model was established. In the final version of the model four paths were removed (AGE and DA; SENSATE and DA; SAM and GPA; DA and GPA), and three
Table 9.1

*Inter-factor correlations for the six observed variables in the SEM*

<table>
<thead>
<tr>
<th></th>
<th>AGE</th>
<th>SENSING</th>
<th>LOC</th>
<th>SAM</th>
<th>DA</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age</td>
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<td>-.09</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sensing</td>
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<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Locus of Control (LOC)</td>
<td>-.25**</td>
<td>-.01</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Surface-achieving-motive (SAM)</td>
<td>-.33**</td>
<td>.32**</td>
<td>.19**</td>
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<td></td>
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<tr>
<td>Deep-achieving (DA)</td>
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<td>-.03</td>
<td>-.38**</td>
<td>.18**</td>
<td></td>
</tr>
<tr>
<td>GPA</td>
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<td>.08</td>
<td>-.26</td>
<td>.03</td>
<td>.19**</td>
</tr>
</tbody>
</table>

*Note.** **p < .01
Figure 9.3. The standardised solution for the 3P model of learning with three approaches to learning.

Note. SENSATE = sensing function; LOC = locus of control; SURF = surface approach; DEEP = deep approach; ACH = achieving approach; GPA = grade point average
paths were also added (AGE and SENSATE; LOC and GPA; SAM and DA). The modified model fits the data well, $\chi^2 (8, N = 385) = 32.55$, $p<.01$ CFI = .90, RMSEA = .09. The final version of model 2 with significant coefficients is presented in Figure 9.4.

As revealed in the Figure 9.4, there were significant paths between sensing function and surface-achieving-motive ($\beta = .30$, $p < .05$), locus of control and deep-achieving ($\beta = .38$, $p < .05$), locus of control and GPA ($\beta = .28$, $p < .05$), surface-achieving-motive and deep-achieving ($\beta = .33$, $p < .05$) and weak significant paths between locus of control and surface-achieving-motive ($\beta = .12$, $p < .05$). There was also a significant negative path between age and surface-achieving-motive ($\beta = -.30$, $p < .05$), and a weak significant negative path between age and sensing function ($\beta = -.08$, $p < .05$).

Comparison of the Two Models

While final versions of both the models provide reasonable results, the first model provides a ‘better’ overall model. The Akaike Information Criterion (AIC), which compares models with different numbers of variables, was used to examine which of the two models provided the ‘better’ model for the present study. The closer the AIC is to zero the more parsimonious the model (Schumacker & Lomax, 1996). The AIC for model 1 was lower (4.18) than for model 2 (16.55), indicating the three approaches to learning model provided a ‘better’ fit in the current study.

Discussion

The aim of the current study was to examine two theoretical 3P models of learning using both two and three factor models of approaches to learning. The results provided limited support to hypothesis 9.1, as there was a weak significant path between the achieving approach and GPA, suggesting that this approach does mediate to some extent between the presage and product factors. However, the deep and surface approaches to learning do not mediate between the presage and product factors. There was no support for hypothesis 9.2, as neither the deep-achieving or surface-achieving-motive approaches to learning mediated
Figure 9.4. The standardised solution for the 3P model of learning with two approaches to learning.

Note. SENSATE = sensing function; LOC = locus of control; SAM = surface-achieving-motive; DA = deep achieving; GPA = grade point average
between the presage and product factors. As the results of this study indicated model 1 provided a ‘better’ fit, this model will be discussed in more detail.

*The Presage – Process Relationship*

As shown in Figure 9.3, there were several significant paths between the three presage variables (age, sensing function and locus of control) and the three process variables or approaches to learning (deep, surface and achieving). Of these relationships, locus of control appeared to have the strongest relationship with the three approaches to learning. There appears to be a relationship between internal locus of control and the deep and achieving approaches to learning, and between external locus of control and the surface approach to learning. These results are consistent with previous findings (Drew & Watkins, 1998; see also, Cassidy & Eachus, 2000; Dart & Clark, 1991; Rose et al., 1996; Schmeck et al., 1991; Summerfield & Young, 1999; Watkins & Akande, 1996).

The negative relationship between age and surface, suggests younger students are more likely to utilise a surface approach to learning than their older counterparts. Though, relatively weak there also appears to be a relationship between age and deep learning. Both of these relationships have been supported in the literature to date (see chapter 8; also, Biggs, 1987a; Gow & Kember, 1990; Hall & Marchant, 2000; Justice & Dornan, 2001; Richardson & King, 1998; Sheehan et al., 2000). The path between age and the achieving approach to learning was dropped from the model, suggesting that age does not influence a student’s use of this approach to learning. This is not supported by the limited research undertaken on the relationship between age and the achieving approach. Biggs (1987a) for example, found an increase in the achieving approach to learning as a student gets older.

The sensing function evidenced a positive relationship with the surface approach to learning, and negative relationships with the deep and achieving approaches to learning. These negative relationships indicate deep and achieving have a relationship with the intuitive function, that is, the opposite end of the perception scale of the Personal Style Inventory. This result is in accord with Biggs’s (1970b) conceptual understanding of the relationship between personal style and approaches to learning.
As well as the paths between the presage and process variables, there were also paths between the presage variables and between the process variables. Locus of control was negatively related to age, suggesting younger students are more likely to have an external locus of control than older students. There were also relationships between deep and achieving and between surface and achieving, reflecting the higher-order factor structure of the SPQ identified elsewhere in this thesis (see chapter 3).

The Process – Product Relationship

Theoretically, the three approaches to learning mediate between personal characteristics and learning outcomes (i.e., product). However, based on the findings of this study there appears only to be such a relationship, albeit weak (.18), between the achieving approach to learning and grade-point-average (GPA). The unexpected results for deep and surface approaches to learning do not generally reflect findings in the literature to date. As a rule, other research undertaken on this relationship between approaches to learning and GPA (Albaili, 1995; Duckwall et al., 1991; Eley, 1992; Gadzella et al., 1996; Miller et al., 1990; Rose et al., 1996) indicates a positive relationship between the deep and achieving approaches and GPA, and a negative relationship between surface approach and GPA. Most recently, Drew and Watkins (1998) found a significant negative path between surface approach and academic achievement, and a significant positive path between deep approach and academic achievement. Conversely, Wong and Watkins (1998) using the LPQ with secondary school students found no such relationship between deep, surface or achieving approaches to learning and learning outcomes. Wong and Watkins’s findings are consistent with those from the present study for deep and surface approaches to learning, however their results were different for the achieving approach. Perhaps the results of the present study reflect some unique aspect of psychology students, rather than a general tendency as previous literature suggests that discipline or programmes of study can influence approaches to learning (see chapter 5). Thus, future research using students from a diverse range of disciplines should be considered; as should further research with psychology students to assess whether the findings of the present study can be replicated.
A problem with examining the relationship between approaches to learning and learning outcomes may be the reliance on GPA as the outcome measure. While GPA is a global measure of attainment and, as such, is widely used in this research, there is perhaps a need to understand the impact different assessment types have on GPA. Prosser and Trigwell (1999a) suggest that it is important to consider the quality of learning as well as the actual grade attained, as students adopting a surface approach to learning have learning outcomes that are poorer in quality than students who adopt a deep approach to learning.

However, based on the current findings and the previous two path analyses (Drew & Watkins, 1998; Wong & Watkins, 1998) there is an evident need for further research examining this relationship. Research should preferably be undertaken with the SPQ and utilising an Australian sample of students to limit potential confounds associated with cultural differences. It would also be useful to test the model with different student samples from different disciplines or programmes of study. For instance, the two previous path analyses were both undertaken with students from Hong Kong. Further, there needs to be some uniformity in the product measure(s) utilised. While the current study and Drew and Watkins (1998) used GPA, Wong and Watkins (1998) used a combination of attitudes and attainment scores for mathematics.

The Presage – Product Relationship

There was a relationship between locus of control and GPA, suggesting students with an external locus of control are more likely to have a higher GPA than students with an internal locus of control. This result was not expected for the model being analysed in the current study. However, such a direct relationship between presage and product has been proposed by Biggs (1999) in the later versions of the 3P model of learning (see chapter 5). Biggs suggests there is a reciprocal relationship between presage and product components of the model. Essentially, previous learning outcomes (product) are considered to influence a student’s future attitudes to learning. For example, a student who receives a high grade from a particular lecturer is likely to perceive future learning with the same lecturer as a positive experience. Conversely, a student who receives a poor grade from the same lecturer would be
likely to have negative perceptions about future learning experiences with that lecturer. In both instances the student would adopt learning strategies and motives appropriate for their perceptions. Based on this finding, it is proposed that future analysis of the 3P model include paths between the presage and product variables being measured to see if this finding is generalisable.

Strengths and Limitations of the Present Study

A particular strength of the current study is an examination of both the approaches to learning and higher-order approaches to learning. This has not been undertaken in previous research to date. By examining both the three approaches to learning (i.e., deep, surface, achieving) and the two higher-order approaches to learning (surface-achieving-motive, deep-achieving) it was possible to investigate how these two levels of the factor structure of the SPQ interacted within the context of the 3P model of learning. While the factor analyses undertaken in chapter 3 suggested the higher-order factor structure was the more appropriate level of analysis for the SPQ, the results of the current study indicate the three approaches to learning provide a better model fit for the 3P model of learning. The results of this study highlight a need for caution in decisions regarding the structure of the SPQ. In this instance, it was prudent to consider two different models examining the SPQ at these different levels. Researchers need to consider the context in which the SPQ is being utilised in their research as a component of choosing the appropriate level of the factor structure of the SPQ for their work.

