APPROACHES TO LEARNING IN EDUCATIONAL PSYCHOLOGY AND
MATHEMATICS: A COMPARATIVE ANALYSIS IN THE SOUTH
PACIFIC REGION
Huy P. Phan & Bisun Deo, 2006

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Abstract:
Emerging evidence indicates that students from varying cultures and disciplines differ from each other in their approaches to learning. Two studies were conducted to examine how tertiary students at the University of the South Pacific differ in their learning approaches in subject disciplines of educational psychology and mathematics. In Study I we examined learning approaches of second-year students in educational psychology ($N = 200$; 125 females, 75 males) and in mathematics ($N = 221$; 94 females, 127 males) with the use of a modified version of Biggs’ (1987) Study Process Questionnaire (SPQ). Analysis of results by EFA and CFA indicated a two-factor model as descriptive of student learning approaches for both educational psychology and mathematics cohorts. The two factors in this case were depicted as Meaning and Reproducing, and hence substantiating Richardson’s (1994) theorisation and argument that there are two, and not three, main approaches to learning. In Study II we used the revised version of the SPQ (SPQ-R-2F: Biggs, Kember, & Leung, 2001) to investigate the learning approaches of the same cohort of students enrolled in educational psychology ($N = 332$; 146 females, 185 males). This study revealed that students’ approaches to their learning in educational psychology, using an alternative inventory, were also defined by two main approaches – Deep and Surface. The results from the two studies then, support previous findings as well as indicating to perhaps readdress and to reconceptualize the theoretical paradigm of learning approaches with reference to different academic subject disciplines. The results of both studies, when compared cross-culturally with other Western and non-Western findings, also indicate theoretical and pedagogical implications pertaining to culture and learning.

Key words: Approaches to learning, Cross-cultural comparison, Confirmatory factor analysis, Educational Psychology, Mathematics, South Pacific, SPQ, R-SPQ-2F, Tertiary students
Introduction

One important line of research inquiry that has emerged during the past three decades concerns the study-process complex (Entwistle & Ramsden, 1983; Marton & Saljo, 1976; Pask, 1976). The pioneering work of Marton and Saljo and subsequently extended by Biggs (1976, 1979) and others indicated a congruence between types of motivation and learning strategies. This priority has led to a body of research pertaining to three main types of learning styles – deep, surface, and achieving (Biggs, 1988). Research into the generality of learning approaches has also established the development of different instruments that demonstrated good psychometric properties, for example, the Study Process Questionnaire (SPQ)(Biggs, 1987). More recently, researchers have advanced the learning approaches inquiry by examining differences in learning motivation and strategies among students of different cultural backgrounds (e.g., Akande, 1998; Kember & Gow, 1991; Kember & Leung, 1998; Niles, 1995; Watkins & Regmi, 1996; Watkins, Regmi, & Estela, 1991; Zhang, 2000; Zhang & Sternberg, 2000). Furthermore, research has ascertained some evidence attesting to differences in study processes and learning styles of students enrolling in different subject disciplines and majors (e.g., Biberman & Buchanan, 1986; Matthews, 1994; Misra, 1998; Skogsberg & Clump, 2003; Smith & Miller, 2005; Stewart & Felicetti, 1992). An examination of the evidence concerning cultural differences and subject disciplines and majors then, established the rationale for the present research. Extending the work cited, this article reported two studies using confirmatory factor analysis (CFA) to investigate the learning orientations of tertiary students in the South Pacific region. Study I involved analysis of student study approaches using the original SPQ (Biggs, 1987) with two groups of tertiary students – those enrolled in educational psychology ($N = 200$) and those enrolled in mathematics ($N = 221$). Study II examined student study approaches with educational psychology students ($N = 314$) using a revised version of the SPQ (SPQ-R-2F: Biggs,
Kember, & Leung, 2001). Research evidence attained from the two studies, in general, provided additional insight into the theoretical conceptions of learning, as well as verifying the psychometric properties of the SPQ and the SPQ-R-2F.

**Student Approaches to Learning: A theoretical perspective**

The pioneering work of Marton and Saljo (1976) established the research paradigm into student approaches to learning (SAL) in educational contexts. They suggested that students, in general, could adopt two different approaches in their study, which they referred to as ‘deep’ and ‘surface’. Accordingly, students may adopt a deep approach with an intention to understand the authors’ meaning and linking it to their prior knowledge and personal experience. In contrast, students may also adopt a surface approach where the main emphasis is on studying merely for the intention of reproducing information without any further analysis (Murphy & Tyler, 2005).