An associated strength of the current study was inclusion of the achieving approach as a process factor in the first model. This has not previously been examined. The results of this study cautiously suggest a need for further exploration of the achieving approach. If the achieving approach is considered to be the organisational aspect of learning and deep and surface as the ways of learning, an examination of the relationship between approaches to learning and learning outcomes should consider the organisational ability of students. As Biggs (1987a) suggests, a lack of congruency between the learning motives and strategies of students will affect their learning outcomes. A suggested study could be to establish whether
the present findings are replicable, and then to use this model as a basis for undertaking further research on the relationships between the presage, process and product components of the 3P model of learning.

A limitation of the current study was the reliance on GPA as the sole measure of learning outcomes. As discussed previously, GPA is a global measure of academic achievement that was considered appropriate for inclusion in the examination of a global model of learning. However, GPA does not provide more in depth information regarding the quality of learning. It would be useful to expand the model identified here by expanding the range of learning outcome measures. The Course Experience Questionnaire (Ramsden, 1991) for example, which measures additional outcomes of course satisfaction and generic skill development, may be a useful tool.

There are also limitations associated with the use of structural equation modelling (SEM) to be considered in relation to this study. Firstly, SEM is a confirmatory method of analysis, and when repeated modifications of the initial model are undertaken to find a ‘better’ model fit, as was done with the current study, a second study should be undertaken, utilising a new sample to reassess the new model. This was outside the scope of the current research programme and it is recommended that the model found in this study should be reassessed in the future.

An associated limitation of SEM is that the results cannot be generalised beyond the type of sample utilised in the initial study (Tabachnick & Fidell, 2001). As has been highlighted throughout this thesis, the homogeneous sample utilised in this series of studies, was chosen because this would limit any potential confounds associated with different degree programmes and cultural differences. However, in order for the results of this study, and the findings of this thesis, to be of use, there will need to be similar studies undertaken utilising different samples.

Summary and Conclusions of Section 2

Overall, the results of the present study offer support to the 3P model of learning, where deep, surface and achieving comprise the process component of the model. This is in contrast
to the findings of the first section of this thesis, which suggested the higher-order deep-achieving and surface-achieving-motive are the most suitable for examining approaches to learning using the SPQ. As previous research has not included the achieving approach as a separate factor, the current study indicates there is a need for further examination of this approach to learning.

This, the second section of this thesis, has examined the components of the 3P model of learning and the model. Overall, it has been established that a modified version of the 3P model of learning can be supported. The results of the first study in this section (chapter 6) suggest the SPQ is relatively stable. The results of the second study (chapter 7) identified that students’ perceptions of the learning environment influence the way they approach their learning. As such, this aspect of the presage component of the model should only be considered when the model is to be tested in a specific context. As this was not the purpose of the current thesis, the situational aspect of the model was not included in the final model. The results of the third study (chapter 8) identified three personal characteristics (locus of control, age and the sensing function of personal style) that are good predictors of approaches to learning (i.e., deep, surface, deep-achieving and surface achieving-motive). The results of these three studies and section one of this thesis were then used to develop two theoretical models for testing in the present study. While both models were acceptable, the first model provided a better fit.
CHAPTER 10

CONCLUSION

Summary of Results

The purpose of the current programme of research was to investigate the 3P model of learning proposed by Biggs (1978, 1987a, 1999). The first step towards this was an examination of the construct validity of the SPQ, the instrument developed by Biggs (1979) to measure approaches to learning. There were several specific aims related to this purpose. The first section of this thesis had as its aims the validation of the SPQ, while the second section examined broader questions regarding components of the 3P model, culminating in an examination of the model itself.

Results of Section 1 - Construct Validation of the SPQ

The initial review of the literature on approaches to learning, the measurement of approaches to learning and the psychometric development of the SPQ identified a number of key strengths and limitations of the existing research. The review identified the substantial literature validating the constructs of deep and surface approaches to learning, using a variety of qualitative and quantitative methodologies. It was also evident, however, that the empirical support for the construct of achieving approach to learning is lacking.

Several problems were identified in the literature on approaches to learning. Five issues of particular interest to the present research were: the over reliance on exploratory factor analysis; inappropriate sample sizes; issues regarding procedural decisions in exploratory factor analysis (viz. extraction of factors and the choice of a specific rotation method); general reliance on factor analysis to examine the psychometric properties of the SPQ; and concerns about the cultural specificity of the SPQ. The majority of research undertaken on the factor structure of the SPQ has used exploratory factor analytic techniques. As discussed in chapter 2, a reliance on exploratory factor analysis in the empirical work resulted in an inability to discern a clear pattern of the factor structure of the SPQ, as there was no systematic approach to this body of work. For example, there was no transparency in decisions regarding the number of factors extracted. Additionally, as the majority of research focussed on factor
analysis of the SPQ, little is known about the retest reliability of the SPQ and the ability of the
depth and surface scales to measure the underlying deep and surface approaches to learning
constructs. Further, researchers (Biggs, 1996; Gow et al., 1989; Hattie & Watkins, 1981;
Kember & Gow, 1991; Marton et al, 1993; Watkins & Murphy, 1994) repeatedly identify that
there are problems associated with the use of the SPQ with non-English speaking students, yet
the majority of psychometric work undertaken on the SPQ has used non-English speaking
samples. Therefore, the resultant psychometric properties suggested for the SPQ must be
viewed with caution. Two studies were designed to address concerns regarding the
psychometric properties of the SPQ.

The first study used a convergent methodology to assess the construct validity of the
SPQ. A particular strength of this study was the use of a single cohort of students to assess
the factor structure of the SPQ employing exploratory and confirmatory factor analysis.
Further this study examined the SPQ at all three levels identified by Biggs (viz. subscale,
scale and higher-order scale). To eliminate problems associated with the cultural specificity
of the SPQ, the research was undertaken with Australian students as the original SPQ
included such a sample. Such an examination of the construct validity of the SPQ has not
been previously undertaken. As a component of this study the internal consistency and retest
reliability of the SPQ were also tested (see chapter 3). The reliability of the SPQ was found
to be acceptable. Cronbach’s alpha identified some weakness in the surface scale and
subscales, but this pattern of internal consistency was consistent with previous research (see
chapter 2). Spearman’s rank-order correlation was used to examine the retest reliability of the
SPQ at all levels. This methodology has not previously been employed to examine the retest
reliability of the SPQ. The results suggest the surface motive, surface strategy, deep strategy,
achieving motive and achieving strategy subscales evidenced good reliability over a period of
three months, but not the deep motive subscale. A similar pattern is evident for the scales of
the SPQ. There was moderate reliability for the surface, deep and achieving scales after three
months. There was also a similar pattern for the higher-order scales, with moderate reliability
for surface-achieving-motive and deep-achieving after three months.
The results of the factor analyses were mixed. The convergent methodology used in this study indicates the higher-order deep-achieving and surface-achieving-motive factors are the most appropriate level at which to undertake research on the SPQ. Both exploratory (H3.9) and confirmatory factor analysis (H3.10) supported such a two-factor model of approaches to learning (deep-achieving + surface-achieving-motive). Previous research also supported a two-factor model of approaches to learning (Kember & Leung, 1998; Sachs & Gao, 2000; Wong et al., 1996). As discussed in chapter 2 differences between the present findings and the factor structures for previous studies may be due to cultural differences. Two sets of hypotheses were developed for the remaining structures of the SPQ based on Biggs’s theory and previous research. For these hypotheses, exploratory (H3.1 and H3.5) and confirmatory factor analysis (H3.2 and H3.6) found limited support for the subscale structure of the SPQ, revealing some instability in the surface motive, achieving motive and deep strategy subscales. Further, no support was found for a three-factor model of approaches to learning (deep + surface + achieving) utilising either exploratory (H3.3 and H3.7) or confirmatory factor analysis (H3.4 and H3.8). Previous research findings (see chapter 2) also indicate some instability in the subscale and scale factor structures of the SPQ. These findings indicate that the achieving approach to learning may not be a conceptually distinct approach to learning as originally thought, but rather functions in conjunction with the deep and surface approaches to learning. Thus, the two higher-order factors were considered the most appropriate level for the analyses in the subsequent research programme.

Based on the findings of the first study, and the acknowledgement by previous researchers that the achieving approach to learning is conceptually different from the deep and surface approaches to learning, and as such is able to combine with deep and surface approaches to learning to form the higher-order factor structure, the decision was made not to include achieving approach in the second study. Deep and surface approaches to learning, as measured by the SPQ, were examined utilising qualitatively derived measures to assess the underlying constructs (see chapter 4). Such an examination of the SPQ deep and surface constructs is innovative. The results found significant positive relationships between the SPQ
deep approach and the deep scale on the interview (H4.1) and the written assessment (H4.2). Similarly, there was a significant positive relationship between the SPQ surface approach and the surface scale of the interview (H4.4), but not between the SPQ surface approach and the surface scale of the written assessment tasks (H4.5). Thus, the ability of the three instruments to discriminate between the deep and surface constructs was mixed. Previous research (Christensen et al., 1991; see also chapter 2) on the concurrent validity of the SPQ also indicates some weakness in the surface approach to learning. Good discriminant validity was, however, demonstrated for the SPQ (H4.7). Overall, the results of this second study indicate good construct validity for the deep approach to learning, and fair construct validity for the surface approach to learning as measured by the SPQ.