The theoretical paradigm of SAL is based on the premise that students approach their studies for various reasons and that these reasons influence the way they go about their learning (Watkins & Akande, 1994). In theoretical and practical sense, students’ motives for learning affect their strategies for learning. The approach to learning that is adopted by a student reflects the interaction between individual characteristics of a student and the context and content of the task involved. Extending the theoretical framework of SAL the work of John Biggs (1987) has further added an ‘achieving’ component to the surface and deep study approaches. The achieving approach, according to Biggs, is based on achieving motivation and involves those strategies which students believe will lead to high marks; for example, “study skills” techniques (e.g., good organization, speed reading, effective note-taking) and “cue-conscious” strategies that depend on the learning environment and the teacher involved (Akande, 1998). The achieving approach is therefore context dependent while the surface and
deep approaches relate to rehearsal and the general cognitive processes of coding, respectively (Akande, 1998). Importantly, however, Biggs’ (1987) theoretical conception of study approaches differs from other theorists in its two components: how students approach a task (strategy); and why they want to approach it in the first place (motive).

Subsequent quantitative and qualitative research using a number of instruments such as the Approaches to Student Inventory (ASI)(Entwistle & Ramsden, 1983), the Approaches and Study Skills Inventory for Students (ASSIST)(Entwistle, Tait, & McCune, 2000; Tait, Entwistle, & McCune, 1998), the Learning and Study Strategies Inventory (LASSI)(Weinstein & Palmer, 1990), and the Study (SPQ) and Learning (LPQ) Process Questionnaires (Biggs, 1987) has confirmed the generality of the different learning approaches of secondary and tertiary students.

The development of the SPQ and subsequent research evidence

The Study Process Questionnaire (SPQ)(Biggs, 1987), containing 42 items, is a widely used measure of students’ approaches to learning. Research using this inventory has produced mixed results pertaining to the study-process complex. One important line of inquiry, in particular, has been the study of differences in students’ learning approaches with reference to their enrolment in various academic subject disciplines. The argumentative premise from this line of inquiry is that students, in general, utilise different motivational and learning strategies depending on the subject majors enrolled. For example, Smith and Miller (2005) found that psychology and business majors differ in their learning style characteristics. Psychology students in this study scored higher on deep strategy and lower on surface strategy. Skogsberg and Clump (2003) found, similarly, significant differences between psychology and biology majors in deep approach, deep motive, and deep strategy.
Psychology students, in general, were found to use more deep approach techniques while studying than that of biology students.

In previous research, Misra (1998) found that arts, science, fine arts, and management majors all differ in their learning approaches between students. Davis and Sales (1996) used Biggs’ (1987) SPQ to investigate differences in learning approaches of junior and senior dental and life sciences students. Their study found that junior dental students reported greater usage of deep, achieving, and surface approaches than junior life science students. In contrast, the trend for the three learning approaches was reversed with senior dental and life sciences students. Similarly, Matthews (1991) found that the learning approaches of students taking education majors were different to those who were majoring in mathematics, humanities, business, science and social science. In particular, the education and mathematics majors significantly differed from each other in their approaches to learning. Furthermore, the learning approaches of education, science, social science, humanities, and business majors were similar, with these students utilising a ‘conceptual’ learning style as differing to those using the ‘applied’ style in the mathematics majors. In a follow up study, Matthews (1994) reported that students enrolled in humanities, social science and education showed similar learning styles, in this case the conceptual approach, as opposed to the applied approach utilised by the science and mathematics majors.

Biggs et al. (2001) extended this line of inquiry by suggesting that students, in general, adjust their styles of learning based upon the demands of the course that they are enrolling in. The authors revised the original SPQ to form the revised two-factor Study Process Questionnaire (R-SPQ-2F). This instrument is designed to evaluate how students approach learning the topics or courses that are the most important to them. Furthermore, the changing of wordings of instruction enables the R-SPQ-2F to be used as evaluation of students’ approaches to specific topics or courses. Fox, McManus, and Winder (2001), for
example, found with medical students that the R-SPQ-2F shared similar characteristics in terms of structure to those of the original SPQ. The R-SPQ-2F as demonstrated also enabled prediction of medical students’ academic performances.