In combination, the results of these studies suggest the good construct validity of the SPQ, particularly at the higher-order two-factor level (deep-achieving + surface-achieving-motive). These findings provide a strong base for an examination of the 3P model of learning using the SPQ to measure approaches to learning.

**Results of Section 2 – Testing the 3P Model of Learning**

The overriding aim of the second section of this thesis was to examine the 3P model of learning in detail. A review of the literature on the development and analysis of the 3P model of learning, and the presage, process and product components of the model identified a number of key strengths and limitations of the existing research. The review identified the key features of the 3P model examined in the literature, using a variety of qualitative methodologies. It was also evident, however, that a systematic investigation of the 3P model has been limited.

Several problems were identified in the research undertaken on the 3P model of learning. Two issues were of particular relevance to the present research: stability of approaches to learning; and research design. A review of the literature provided support for three different premises regarding the stability of approaches to learning (viz. state, trait, or state and trait), however, but with limited empirical research on the stability of approaches to learning. Six studies to date have examined the stability of the SPQ. The results of these studies were
mixed, suggesting a need for further research to examine the stability of approaches to
learning. An adjunct to the work on the stability of approaches to learning is the notion of
influencing approaches to learning. Research on the situational sensitivity of the SPQ is also
limited. Moreover, an analysis reveals several research design concerns in the body of work
undertaken on the 3P model of learning. Firstly, the choice of a research design has been
problematic. Many studies on the 3P model of learning have used between-subject research
designs. Obviously, when the purpose of the research is to assess the stability of a construct
such as approaches to learning, it is important to limit possible confounds associated with
personal characteristics. Biggs (1987a) and others (Prosser & Trigwell, 1999; see also
chapter 5) all suggest that individual characteristics affect the approach to learning of any
given student. The implication of this for research on the 3P model of learning is the
adoption of a within-subjects research design. Secondly, consistency in the design of research
on the 3P model was identified as problematic (see chapter 5). As the potential range of
variables associated with the 3P model of learning is broad, researchers have tended to select
only a few that are of personal interest. This has resulted in a limited ability to directly
compare the results of different studies. Finally, methodological problems associated with
investigating the 3P model were also identified (see chapters 5 and 9). The need for a
systematic investigation of the components of the 3P model to help limit the impact of these
issues was identified. Four studies were designed to address the concerns of previous
research.

The third study in this thesis examined the stability of approaches to learning. A single
cohort, within-subjects design was employed to examine shifts in approaches to learning
between the first and third years of study in an undergraduate degree. Such a research design
has not been used to date to with psychology students. The results suggested relative stability
in the deep and surface approaches to learning over this timeframe (H6.1); however there was
a decrease in the achieving approach to learning. Previous research using a longitudinal
research design also suggests relative stability in the deep and surface approaches to learning
over a period of several years (Zeegers, 2001; see also chapter 5). Qualitative information
gathered in the present study suggests changes in self- or meta-cognitive awareness may be more evident than actual changes in approaches to learning. Problems identified in section 1 of this thesis regarding the use of the achieving approach to learning as a separate learning construct are further supported by the findings of this study.

The fourth study was undertaken over a period of three months to investigate the teaching-learning environment as a presage factor in the 3P model of learning. The purpose of this study was to ascertain whether approaches to learning shift as a result of differences in the perceptions of teaching-learning environments and thus are stable traits or changeable states (see chapter 7). This study used an innovative within-subjects research design to assess these potential shifts. Overall, the results indicated surface strategies, the surface-achieving-motive approach, and some aspects of both the deep and deep-achieving approaches to learning as measured by the SPQ are sensitive to differences in teaching-learning environments. Students evidenced a significant decrease in surface strategies (H7.1) and a decrease in overall surface approach to learning (H7.2) in the non-traditional, compared to the traditional course. Conversely, there was a significant increase in the overall deep approach to learning (H7.4) in the non-traditional, compared with the traditional course. As expected, students with a predisposition toward a surface approach to learning evidenced a larger shift toward deep learning in the non-traditional course than those predisposed to deep learning (H7.5 and H7.6). The results of this study indicate students’ perceptions of the particular learning environment influence the way in which they approach their learning. Previous research using between-subjects research designs has also found differences between students in traditional and non-traditional learning environments (see chapters 5 and 7). As both the present study and previous findings suggest approaches to learning are sensitive to environmental changes, it was decided not to include a measure of learning environment, which is context specific, in an examination of the more general 3P model of learning.

The focus of the next study was on the presage component of the 3P model, namely personal characteristics. The purpose of the fifth study was to examine a combination of the different personal characteristics identified as salient in the literature, namely, locus of
control, personality type, intelligence, and demographics (age, gender, year of study) to ascertain their capacity to predict deep and surface approaches to learning (see chapter 8). The results indicated locus of control, the sensing function of Jungian personality type and the demographic variable age, were significant predictors of the surface (H8.1), surface-achieving-motive (H8.3), deep (H8.5) and deep-achieving (H8.7) approaches to learning as measured by the SPQ. More specifically, external locus of control, sensing function of personal type, and younger age were found to be good predictors of the surface and surface-achieving-motive approaches to learning, whereas internal locus of control, intuitive function of personal type, and older age were found to be good predictors of the deep, and in some instances, deep-achieving approaches to learning. However, no relationship was evidenced between gender and approaches to learning. The results of the present study are consistent with previous findings on this relationship (Wilson et al., 1996). Further, no relationship was evidenced between intelligence and any of the approaches to learning (H8.2, H8.4, H8.6 and H8.8). Previous research on the relationship between intelligence and approaches to learning has found similar results to those of the present study (Biggs & Kirby, 1984; Saljo, 1981). However, it is possible that the previous research may have been confounded by using mixed gender samples, whereas in this study intelligence was tested with a same gender sample.

The final study in the current thesis brought together the components of the 3P model. The purpose of the final study in this thesis was to examine the 3P model of learning. Two modified versions of the model, based on the second-order (i.e., deep, surface, achieving) (H9.1) and third-order (deep-achieving, surface-achieving-motive) (H9.2) approaches to learning, were examined. The results, while providing support for both models, suggested the three approaches to learning model provided a ‘better’ model fit. The final version of this model indicates several significant paths; namely, significant positive paths between sensing function and surface approach to learning, locus of control and GPA, the deep and achieving approaches; and weak significant paths between age and deep approach, sensing function and achieving approach, achieving approach and GPA, and the surface and achieving approaches.
There were also significant negative paths between age and locus of control, age and surface approach, locus of control and surface approach, locus of control and deep approach, locus of control and achieving approach; and a weak significant negative path between sensing function and deep approach. The results of this study are consistent with previous findings for the relationship between personal characteristics and approaches to learning (see chapters 5 and 9). There was also a relationship between locus of control and GPA, indicating that students with an external locus of control are more likely to have a higher GPA than students with an internal locus of control. While this relationship has not been previously tested, Biggs (1999) suggests such a relationship is possible. The relationship between approaches to learning and GPA was not as expected. A weak significant relationship was found between the achieving approach to learning and GPA; no such relationship was evidenced for the deep or surface approaches to learning. As a rule, research on approaches to learning and GPA indicates a positive relationship between a deep approach to learning and GPA, and a negative relationship between a surface approach and GPA (see chapters 5 and 9). The results of this study may reflect the unique characteristics of psychology students, who need to compete for places in post-graduate courses in order to attain professional recognition. As such there is a need for further research on the 3P model of learning. Future research should endeavour to systematically examine the 3P model of learning within a range of different disciplines or programmes of study to ascertain whether the results of the present study can be generalised.

Implications for Research and Practice

There are several implications of the present research programme to address. Firstly, the structure of the SPQ may benefit from further investigation. As has been noted elsewhere in this thesis, the third order factor structure appears to be most stable, and is the level at which future analyses could most fruitfully be undertaken. However, the results of the final study in this thesis (see chapter 9) suggest the achieving approach to learning may have a role within the broader context of the learning – assessment process, although the correlation was significant but small. Thus, until this relationship has been further explored it would be prudent to use both the SPQ (Biggs, 1987a) and the latter, more recently developed R-SPQ-
2F (Biggs et al., 2001) in studies designed to examine the context of learning, as the more recent version of the SPQ has removed the achieving approach to learning. Further, perhaps the tendency in research to simply omit the achieving approach from analysis should be reconsidered.

An associated implication of the present research relates to the recently revised SPQ, as this newer version of the instrument is likely to become the focus of future research. Research methodologies have become more sophisticated since the SPQ was first developed, and thus researchers are likely to employ more stringent and rigorous methodologies. The current research provides a useful methodology for validation of the R-SPQ-2F. Firstly, researchers could establish the reliability and validity of the instrument with long term studies utilising a range of quantitative and qualitative methodologies, including a convergent exploratory and confirmatory factor analysis methodology, to ascertain whether the constructs of deep and surface as measured by the R-SPQ-2F are valid, as well as whether the instrument has internal validity. The reliability of the R-SPQ-2F will also need to be tested to ascertain the optimal maximum and minimum intervals between testing to avoid response sets and associated problems.