The learning motives and strategies have also been examined in the context of cross-cultural comparisons. Cross-cultural studies using mainly the SPQ have indicated that students’ styles of learning are situated socially and culturally (e.g., Kember & Leung, 1998; Wong, Lin, & Watkins, 1996; Zhang, 2000). The work of Biggs, Kember, Watkins and colleagues, in particular, suggests the distinct demarcation of learning approaches between Western and non-Western students. Importantly, the contention argued by researchers in this area employing different methodologies concerns whether Western concepts of approaches to learning are relevant in other social and cultural settings. Studies have been conducted in a number of Asian countries, including Hong Kong (e.g., Biggs et al., 2001; Kember & Gow, 1990; Kember & Leung, 1998; Tang & Biggs, 1996), mainland China (e.g., Zhang, 2000; Zhang & Sternberg, 2000), and Nepal (e.g., Watkins & Regmi, 1996; Watkins et al., 1991), as well as other non-Western countries such as South Africa (e.g., Akande, 1998) and Nigeria (e.g., Watkins & Akande, 1992). The evidence ascertained from these studies, in general, support the main approaches to learning, as well as the factorial structure of the SPQ. In contrast, however, other studies producing contradictory findings have questioned the factorial structure of the SPQ and whether Western concepts of approaches to learning are relevant with non-Western students (Hattie & Watkins, 1981; Watkins & Akande, 1994).

In the South Pacific region, research has been few in examining the learning approaches of students. In an earlier study, Richardson and colleagues (Richardson, Landbeck & Mugler, 1995) found using the Approaches to Studying Inventory (ASI) that tertiary students at the University of the South Pacific (USP) were largely driven by motivational considerations (achievement motivation, intrinsic motivation, and passivity or a
general lack of motivation). There was also a marked absence of cognitive strategies and approaches, contrasting Newstead’s (1992) and Richardson’s (1992) findings, guiding these various types of motivation that could be considered in bringing about effective learning. Interestingly, however, these motivational orientations were not aligned to effective cognitive strategies as one would expect, and as has been noted amongst learners in Western contexts, of students having deep, surface or achieving approaches to learning. This research has, similar to some of the findings of Kember and Gow (1990, 1991), Watkins and Regmi (1992), established that there are variations in approaches to learning between Western and non-Western students.

In a follow up phenomenographic study, Landbeck and Mugler (1997) explored the conceptions of learning held by tertiary students at USP under six categories: a) an increase in knowledge, b) memorizing and reproducing, c) the ability to apply knowledge, d) understanding, e) seeing something in a different way, and f) seeing learning as changing a person. Results obtained from the study indicated that the most common conception of learning was applying or making use of knowledge. In general, the students at USP also displayed a lower percentage of higher-order conceptions of learning. It could be argued that the lower percentage of higher-order conceptions of learning resulted from highly examination driven curricula of senior secondary schools in the member countries of the South Pacific, as well as the lecture-based transmission mode of teaching preferred by students (e.g., Deo & Nabobo, 2003).

There is also some anecdote evidence of a pressing concern that tertiary students of the South Pacific region, predominantly those of Indo-Fijian background, are increasingly pressured by their parents and community to excel academically. This intense pressure instills a mindset in a majority of the Indo-Fijian students enrolled in the regional university to engage in more surface-based learning and less deep-based learning orientation. This kind of
learning utilizes what may be regarded as “short cuts” to learning that involves memorisation and rote learning with elements of guesswork. Some of these are already learnt at the school level and are carried over to tertiary level learning. For these students, effective learning entails the notion of being able to pass quizzes, short tests and external examinations with good grades and these good grades then enable students to proceed onto and graduate from the university. This “institutionalised” cycle is then perpetuated at the university where students orient towards a particular learning style so as to achieve the status quo. It is important then, we believe, that more emphasis is placed on investigating the orientation of South Pacific students relating to their learning approaches.