Thirdly, the second study in this thesis identified that when faced with assessment such as examination, students tend to utilise similar learning strategies. As identified in a focus group discussion conducted as a component of the second study (see chapter 4), it was difficult to differentiate between deep and surface learners on their strategies for completing learning tasks such as writing assignments and studying for examinations. In relation to examinations, both deep and surface learners reported utilising similar strategies. This has implications for the way academic assessment is structured. If a deep approach to learning is to be encouraged, then assessment will have to reflect this goal. Further, as shown in chapter 7, group-based project work and reflective assessment are more likely to promote the use of deep learning, whereas traditional lectures and assessment are more likely to promote surface learning.
Fourthly, with regard to the test-retest capability of the SPQ, three months appears to be an appropriate timeframe for retesting the learning approaches of students, with Spearman’s Rho identified as the most appropriate analysis for assessing such test-retest reliability. Conclusions regarding the state/trait nature of approaches to learning may not be definitively made based on the current findings, save for the possibility that students report having a greater understanding of their own learning processes in the final year of an undergraduate degree, than in the first year. More work is required on this aspect of approaches to learning to ascertain whether shifts do occur in approaches to learning: in particular, whether these changes are the result of temporary environmental pressures as found by Tooth et al. (1989; see also Coles, 1985). A useful methodology would be to follow one cohort throughout their entire undergraduate degree, testing them at the commencement and conclusion of each semester to map any shifts in their approaches to learning. As well, it would be useful to incorporate some of the other methodologies, such as interviews and written tasks, discussed elsewhere in this thesis (see chapter 4).

At the same time, perceptions of the learning environment appear to be important in defining whether students will utilise deep or surface approaches to learning. This has both research and practical implications. There are two levels at which approaches to learning can be examined: namely, specific, and general approaches to learning. For researchers, the implication is that care needs to be taken in designing their research so that there is consistency in the level at which approaches to learning are being examined. For instance, in the current research programme, learning environment was not included in the 3P model of learning, because the purpose of the study was to examine general approaches to learning, and examination of learning environment would necessitate the testing of a range of specific learning environments. Further, there is an obvious need to understand how perceptions of the learning environment are developed and how these perceptions can be altered to enhance learning. For educators, there is also the need to understand and establish learning environments that are suited to students’ preferred learning approaches. Based on the findings of the present thesis, it appears that students are adept at interpreting the learning
environment and, based on their perceptions, making flexible decisions regarding the learning strategies they adopt in any given class. These findings are consistent with those from previous research (see chapter 5).

Finally, the results of the 3P model of learning in chapter 9 indicate that the role of approaches to learning in the broader learning context requires further examination. The finding of this thesis, in contrast to previous studies, found deep and surface approaches to learning did not mediate between personal characteristics and learning outcomes. Research needs to re-examine the model developed in this thesis, utilising different samples of students to ascertain whether this is an anomaly of this degree programme, or whether this result is more generalisable. The role of the achieving scale needs to be further considered, as it is apparent that this approach to learning cannot be removed from examination until it is better understood. Further, Biggs’s (1999) own model of learning requires re-examination to develop a model that can be tested within the current technological limitations. As discussed earlier (see chapters 5 and 9) the most recent version of the model is unable to be tested because of the constraints of available statistical methodology.

Finally, it is clear from the present findings that the SPQ can be confidently used by educators to assess approaches to learning. Furthermore, as the instrument is sensitive to differences in learning approaches as a function of differences in teaching and learning environments, it can be used as a component of course evaluation to assess such changes. This is an aid to educators in terms of the re-design of more effective learning environments. In this regard, it is useful for educators to also consider and measure shifts in approaches to learning as a function of students’ higher or third-order approaches.

Strengths and Limitations of the Present Research Programme

While the strengths and limitations of the various studies have been discussed in the associated chapters of this thesis, there are clearly key strengths and limitations associated with the research programme as a whole.
Chapter 10  241

**Strengths**

A key strength of the present research has been the overall structure of the research programme. Firstly, assumptions regarding the psychometrics of the SPQ using both convergent qualitative and quantitative methodologies were tested prior to using this instrument in a range of other studies. This rigorous examination of the SPQ was undertaken to ensure that the findings of the studies in section two of this thesis were based on valid measurement. Once the psychometric properties of the SPQ were established the components of the 3P model of learning were then examined, to assist in the development of an appropriate model for testing. Again, the decision to do this was to ensure that the model could be examined with rigor.

This thorough examination of the SPQ and the 3P model of learning was undertaken using a range of quantitative methodologies, chosen to best answer the various research questions. This is a second strength of the present research programme. A number of innovative research methodologies were used, for example: a convergent methodology employing systematic and exhaustive item and scale level, first-, second- and third-order level analysis using both exploratory and confirmatory factor analysis on the same student sample; test-retest reliability of the SPQ using Spearman’s rank-order correlations; a multitrait-multimethod matrix to examine the construct validity of the deep and surface constructs of the SPQ; and a within-subjects comparison group design to investigate changes in learning approaches between different learning environments.

Finally, the present research programme utilised a homogeneous sample of students to examine the SPQ and 3P model of learning. By doing this, any of the possible confounds such as differences in the factor structure resulting from cultural differences (see chapter 2), were avoided. Further, there is evidence to suggest that different disciplines of study may be associated with different learning profiles (Biggs, 1987a; Hattie & Watkins, 1981), thus any potential problems associated with such differences were also avoided by utilising homogeneous samples from the same population of students.
Limitations

A limitation of the present research programme is the inability to generalise the results of this thesis beyond the university psychology course in which the research was undertaken. While this was also considered a particular strength of the study, it also limits the application of the findings. While there is a need for more research of this type to be undertaken in different courses in order to establish generic findings on approaches to learning, it must be remembered that there is a growing belief that such a broad-based understanding of learning may not be appropriate (see chapters 2 and 5; see also Prosser & Trigwell, 1999). Thus, while research in different learning contexts should be encouraged, perhaps it is inappropriate to consider that general findings, applicable to all students regardless of discipline of study, are the ultimate goal of such research. Instead, as evidenced in the present research, findings regarding a particular student population (i.e., psychology) can be compared to those from students in different disciplines. It is also possible to attempt to replicate the findings from the present study on other psychology students within the same degree programme.

A second limitation to this thesis became apparent after the completion of the final study; namely, the limited examination to date of the achieving approach to learning. It is apparent that there is a need to establish the role of the achieving approach in learning, and this should be taken into account in future research. Thus, it would be useful to undertake more work using the SPQ, perhaps extending the methodology of the second study (i.e., multitrait-multimethod) to examine the underlying achieving construct. It is evident that the way students organise their learning influences their learning outcomes. An associated limitation was the decision to utilise surface-achieving-motive approach to learning, rather than the surface-achieving approach. It can be stated that both decisions were measured, based on the available literature in the first instance, and the factor structure of the current research programme in the second. However, both also provide ample opportunities for further research to be undertaken employing a similar methodology to this thesis.
Chapter 10 243

Future Research

There are many possible directions for future research stemming from this thesis. Many of the studies have examined approaches to learning in new ways and as such will require follow up in order to assess the generalisability of the current findings to other disciplines or programmes of study and to other cultures. While many of the suggestions for future research have been progressively mentioned, there are two fundamental directions in which further research could fruitfully develop. Each is discussed in turn.

Methodology

As argued throughout this thesis, there is a need for more systematic and methodologically sound research on approaches to learning as measured by the SPQ, and as considered in the 3P model of learning. There are three areas of particular interest associated with the current thesis. Firstly, there is a need to establish a systematic approach to undertaking psychometric research on the SPQ and the newer R-SPQ-2F. It is evident, based on both available literature and the current findings, that while exploratory factor analysis is a reasonably simple statistical technique to run, it causes a range of problems when attempting to interpret and compare factor structures. Further, there is a need to ensure that the same information in terms of criteria is being provided about the results of all factor analytic studies undertaken on the SPQ/ R-SPQ-2F. Of primary importance to the further development of the SPQ is the need to ascertain whether there is one higher-order factor structure or whether differences in the factor structure are associated with other variables. For instance, there is a need to undertake a series of studies within the different cultural settings in which the SPQ is currently being utilised in an attempt to validate the SPQ for those cultures. Research to date has provided mixed results regarding the cultural specificity of the SPQ (Marton, DallÁlba & Tse, 1993; Watkins & Murphy, 1994) and this issue needs to be clarified before any cross-cultural comparisons of the SPQ can be interpreted with confidence.

Another methodological issue is the need to conduct research on the SPQ/ R-SPQ-2F utilising methods other than factor analysis. The current thesis has provided one such methodology for doing this, utilising a multitrait-multimethod approach. The current research
indicates the SPQ deep and surface approaches to learning are adequately measuring the underlying deep and surface constructs. However, as this research is new in this field and there were some problems associated with the written task (see chapter 4) there is a need for further research utilising a similar methodology to further explore the construct validity of the SPQ deep and surface constructs.

This comment can be extended to a number of the studies in the current thesis as many of these studies used innovative research designs, in this field, for examining questions associated with approaches to learning as measured by the SPQ. Thus, it is important that further research be undertaken replicating these methodologies to test the generalisability of current findings. Of particular interest would be a study utilising a within-subjects design to re-examine the role of the learning-teaching environment in approaches to learning.

The 3P Model of Learning

The current thesis provided a modified version of the 3P model for examination, based on the findings of the studies contained within the thesis. More research needs to be undertaken to establish whether this model can be supported, utilising similar and dissimilar student samples. This could involve undertaking a series of studies, as exemplified by this thesis, to establish the factors for inclusion in the model, and then an examination of the model developed from such research.

Finally, the achieving approach to learning needs to be researched more thoroughly to establish whether it is an approach to learning in its own right, or is best omitted from future research on student learning. The results of the present thesis suggest caution in making such a decision.

The results of the present programme of research indicate the SPQ is both a reliable and valid instrument as a measure of approaches to learning. Consequently, the SPQ can be used with confidence in research and educational practice. The SPQ has also been shown to be sensitive and capable of measuring changes in perceptions of the learning environment. Thus, the SPQ is suitable for use in pre-post examinations of different teaching initiatives. The
higher-order structure of the SPQ appears to provide the most consistent results. In general the higher-order approaches to learning appear to provide the most useful application for educational research purposes. However, the results of the investigation of the 3P model indicate the need to also continue to examine the second-order structure of the SPQ. Research employing both the second- and third-order structures of the SPQ will provide a breadth to future research, which may be missed if there is over-reliance on the third-order structure. For instance, the results of the present research indicate the three approaches to learning (deep, surface and achieving) provide more information on the presage to process relationship than the two higher order approaches to learning (deep-achieving and surface-achieving-motive) model. Thus, conclusions from both are useful for educational and research practice. Moreover, this leaves open the possibility for further investigation of the achieving approach and its place in learning.
APPENDIX A

THE STUDY PROCESS QUESTIONNAIRE AND DEMOGRAPHIC INFORMATION

GENERAL INFORMATION (Version 1)

This questionnaire package asks you to answer some questions about the studying and learning you did at university in the Bachelor of Behavioural Science degree programme. The information you provide will be fed back, as group data, to the university so that they can gain some understanding about what students think of the degree programme.

The information you provide is confidential and will only be seen in individual form by people involved in analysing the information.

You are free to discontinue your participation in this research project at any time. If you have any queries regarding the research please contact the primary researcher.

Please complete the demographic information below as this will assist us in matching your responses to information that was collected from you in 1994.

Your name

Your student number

Your age ___________ years ___________ months

Your gender Male Female (Please circle one)

How many years of post-secondary study have you undertaken? ______________

Would you be available, if requested, to participate in a brief (1 1/2 hour) focus group discussion during semester on aspects of this subject design or implementation?

Yes No (circle one)

Thank you for taking the time to complete these questions.
GENERAL INFORMATION (Version 2)

The purpose of this exercise is twofold:

* to provide you with some data as co-commentates which will better help you to manage your relationship around issues of preferred strategies and style

* to provide us, as subject managers, with a better empirical basis with which to understand the impact of these types of designs and how to improve them.

To this end we ask that you return the questionnaires and answer sheets to us and complete and retain the Personal Summary Profile (last pages) for your own use.

The information you provide is confidential and will only be seen in individual forms by myself in the role of subject evaluator or a person assisting me in organising the data analysis. You are of course free to disclose your responses to members of the teaching team.

Please complete the demographic information below as this will assist us in matching pre and post scores when an end of semester evaluation is conducted.

Your name

Your student number

Your age years months

Your gender Male Female (Please circle one)

How many years of post-secondary study have you undertaken?

Would you be available, if requested, to participate in a brief (1 1/2 hour) focus group discussion during semester on aspects of this subject design or implementation?

Yes No (circle one)

Thank you
STUDY PROCESS QUESTIONNAIRE

There is no right way of studying. It all depends on what suits your own style and the courses you are studying. The following questions have been carefully selected to cover the more important aspects of studying. It is important that you answer each question as honestly as you can. Please answer the following questions in terms of your typical approach to study.

How to answer:

For each item there is a five point scale on the Answer Sheet attached. A response is shown by circling one of the five options for each statement. The numbers stand for the following response:

5 = this item is always or almost always true of me
4 = this item is frequently true of me
3 = this item is true of me about half the time
2 = this item is sometimes true of me
1 = this item is never or only rarely true of me

Example:

I study best with the radio on

If this is almost always true of you, you would circle 5 on the answer sheet.

If you sometimes studied well with the radio on, you would circle 2.

Do not worry about projecting your good image. As answered above your answers are CONFIDENTIAL and there are several different approaches to studying. Please answer each item.

Thank you for your cooperation.
1. I chose my present courses largely with a view to the job situation when I graduate rather than out of their intrinsic interest to me.

2. I find that at times studying gives me a feeling of deep personal satisfaction.

3. I want top grades in most or all of my courses so that I will be able to select from among the best positions available when I graduate.

4. I think browsing around is a waste of time, so I only study seriously what’s given out in class or in the course outlines.

5. While I am studying, I often think of real life situations to which the material that I am learning would be useful.

6. I summarise suggested readings and include these as part of my notes on a topic.

7. I am discouraged by a poor mark on a test and worry about how I will do on the next test.

8. While I realise the truth is forever changing as knowledge is increasing, I feel compelled to discover what appears to me to be the truth at this time.

9. I have a strong desire to excel in all my studies.

10. I learn some things by rote, going over and over them until I know them by heart.

11. In reading new material I often find that I’m continually reminded of material I already know and see the latter in a new light.

12. I try to work consistently throughout the term and review regularly when the exams are close.

13. Whether I like it or not, I can see that further education is for me a good way to get a well-paid or secure job.

14. I feel that virtually any topic can be highly interesting once I get into it.

15. I would see myself basically as an ambitious person and want to get to the top, whatever I do.

16. I tend to choose subjects with a lot of factual content rather than theoretical kinds of subjects.

17. I find that I have to do enough work on a topic so that I can form my own point of view before I am satisfied.

18. I try to do all my assignments as soon as possible after they are given out.

19. Even when I have studied hard for a test, I worry that I may not be able to do well in it.

20. I find that studying academic topics can at times be as exciting as a good novel or movie.

21. If it came to the point, I would be prepared to sacrifice immediate popularity with my fellow students for success in my studies and subsequent career.

22. I generally restrict my study to what is specifically set as I think it is unnecessary to do anything extra.

23. I try to relate what I have learned in one subject to that in another.

24. After a lecture or lab I reread my notes to make sure they are legible and that I understand them.
25. Lecturers shouldn’t expect students to spend significant amounts of time studying material everyone knows won’t be examined.

26. I usually become increasingly absorbed in my work the more I do.

27. One of the most important considerations in choosing a course is whether or not I will be able to get top marks in it.

28. I learn best from lecturers who work from carefully prepared notes and outline major points neatly on the blackboard.

29. I find most new topics interesting and often spend extra time trying to obtain more information about them.

30. I test myself on important topics until I understand them completely.

31. I almost resent having to spend a further three or four years studying after leaving school but feel that the end results will make it all worthwhile.

32. I believe strongly that my aim in life is to discover my own philosophy and belief system and to act strictly in accordance with it.

33. I see getting high grades as a kind of competitive game, and I play it to win.

34. I find it best to accept the statements and ideas of my lecturers and question them only under special circumstances.

35. I spend a lot of my free time finding out more about interesting topics which have been discussed in different classes.

36. I make a point of looking at most of the suggested readings that go with the lectures.

37. I am at university mainly because I feel that I will be able to obtain a better job if I have a tertiary qualification.

38. My studies have changed my views about such things as politics, my religion, and my philosophy of life.

39. I believe that society is based on competition and schools and universities should reflect this.

40. I am very aware that lecturers know a lot more than I do and so I concentrate on what they say is important rather than rely on my own judgement.

41. I try to relate new material, as I am reading it, to what I already know on that topic.

42. I keep neat, well-organised notes for most subjects.
**STEP ONE:** Circle the number on this Answer Sheet that best fits your immediate reaction to each question as it relates to your study habits. Do not spend a long time on each item; your first reaction is probably the best one.

**How to answer:** For each item there is a five point choice option. The numbers stand for the following response:

5 = this item is **always or almost always** true of me  
4 = this item is **frequently** true of me  
3 = this item is true of me **about half the time**  
2 = this item is **sometimes** true of me  
1 = this item is **never or only rarely** true of me

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**STEP TWO:** There are 6 subscales on this questionnaire. To determine your score on each add up your score on items marked with the same code (e.g. SM) and enter this subtotal in the appropriate box below. This will be easier if you notice that every sixth item has the same code (e.g. SM = 1, 7, 13, 19, 25, 31, 37).
APPENDIX B

INTERVIEW QUESTIONS

The purpose of this interview is to gather information about the way in which you approach your learning. You are going to be asked a series of questions about how you write assignments. Also I am going to ask you some questions about the reasons why you are studying. The information you give me today will be confidential. If, at any time, you would like to stop the interview for any reason, let me know. Have you got any questions?

Q1. What is your typical approach to writing an assignment?

Prompts

What is the first thing you do?

When do you start working on this?

How long do you work on this?

Why do you start with this?

What do you do next?

When do you start working on this?

How long do you work on this?

Why do you start with this?

NB. Continue this process for all stages of assignment writing as needed.

Q2. How much time do you spend conceptualizing an assignment?

Prompts

At what point do you go to the literature?

Do you go to the literature with questions in mind?

If Yes: What kind of questions?

If No: How do you search the literature?