The culmination of evidence from existing researches then, indicates differences in learning approaches utilised by students enrolled in different subject majors. Furthermore, cross-cultural studies suggest the importance of exploring student learning approaches between Western and non-Western contexts. An examination of previous results indicates three important lines of inquiry that warrant further investigation in the South Pacific context. The first impetus is to explore the differences, if any, of learning approaches of tertiary students enrolling in different subject majors. Secondly, the question of inquiry concerns the cross-cultural comparison of findings between South Pacific students in their learning styles and those obtained previously of Western students. Thirdly, the question of alternative inventory that may be used in place of Biggs’ (1987) original SPQ is also of major concern in the study of student learning approaches. The purpose of the present research was therefore to explore three research inquiries by means of two major studies. The first study using Biggs’ (1987) SPQ is a comparison of study approaches of two cohorts of tertiary students at USP: those enrolled in educational psychology and those enrolled in mathematics. The second study is an examination of the revised SPQ (R-SPQ-2F: Biggs et al., 2001) with a cohort of students enrolled in educational psychology. These two empirical studies were designed to...
address the three research objectives related to student learning approaches mentioned above. Evidence arising from the present research studies would contribute to the existing literature, as well as provide useful information and a clearer picture of the different approaches of learning style that Pacific students orientate towards.

**Study I: A comparison of two cohorts**

This study, based on previous research evidence (e.g., Misra, 1998; Skogsberg & Clump, 2003; Smith & Miller, 2005), examined students’ learning approaches in their second year at USP using Biggs’ (1987) original SPQ. We employed confirmatory factor analysis (CFA) as a statistical procedure as it is inherently more sophisticated than exploratory factor analysis (EFA) in the investigation of factor structures of constructs (Bollen, 1989; Mueller, 1997; Pedhazur, 1997). A discussion of CFA is beyond the scope of this article; however, CFA has been used recently in a number of studies to explore the dimensions of students’ study approaches (e.g., Burnett & Dart, 2000; Fox et al., 2001; Kember & Leung, 1998; Wong et al., 1996). Students’ responses were then tested with seven first and second-order factor models, as presented in Figure 1. Kember and Leung (1998) also tested the seven *a priori* models in their studies and found consistent evidence of a two-factor model descriptive of students’ study approaches. In our analyses, the first five models were first-order factor models while the last two were second-order factor models.

**Model 1A: Two-factor model**

This is a two-factor model based on Richardson’s (1994) conceptualisation. This model has two latent factors: ‘meaning’ (ME) and ‘reproducing’ (RP). The meaning factor has an orientation towards comprehending the meaning of the materials to be learnt, while the reproducing factor describes an orientation towards being able to reproduce materials for the purpose of academic assessment. The reproduction factor
has the surface strategy and surface motive subscales as indicators, and the meaning factor has the remaining four subscales, DM, DS, AM, AS as indicators.

**Model 1B**: Two-factor model with shared indicators

This model is a refinement of Model 1A in that the reproduction factor also has AS and AM as indicators.

**Model 2A**: Three-factor model

This model has three latent factors: Deep approach (DA), Surface approach (SA), and Achieving approach (AA). Each of the three factors has two indicators representing the strategy and motive subscales.

**Model 2B**: Three-factor model with correlation b/w (DA) and (AA)

This is an extension of Model 2A with a covariance included between the deep and achieving approaches. The inclusion of the covariance suggests that deep approach is commonly found in conjunction with the achieving approach (Biggs, 1987).

**Model 2C**: Three-factor model with correlation b/w (DA) and (AA), and (SA) and (AA)

This model is an extension of Models 2A and 2B with another covariance included the surface and achieving approaches.

**Model 3A**: Higher-order factor model with factors b/w (DA) and (AA)

This model is based on Biggs’ (1987) depiction of a composite higher-order deep-achieving factor (D-A).

**Model 3B**: Higher-order factor model with factors b/w (DA) and (AA), and (SA) and (AA)

This model is an extension of Model 3A with another higher-order factor included for surface-achieving (S-A).

**Sample**

Two samples of second year students enrolled at USP were used in this study: in educational psychology ($N = 200$; 125 females, 75 males) and in mathematics ($N = 221$; 94
females, 127 males). The ages of the educational psychology cohort ranged from 17 to 25 (mean = 18.38), and the mathematics cohort ranged from 17 to 21 (mean = 18.26).