What do you with the information that you gather?
How do you decide what information is important?

Q3. How do you go about actually writing the assignment?

Prompts

Do you structure your essay before you start?

Does the way you write assignments alter depending on the type of assignment?

Do you use the criteria you are given for an assignment?

Q4. How do you study for exams?

Prompts:

Do you study throughout the semester?

How do you organize your time during study weeks?

Q5. Do you learn from doing assignments?

Q6. Do you learn from doing exams?

Q7. Do your grades reflect what you have learned?

Q8. What does learning mean to you?

Q9. How would you describe the relationship between learning and studying?

Q10. How do you approach your learning at university?
APPENDIX C

DIFFERENT VERSIONS OF THE 3P MODEL OF LEARNING

![Diagram of 3P Model]

*Figure C.1.* Expanded model of study processes (Biggs, 1984).
INDEPENDENT VARIABLES

Personological
- Process abilities
- Content abilities
- Prior knowledge
- Developmental stage
- Personality

Situational
- Content
- Teaching method
- Evaluation
- Time allowed for task
- Course structure

INTERVENING VARIABLES

Learning Process Complex
- Motives
- Strategies

DEPENDENT VARIABLES

Academic performance

Figure C.2  Mediation model of study processes  (Biggs & Kirby, 1984).
Figure C.3. Updated model of study processes (Biggs, 1985).
Figure C.4. General model of study processes (Biggs, 1987a).
Figure C.5. General model of study processes (Biggs, 1989).
**Figure C.6** General model of study processes (Biggs, 1990).
Figure C.7. General model of study processes (Biggs, 1992).
APPENDIX D

COMMENTS BY STUDENTS REGARDING WRITING ASSIGNMENTS WITH INTERPRETATION

For example one student's response to the question in their first year was:

*Generally I probably go to the library and look up the key words, find a book that’s good and then use their references to find other reference… I have an organic style. I sit down write up the topic and link sentence for each paragraph and then fill in the body (Student A).*

And another using a similar approach:

*Look up related words from topic, pour through indexes and get the outline together. Do more reading and make note of page numbers that are important. Put snippets of information into the outline (Student B).*

Both responded in the first instance that the first step was to decide what the keywords were in the question and then to go to the literature and search for these keywords. Subsequent steps involved reading the literature and formulating a response to the essay topic based on what has been read. These students did not mention the need to understand or integrate the information collected before writing the assignment. The final student was more strategic in the first instance than the other two students, wanting to get an understanding of what was expected before turning to the research.

*Read the question several times and try and get some idea of what the marker would want and then look for readings in the library. Do lots of reading and summarise the important parts, making a basic plan as I go then when I finish this write an outline and then write the essay (Student C).*

The desire to ascertain what the lecturer wants as the first step in writing the assignment can initially be interpreted as either a surface or achieving strategy as the goal is to figure out what is required and then deliver that to the lecturer. However, undertaking a range of reading suggests this student is utilising achieving strategies rather than doing the bare minimum reading that would be done by a surface strategist. The key difference between Student C’s original answer to
this question and their subsequent answer is the way that this student articulates the desire to understand the question for its own sake rather than to second guess the lecturer, which is lacking in the first instance:

Read the question and seek to understand it. This might involve discussing the topic with the lecturer, tutor, and other students to clarify my understanding of what was expected. Research the topic. Generally starting with general information (e.g., from texts) and then exploring further articles (e.g., research articles/journals) for more detailed information. As I’m reading for the topic I construct in my mind a structure for the assignment with points to be covered specified. This gets put onto paper at some stage and is amended with further reading and writing of the assignment. Write for each point, move onto another, editing as I work (Student C).

The same can be said of the other two students who, upon reflection, after the completion of their studies are more articulate about the way in which they undertake this type of learning task.

In the second instance, Student A again responded to the question following this basic formula for writing assignments:

Probably in the most undisciplined way I could imagine. I would usually read the topic first, then go to the library the same day, photocopy articles (both those articles specifically requested plus several spare). Normally I would read one or two of these, the begin to talk with my peers about the topic, what was expected, what other people thought was important, and what sort of “flow” the lecturer might expect. Generally I would do very little (other than mull things over in my mind) until a few days before the assignment was due, at which point I would read the remaining articles (highlighting paragraphs/sentences that seemed important or relevant) (Student A).

And Student B responded:

Firstly, sit down with the criteria and guidelines and map out the preliminary structure. The most common second step would be to collect and read literature on the pertinent topic. I might also look at past assignments, consult textbooks etc. Then write the introduction, forming the argument and just write the paragraphs as they come. I would have all the literature beside me to incorporate into the paper.
I would also often print out the essay to check its quality, and use what I have written to write a conclusion. During the second step I would sometimes consult with friends (Student B).

While no strong conclusions can be based on the findings of three students, the comments of these students suggest certain patterns that warrant further investigation. For instance, it is possible that students are more able to articulate their approach to writing an assignment as they grow academically. For these students, there was an increased awareness of the role of their friends as a resource after the completion of their degree and a general acknowledgement that their approach to writing assignments was not those of the archetypal model student. Two research questions arise from this pattern. First, research on the role of peers in the learning process needs to ascertain whether students are not aware of the importance of their peers in their learning earlier in their studies, or whether students do not consider it appropriate to be seen to be collaborating with their friends. Fears of allegations of plagiarism and collusion may inhibit students from working collectively. Research needs to examine whether students understand the role of peer learning, and if so why do they appear to minimise this role. Second, as the written responses of these three students displayed almost no change in their underlying choice of learning strategies, used in writing assignments, then perhaps the conjecture that students are more articulate regarding their own behaviours at the completion of their studies. Of course, this may be an anomaly particular to psychology students, where much of their study involves increasing their self-awareness. Research will need to be undertaken to ascertain whether this phenomenon occurs across different fields of study.
The Questions

Please answer the following questions in the spaces provided. If you need more room to answer certain questions please use the back of the paper and number your responses.

1. How did you go about writing your assignments when you were enrolled in the Bachelor of Behavioural Science degree programme? What were the steps in your assignment writing process?
   - What was the first thing that you would do?
   - The second thing?
   - The third thing?.....etc.

2. What does learning mean to you?

3. What does studying mean to you?

4. What did you learn from the Bachelor of Behavioural Science degree programme?

5. How do you feel/think you learn best?

6. Are there any subjects that you feel/think you learned more in than others? Why? How are these subjects different from the rest of the subjects in the degree programme?
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<th>Student A</th>
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1. Read the question and seek to understand it. This might involve discussing the topic with the lecturer, tutor, and other students to clarify my understanding of what was expected.

2. Research the topic. Generally starting with general information (eg. from texts) and then exploring further articles (eg. research articles/journals) for more detailed information.

3. As I’m reading for the topic I construct in my mind a structure for the assignment with points to be covered specified. This gets put onto paper at some stage and is amended with further reading and writing of the assignment. Write for each point, move onto another, editing as I work.

Probably in the most undisciplined way I could imagine. I would usually read the topic first, then go to the library the same day, photocopy articles (both those articles specifically requested plus several spare). Normally I would read one or two of these, then begin to talk with my peers about the topic, what was expected, what other people thought was important, and what sort of “flow” the lecturer might expect. Generally I would do very little (other than mull things over in my mind) until a few days before the assignment was due, at which point I would read the remaining articles (highlighting paragraphs/sentences that seemed important or relevant). On reflection, I recognise this was a poor method, but then, I recognised it at the time too. Then, I would usually wait until the last possible minute before starting to write assignments (generally about 6pm the night before the assignment was due), work on an outline, write the assignment (in between coffee pit stops), and have it finished “just in time”. I guess the methodology I used included a lot of “write whatever”, then cut and paste, sort, delete bits to get the right word count, drop bits of pizza onto first drafts. I almost always finished the assignments with three drafts, a proof read or two and a computerised grammar check - but it was almost