**Instrumentation**

The SPQ was chosen in this study as it demonstrated from previous research evidence to have good reliability and construct validity (e.g., Kember & Leung, 1998). As mentioned earlier, Biggs’ (1987) SPQ contains 42 self-report items operationalising the three study approaches, Deep, Surface, and Achieving, with their respective motives and strategies components with respect to the students’ general orientation to learning. Given that English is a second, third or even fourth language for the majority of the students enrolling at USP, and that the cultural context differs with that of the West, the SPQ was modified to cater for use with the USP cohorts. Responses were expected on a seven-point Likert scale from “I strongly disagree or disagree with this item” (1) to “I agree or strongly agree with this item” (7). Sample items from the modified SPQ included, for example, “I want top grades in most or all of my courses so that I will be able to select from among the best offers available when I graduate from USP (AM); “I chose my present course largely with a view to the job situation when I graduate rather than out of its personal (intrinsic) interest to me” (SM). This questionnaire was administered by the authors with the assistance of a tutor in a lecture theatre during the first 25 minutes of a lecture in educational psychology and mathematics. The participants were briefed at the outset concerning the purpose of the research, and that participation was voluntary.

**Data Analysis**

SPSS statistical program was used to determine the reliability of the scales and subscales as well as to provide descriptive results. CFA by means of LISREL (Joreskog & Sorbom, 2000) was used to examine the learning style orientations of the two cohorts. CFA employed in this study, in contrast to other simplistic methodologies, is advantageous as it
enables examination of the seven *a priori* models hypothesised. Various goodness-of-fit indexes (e.g., CFA, NNFI) were used as indicators representative of a well-fitted model. LISREL in this case involved testing the fit between a sample covariance matrix and a matrix produced when parameters are constrained to match a theoretical model. Covariance matrixes were computed from input raw data and subsequently analysed. The Maximum Likelihood method (ML) was chosen as the estimation procedure as it is shown to perform reasonably well with multivariate normally distributed data (Chou & Bentler, 1995).

**Results of Study I**

The reliability estimates for the scales and subscales of the SPQ are presented in Table 1 for the two cohorts. Cronbach’s values for the subscales ranged from .45 to .74 (educational psychology), and .41 to .79 (mathematics). These alpha values are similar to those obtained in previous studies (e.g., Leung & Kember, 2003). Some researchers have adopted an arbitrary cutoff point for alpha value of .70; however, others (e.g., Schmitt, 1996) have argued that alpha values as low as .50 would not weaken validity coefficients. The goodness-of-fit indexes for the confirmatory factor analyses are presented in Table 2.

*Insert TABLE 1 here*

*Insert TABLE 2 here*

According to Table 2, the various fit indexes indicated a comparison in terms of the best fitted model between the two-factor model with shared indicators (Model 1B), and the higher-order factor model (Model 3B) for both cohorts. In contrast, for both cohorts, the three-factor model (Model 2A) provided the worst model fit. Our results are similar to those obtained by Kember and Leung (1998). The correlated three-factor model (Model 2C) also showed a moderate model fit. However, a comparison of the indexes suggests, based on our review of research evidence as well our subjective judgment, that the best fit for the SPQ data is that of Model 1B. The selection and acceptance between first and second-factor models is
quite subjective from a researcher’s point of view. In most cases, the various GFI values between first and second-order factor models would be near identical, as evident in this case, with no significant differences in GFIs values in a practical sense. Accordingly researchers would, based on their own subjective judgments and criteria, choose between first and second-order factor models of a “best fitted model” to the empirical data (e.g., Marsh & Hocevar, 1985). Figure 1 shows the standardized solutions for Model 1B with paths statistically significant at the 0.05 level.

*Insert FIGURE 1 here*

**Summary of Study I**

A number of important findings emerged from the analysis of the different *a priori* models tested. A comparison of the goodness-of-fit indexes for the seven factor models indicated a rejection of Biggs’ (1987) theoretical conception of a three-factor structure of study approaches. Consistent with previous empirical studies (e.g., Kember & Leung, 1998; Wong et al., 1996), the finding showed instead for both cohorts an acceptance of a two-factor shared indicators model. Notably this finding in concert with other empirical studies cited earlier, provided support for Richardson’s (1994) argument that the achieving/strategic dimension could not be classified as a third category of the learning approach construct. The impetus arising from these findings is the established consistency of a two-factor structure of learning approaches that exists between educational psychology and mathematics. When taken together there is support then, for a reconceptualisation and redevelopment of the learning approaches model as well as Biggs’ (1987) original SPQ.

**Study II: The Revised SPQ (R-SPQ-2F)**

This study, based on Biggs *et al.*’s (2001) recent empirical work, concerned the testing of a revised version of Biggs’ (1987) SPQ. Biggs *et al.*’s study of Hong Kong tertiary
students showed the revised SPQ to have good psychometric properties. Furthermore, the revision process of the original SPQ resulted in the validation of a two-factor structure of learning approaches that correspond to two main learning styles: deep and surface. Both deep and surface approach scales also demonstrated well established motive and strategy subscales. Since then other research studies, albeit limited, have provided supporting evidence pertaining to the validation of the R-SPQ-2F, as well as its effectiveness in evaluating students’ learning approaches (Leung & Kember, 2003; Skogsberg & Clump, 2003). The focus of this study examined the R-SPQ-2F with another cultural group of tertiary students. Central to this study’s objective was to establish, empirically, the psychometric property of the R-SPQ-2F, as well as to determine its appropriateness in describing student study approaches compared to Biggs’ (1987) original SPQ.

**Sample**

Three hundred and thirty-two (146 females, 185 males) second-year students enrolled in educational psychology took part in this study. The ages of the educational psychology cohort ranged from 17 to 25 (mean = 18.26). The majority of the students in this study also took part in the first study.

**Instrumentation**

The R-SPQ-2F consisted of 20 items grouped into two approaches – deep and surface. Each subscale (e.g., deep motive (DM)) comprised of 5 items; for example, “I find that at times studying gives me a feeling of deep personal satisfaction” (deep motive), “I find that I have to do enough work on a topic so that I can form my own conclusions before I am satisfied” (deep strategy), “My aim is to pass the course while doing as little work as possible” (surface motive), and “I only study seriously what’s given out in class or in the course outlines” (surface strategy). A full version of the 20 items may be obtained from Biggs et al. (2001). This questionnaire was administered by the authors in a lecture theatre.
during the first 25 minutes of a lecture in educational psychology. The participants were briefed at the outset concerning the purpose of the research, and that participation was voluntary.

Results of Study 2

Cronbach’s alpha values were relatively good for the two scales and four subscales. The reliability coefficient for the overall inventory was .86, whereas the coefficient alphas for the R-SPQ-2F approaches yielded the following: .87 for deep approach, .94 for deep motive, .86 for deep strategy, .77 for surface approach, .89 for surface motive, and .93 for surface strategy. These Cronbach’s alpha values are comparative to those reported by Biggs and colleagues (Biggs et al., 2001; Leung & Kember, 2003).

Similar to Biggs et al.’s (2001) study, two models were tested in this study to show different aspects of the R-SPQ-2F. The first model, Model 1 shown in Figure 2, examined the structure of the complete instrument from the items level. The model consisted of the four subscales, represented as latent constructs, with their corresponding five items as measured indicators. Overall, compared with Biggs et al.’s findings, Model 1 is average in fit (GFI = .87, CFI = .94, RMSEA = .08) with all of the paths statistically significant at the .05 level. The standardised path coefficients range from .59 to .96 suggesting that the items are average indicators of the four constructs. The negative correlation between deep motive and surface motive also indicated the expected relationship between the two latent constructs.

Insert FIGURE 2 here

Summary of Study II

The results of items and subscales analyses indicated moderate support for the revised version of the SPQ in terms of its psychometric properties. An examination of the reliability estimates and the construct validity showed findings that are, to a large extent, similar to those cited elsewhere. In the present study, we also found comparable reliability values for
the subscales of the R-SPQ-2F when compared to previous research studies (Biggs et al., 2001; Leung & Kember, 2003). Furthermore, the factorial structures analysed confirmed the discriminant validity of the R-SPQ-2F. This finding indicated the differentiability, according to the students’ perceptions, between items of the instrument. Taken together, the evidence in this study established the precedence for using a shorter version of the SPQ to assess students’ learning approaches in the South Pacific region.

**General Discussion**

The approaches to study and the SPQ (Biggs, 1987; Marton & Saljo, 1976) have been a recurring theme recently in the literature and have been addressed by a number of scholars. Noteworthy, the argument has been advanced from two premises. First, education has undergone a rapid and major transformation since the original conceptualisation of the study approaches, and inevitable changes needed to be made (Biggs et al., 2001). Second, contradictory findings emerged during the 1980s and the 1990s indicated a strong need to readdress the theoretical conception of study approaches in relation to subject disciplines and cross-cultural comparison. Insights into the study approaches of students enrolling in subject disciplines and those who are from a non-Western context, for example, and a better understanding of extrinsic motivation have contributed to the rethinking of student study approaches and the SPQ’s psychometric properties (Kember, Wong, & Leung, 1999).