Firstly, sit down with the criteria and guidelines and map out the preliminary structure. The most common second step would be to collect and read literature on the pertinent topic. I might also look at past assignments, consult textbooks etc. Then write the introduction, forming the argument and just write the paragraphs a they come. I would have all the literature beside me to incorporate into the paper. I would also often print out the essay to check its quality, and use what I have written to write a conclusion. During the second step I would sometimes consult with friends.
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<td>always in an &quot;intense&quot; learning block. [NB. my present position requires me to write 1500-2500 word case notes each night within about 90 minutes . . . so despite the poor method, it turns out to be a viable and valuable skill for the &quot;real&quot; world].</td>
<td>God, how can I possibly summarise a meaningful answer to such a question? Learning means discovering. It usually means discovering what I want to learn rather than what other people want me to learn. For instance, I am deeply interested in learning about human beings, but find that I can usually learn a great deal more from forays into the &quot;wild&quot; (humans in situ - they're so predictably unpredictable) than from reading about how human beings &quot;tick&quot; as described in books. That way, I end up being fairly convinced that I actually might know &quot;something&quot; about their behaviour, (especially as it relates to how I interact with them) rather than just &quot;believe&quot; something because someone else said it was so (statistics or no statistics). Nonetheless, there have been critical authors who have had significant impact – like Rollo May and Murray Bowen – and maybe that's because they enjoyed bucking status quo beliefs. I was once trained to be a minister of religion, but ended the course as an agnostic (not much call for agnostics in churches, you know). Now I've been trained (encouraged) to be a psychologist, and I find I've become more of a &quot;social consultant&quot; or an &quot;anarcho-syndicalist.&quot; Learning may mean &quot;think for yourself, pay attention to the process, be skeptical (but watch for cynicism), and never believe that you've actually figured it out&quot; . . . but the term &quot;learning&quot; can't really be encapsulated adequately (unless one writes for a dictionary or encyclopaedia). I could draw a Kolb cycle to explain my understanding of the process of learning, but that would beg a description</td>
<td>I guess learning can occur both consciously and unconsciously but you only know you have learnt something when you realise you know or can do something you couldn't previously. I think life is learning. It is everywhere. What does it mean to me? That I am alive. That I am aware. That I am growing, changing.</td>
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<td>Studying, to me, refers to academic learning and all that is involved with it: writing and submitting assignments, completing exams, and doing the necessary work to successfully complete these tasks. It may also mean (more broadly) being engaged in a course of recognised academic activity. For me, however, it may also mean study undertaken under one’s own initiative (which may or may not lead to formal qualifications or recognition, but which the student finds beneficial for other reasons).</td>
<td>Presently it means &quot;am I actually learning what I want to learn&quot; (again, it means a lot more to me). Do I know what the various facets of my life are, do I know what is important and what is not important (for me), am I improving the areas of life that I wish to improve, am I acting according to my belief system (am I congruent), am I aware of my emotions, do I have a plan, is a plan important, am I acting toward others in the manner that I would have others act toward me. I don't know the succinct answer to the question, but I do know that I am trying to learn, and hopefully just before I die, I might learn something.</td>
<td>The word has two meanings. I can be studying for an exam, or say I am studying psychology. In the first instance, it means reading, making notes, asking myself questions, relating the material to stuff I have already learnt. In the second instance, it means I am enrolling in a formal degree program, where learning is institutionalised, I have to perform to external standards, and I am assessed on what I learn.</td>
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<td>I gained a great deal of knowledge from this course, related to work and health, industrial relations, the disability field and (most important for me) psychology. In particular, I learned skills for research and critical thinking; understanding of biological, individual and social psychology; a greater understanding of and appreciation for the various fields within psychology and their potential (and actual) roles in the community; knowledge of various approaches to counselling. In the fourth year programme, the practicums (Social Consultancy and Counselling) allowed me to learn more about professional practice in different fields (using psychology as a profession), and allowed me to gain a deeper understanding of the Kolb cycle itself. After all, Kolb may refer to an activity, to a type of learning, or to the cycle itself.</td>
<td>Almost everything that I now consider the most important learnings (those that abide, and are the most useful in real time psychological work) was learnt in the change management stream and over discussions at the common room with my peers. I guess I learnt something of what it means to be myself in the company of others, and what might be going on for others when I interact with them.</td>
<td>Self-reflection and analysis. Critical thought. Anarchy. How to do research. How fucked up the present state of psychology is. How to work with others, with groups. (It is really difficult to actually separate what I learnt from the program and what I learned from actually living through the uni experience and being with my fellow students). I learnt how to write academically (that is, sucking all the life out of a perfectly good concept). I learnt how to distant my own beliefs to conform to the marking criteria. I learnt how to distant their criteria to express my own beliefs. I learnt to find freedom and express myself in a system that tries to socialise you to a standard….that</td>
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<td>to develop my skills as a practitioner.</td>
<td>When I arrived at uni, by theoretical abstraction, planning, intuition and reflection. However, because of the way the &quot;change management&quot; strand of the course was constructed, I have &quot;learnt to learn&quot; in many other ways: eg. Much more through Observing process, much more through taking risks and action (and then reflecting). Regards learning by &quot;feeling.&quot; I will call this journey from ENTJ to INFP (well almost introvert. I never did learn much about learning through sensate awareness (at least the tests never showed this up). My new learning style suits much better than the old one: my clothes now come out whiter, and the colours don't run.</td>
<td>tries to create a bunch of ‘little psychologists’ to ‘cure’ the masses.</td>
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5 I learn best when I have some concrete experience (direct or indirect) to relate my new learning to. I also find that discussing a topic with fellow students significantly clarifies my understanding of the topic, helping me to internalise my new knowledge. I find it easier to learn information when I can see how it fits in with other information and how it all relates within the larger scheme of things. I find that I need to achieve a balance between reading, doing and discussing in order to learn effectively. | When I arrived at uni, by theoretical abstraction, planning, intuition and reflection. However, because of the way the "change management" strand of the course was constructed, I have "learnt to learn" in many other ways: eg. Much more through Observing process, much more through taking risks and action (and then reflecting). Regards learning by "feeling." I will call this journey from ENTJ to INFP (well almost introvert. I never did learn much about learning through sensate awareness (at least the tests never showed this up). My new learning style suits much better than the old one: my clothes now come out whiter, and the colours don't run. | In relationship with others – talking, exchanging ideas over coffee, a beer, working together on a project. I learn from doing, trying things out, action. Reflection on experiences. I also learn from reading and talking about what I have read with others. |

6 Yes. Subjects which involve a high level of student participation (and ownership) are the ones in which I learned the most. Interestingly, these are often the ones in which I did not achieve my highest grade (for the most part). Some examples are Community psychology, Group and Org. Change Facilitation, and basically the whole change facilitation strand, come to think of it. I learned best in these because the content had more meaning for me at the time, and I could more easily see how I could apply it as a professional.

Subjects I did not learn as much in were those which had high factual content and little practical application of the information (ie relatively few practical exercises or little student participation – passive intake of information). | Yes - every subject in the change management stream and in particular SOCIAL CONSULTANCY A and B (Honours year). Because in the change management stream particularly, I learnt through lecturers and tutors modelling "useful" behaviours and actions and encouraging "real time" interaction and self directed learning. Far from being an easy option course, SOCIAL CONSULTANCY was perhaps the most psychology demanding, difficult, intriguing, and yet non-controlling "official" learning experience (ie. taking place in an institution) that I have ever experienced. It is my perception that it is in this strand that I learnt what "psychology" (if anything) is or might be. These subjects were like chalk and cheese compared to much of the more didactic avenues available. | Social Consultancy and the Change Agency stream. Because these subjects were about being authentic, interacting with yourself and others. They were practically focussed. Balanced action and reflection. Encouraged participation in learning rather than passivity. Dealt with emotions. These subjects were different because they challenged me, challenged me to become self-aware, self-critical, to be aware of others. To think in terms of systems. To question everything. To take responsibility for your own learning and your own power. |
APPENDIX E

CHANGES TO STUDY PROCESS QUESTIONNAIRE FOR STUDY 4

STUDY PROCESS QUESTIONNAIRE

There is no right way of studying. It all depends on what suits your own style and the courses you are studying. The following questions have been carefully selected to cover the more important aspects of studying. It is important that you answer each question as honestly as you can. The answer sheet follows the questions. In this case we are interested in a comparison of studying approaches between non-traditional and traditionally taught courses. When we use the term “more traditionally taught course”, we mean a subject run with a lecture and tutorial format. Thus, we are asking you to make a comparison with each item and provide two scores, the first for the approach to study you have used in the subject “Group and Organisational Change Facilitation” this semester, and the second for the approach to study you have used in other more traditionally taught courses this semester.

We have provided a scoring sheet for you to enter your scores. It may be easier if you enter the two scores for each item at the same time in the appropriate column. Thus the two questions you are asking yourself are:
1. What has been my approach to study/learning in the “Group and Organisational Change Facilitation” this semester?
2. What has been my approach to study/learning in the more traditionally taught subjects this semester?

Remember, although a number of the questions in the questionnaire ask you about your approaches to studying in general, or in your degree as a whole, we are asking you to focus only on your learning this semester firstly in this subject, and secondly in more traditionally taught subjects. So, please relate each question specifically to your experience this semester in firstly “Group and Organisational Change Facilitation” and then, more traditionally taught subjects.

How to answer:
For each item there is a five point scale on the Answer Sheet attached. A response is shown by circling one of the five options for each statement. The numbers stand for the following response:
5 = this item is always or almost always true of me
4 = this item is frequently true of me
3 = this item is true of me about half the time
2 = this item is sometimes true of me
1 = this item is never or only rarely true of me

Example:
I study best with the radio on
If this is almost always true of you in Group you would circle 5 on the answer sheet.
If this was frequently true of you in “more traditionally taught subjects” you would circle 4 on the answer sheet

Do not worry about projecting your good image. As answered above your answers are CONFIDENTIAL and there are several different approaches to studying. Please answer each item.

Thank you for your cooperation.
STUDY PROCESS QUESTIONNAIRE

5 = this item is **always or almost always** true of me
4 = this item is **frequently** true of me
3 = this item is true of me **about half the time**
2 = this item is **sometimes** true of me
1 = this item is **never or only rarely** true of me

Circle two scores for each item, one under non-traditional and the other for the more traditionally taught courses.

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GENERAL INFORMATION

This questionnaire package asks you to answer some questions about studying and learning at university. The information you provide will be fed back, as group data, to the university so that they can gain some understanding about what students think of the degree programme.

The information you provide is confidential and will only be seen in individual form by people involved in analysing the information.

You are free to discontinue your participation in this research project at any time. If you have any queries regarding the research please contact the primary researcher.

Please complete the demographic information below as this will assist us in matching your responses to information which will be collected at a later date.

Your name ________________________________

Your student number ______________________

Thank you for taking the time to complete these questions.
APPENDIX F

Personal Style Inventory

R. Craig Hogan and David W. Champagne

A measure of Isobel Myers’ adaptation of Jung’s personality typology, modified slightly from the questionnaire by Hogan and Champagne in the 1980 Annual handbook for group facilitators.

The score you get will be more accurate if you read these instructions -

Below you will find 32 pairs of statements. Use the following procedure for each pair. Read the two items in the pair. Then divide the 5 votes over the two items to reflect your preference for them.

* If you have a strong preference for one item over the other, give 5 votes to your preference and 0 votes to the other.

* If you have a slight preference for one item, give 4 votes to it and one vote to the other.

* If you find it hard to decide which item you prefer, give 3 votes to the item you eventually decide to give your preference to, and 2 votes to the other.

The total score for any pair of items must be 5. Please do not use half votes.

You are being asked to answer in terms of your preference - not what you usually do, or what you think you should do, or what others expect you to do. As you respond to each pair of items, imagine that both items are just as likely to be successful, both are just as likely to be regarded by others as correct, and both are just as likely to please others. If it didn’t matter which of the items you chose, which would you really prefer to be able to do?

The pairs of items have been chosen so that many people prefer one item, and many people prefer the other. No answer is more correct than another. People differ from one another. This inventory gives you a chance to identify some of the ways you differ from some other people. Knowing this will help you understand yourself and them.

Almost everyone finds this an informative, useful and enjoyable exercise. If you succeed in answering the items in terms of your real preferences, it is very likely that you will too.

It will take you about 10 minutes to complete the inventory. The results will be more accurate if you don’t take too long over any one question.
If it doesn’t matter which I chose, I prefer.....

1a  making decisions after finding out what others think
1b  making decisions without having to consult with others

2a  being called imaginative or intuitive
2b  being called factual and accurate

3a  being able to make decisions about people (for instance in organisations) based on available data and systematic analysis of situations
3b  being able to make decisions about people (for instance in organisations) based on empathy, feelings, and an understanding of their needs and values

4a  allowing commitments to occur if others want to make them
4b  pushing for definite commitments to ensure that they are made

5a  frequent quiet, thoughtful time alone
5b  frequent active, energetic time with people

6a  using methods I know well that are effective to get the job done
6b  trying to think of new methods of doing tasks when confronted with them

7a  drawing conclusions based on unemotional logic and careful step-by-step analysis
7b  drawing conclusions based on what I feel and believe about life and people from past experience

8a  being able to avoid making deadlines
8b  setting a schedule and sticking to it

9a  taking a while and then thinking to myself about a subject
9b  talking freely for an extended period and thinking to myself at a later time

10a  thinking about possibilities
10b  dealing with actualities

11a  being thought of as a thinking person
11b  being thought of as a feeling person

12a  considering every possible angle for a long time before and after making a decision
12b  getting information that I need, considering it for a while, and then making a fairly quick, firm decision

13a  inner thoughts and feelings others cannot see
13b  activities and occurrences in which others join

14a  the abstract or theoretical
14b  the concrete or real

15a  helping others explore their feelings
15b  helping others make logical decisions
16a  change and keeping options open
16b  predictability, and knowing in advance
17a communicating little of my inner thinking and feelings
17b communicating freely of my inner thinking and feelings

18a possible views of the whole
18b the factual details available

19a using common sense and convictions to make decisions
19b using data, analysis, and reason to make decisions

20a planning ahead based on projections
20b planning as necessities arise, just before carrying out plans

21a meeting new people
21b being alone with one or two people I know well

22a ideas
22b facts

23a convictions
23b verifiable conclusions

24a keeping appointments and notes about commitments in notebooks or in appointment books as much as possible
24b being able to dispense with the use of appointment books and notebooks most of the time (though I may have to use them sometimes)

25a discussing a new, unconsidered issue at length in a group
25b puzzling out issues in my mind, then sharing the results with another person

26a carrying out carefully laid, detailed plans with precision
26b designing plans and structures without necessarily carrying them out

27a working and living with logical people
27b working and living with feeling people

28a being free to do things on the spur of the moment
28b knowing well in advance what is to be done

29a being the centre of attention
29b being reserved

30a imagining the non-existent
30b examining the details of the actual

31a experiencing emotional situations, discussions, films
31b using my ability to analyse situations

32a starting meetings at a prearranged time
32b starting meetings when all are comfortable and ready.
PERSONAL STYLE INVENTORY SCORING

Transfer your scores for each item of each pair to the appropriate blanks, noting that the pairs of scores are not always written in the same order. Check that the a and b scores are in the right spaces. Then total the scores for each of the eight groups of scores.

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PERSONAL STYLE INVENTORY FEEDBACK

Place your totals for each of the eight PSI scores in the appropriate place below. Your MBTI type is based on the higher score from each of the four pairings. If you have a pair both with scores of twenty then read the description of the pair below and choose the one that you are more comfortable with as your preference within that pair.

I  E
S  N
T  F
J  P  Your type________

Each of us has preferences for how we work within the world. Jung’s work deals with the personality styles that people tend to use. The information contained on this sheet is a basic overview of the components of the MBTI as measured by the Personal Style Inventory. The main focuses of the MBTI are:

1. **The source of our energy.** Relates to introversion/extraversion (I/E). Introverts are more comfortable with their inner world and draw strength from within. Extraverts are more comfortable with the outer world of people and things and draw their strength from there.

2. **The way we perceive reality.** Relates to sensation/intuition (S/N). Sensate people rely more on their senses to gather concrete information about reality. Intuitive people rely more on vibes, feelings and hunches about things to gather information about reality.

3. **The way we act.** Relates to thinking/feeling (T/F). Thinkers tend to use principles, order, and understanding of the consequences of actions and logic to determine how to act in a given situation. Feelers tend to respond to values rather than logic when acting in a given situation. Thinkers can be considered to be objective and feelers subjective in their approach to decision making.

4. **Our approach to collecting information from the world.** Relates to judging/perceiving (J/P). Judgers tend to make judgements and then use these judgements in their actions. Perceivers tend to continue to collect information and are in no really hurry to act.

Remember that your personal preferences are just that, your preferences. They are all equally valid ways of functioning. They all have strengths and weaknesses.
APPENDIX G

STUDY CONTROL QUESTIONNAIRE

In order to indicate your sense of control regarding your studies, choose one of two options (True or False), and record your responses on the Answer Sheet.

For example, with question number one:

* If you believe that university grades most often reflect the effort you put into your studies then circle (T) for True;

* However, if you believe that your university grades seldom reflect the effort you put into your studies then circle (F) for False; and so on for all the 28 questions.

1. University grades most often reflect the effort you put into classes.
2. I came to university because it was expected of me.
3. I have largely determined my own career goals.
4. Some people have a knack of writing, while others will never write well no matter how hard they try.
5. I have taken a course because it was an easy grade at least once.
6. Educators sometimes make an early impression of you and then no matter what you do, you cannot change that impression.
7. There are some subjects in which I could never do well.
8. Some students, such as student leaders and athletes, get free rides in university classes.
9. I sometimes feel that there is nothing I can do to improve my situation.
10. I never feel really hopeless - there is always something I can do to improve my situation.
11. I would never allow social activities to affect my studies.
12. There are many more important things for me than getting good grades.
13. Studying every day is important.
14. For some courses it is not important to go to class.
15. I consider myself highly motivated to achieve success in life.
16. I am a good writer.
17. Doing work on time is always important to me.
18. What I learn is more determined by university and course requirements than by what I want to learn.
19. I have been known to spend a lot of time making decisions which others do not take seriously.
20. I am easily distracted.
21. I can be easily talked out of studying.
22. I get depressed sometimes and then there is no way I can accomplish what I know I should be doing.
23. Things will go wrong for me sometime in the near future.
24. I keep changing my mind about career goals.
25. I feel I will someday make a real contribution to the world if I work hard at it.
26. There has been at least one instance in school where social activity impaired my academic importance.
27. I would like to graduate from university, but there are more important things in my life.
28. I plan well and stick to my plans.
STUDY CONTROL QUESTIONNAIRE

In order to indicate your sense of control regarding your studies, choose one of the two options (True or False), and circle your response on this answer sheet. Please answer every item as honestly as you can by giving your immediate response.

Code: T=True F=False

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SCORING PROCEDURE: Simply add up the number of items coded I to which you respond T (True). Then add up the number of items coded E to which you responded T (True). Enter these totals in the boxes below.

TOTALS = I E

[boxes for entering totals]
APPENDIX H

CONSENT FROM FOR OBTAINING GRADE POINT AVERAGE

GENERAL INFORMATION

This questionnaire package asks you to answer some questions about studying and learning at university. The information you provide will be fed back, as group data, to the university so that they can gain some understanding about what students think of the degree programme.

The information you provide is confidential and will only be seen in individual form by people involved in analysing the information.

You are free to discontinue your participation in this research project at any time. If you have any queries regarding the research please contact the primary researcher.

Please complete the demographic information below as this will assist us in matching your responses to information which will be collected at a later date.

Your name

Your student number

In order to complete the research project it is important to obtain GPA scores for students participating in the project. This information will be used in the strictest confidence by myself and my supervisor.

Do you give your consent to obtain your GPA for this project YES/NO

Thank you for taking the time to complete these questions.
REFERENCES


References


References