We reported two studies in this article that investigated the appropriateness of a Western model of learning orientation (Biggs, 1987) in the South Pacific context using two alternative inventories – the original SPQ and the revised version of the SPQ. Although differing somewhat in their contents and the number of items used, both inventories provided moderate support for two main study approaches and not three, as originally conceptualised by Biggs (1987). Empirical results of Study I suggest that approaches to learning in both...
educational psychology and mathematics are described better by a two-factor model than the three – or four-factors on which the SPQ is based. This finding highlights the importance of reading for understanding and reading for reproducing contents in both subject disciplines. The results reported in this study, in concert with earlier findings (Kember & Leung, 1998; Wong et al., 1996), support the rejection of the three different styles of learning and an acceptance Richardson’s (1994) argument, namely that:

the broad distinction between two fundamental approaches to studying: first an orientation towards comprehending the meaning of the materials to be learned; and, second, an orientation towards merely being able to reproduce those materials for the purposes of academic assessment. (p. 463)

The consistency of a two-factorial structure representative of student learning approaches in both educational psychology and mathematics comes as a surprise given that previous studies (e.g., Smith & Miller, 2005; Skogsberg & Clump, 2003) indicated otherwise. Furthermore, others have also entertained the notion of differentiating various subject disciplines in terms of whether they are “hard applied” or “soft pure” discipline (Becher, 1994; Entwistle & Ramsden, 1983; Ramsden & Entwistle, 1981). On the one hand, the focus of a “soft pure” discipline such as educational psychology involves a learning process that is directed towards interpreting ideas, establishing coherence in an argument, and reflecting and critically evaluating the given information (deep motive). In contrast, students studying within the “hard applied” discipline such as mathematics focus on cumulative and atomistic types of knowledge where the learning of specific facts, principles, and concepts is considered as highly important (surface motive). The basis of these differences in subject disciplines enables students then, to be more aligned to a surface approach or a deep approach in learning. The results of this study suggest, importantly, that other factors might
account for the similar approach in learning that students in both subject disciplines have indicated.

Cross-culturally, the results of Study I are similar to those cited earlier pertaining to a two-factorial structure of learning approaches (e.g., Akande, 1998; Biggs *et al*., 2001; Watkins & Akande, 1992; Watkins & Regmi, 1996; Zhang, 2000). This evidence does not come as a surprise given the social, historical and cultural contexts of the South Pacific region. The issue of landlessness, insecurity, discrimination and poverty experienced by the Indo-Fijians, who make up the majority of the student population at USP, historically and ongoing, serves as a pressure for these students to excel academically. The parental and societal pressure to excel academically, enabling economic and social mobility, instils a mindset for the majority of the Indo-Fijian students enrolled in the regional university of the South Pacific to engage more surface-based and less deep-based orientation in their learning. This ‘institutionalisation’ of learning, where students pick up the tricks of effective learning, for example, the usage of ‘memorization’ and ‘rote learning’, starts early and is encouraged in the school system. For these students, effective learning entails the notion of being able to pass quizzes, tests and external examinations with good grades and these good grades then enable students to graduate from the university.

Results obtained from Study II also, in part, support the view of learning being orientated towards two main approaches – deep and surface. The psychometric evidence obtained in terms of items and subscales levels, indicates that study motivation and strategies correspond to the theoretical paradigm of deep and surface approaches of learning. However, the moderate values of the goodness of fit index suggest the need to readdress the R-SPQ-2F. One could argue, however, that these moderate goodness of fit index values are indicative of sampling differences, or that it could be psychometric deficits of the revised SPQ. The R-SPQ-2F has emerged recently as an alternative inventory (Biggs *et al*., 2001), and more
empirical studies are therefore needed to validate the items that make up this inventory. It is important to acknowledge the cultural and social contexts in which the R-SPQ-2F is being administered. This acknowledgement is especially prevalent when discussing generalisations about the psychometric properties of the R-SPQ-2F. For instance, the teaching learning environment at USP is orientated towards rote learning, memorisation and standardised examinations. Moreover, the socio-historical and cultural backgrounds of the students, as cited previously, together with the defining characteristics of this tertiary teaching approach may therefore influence how students respond to items of the R-SPQ-2F. In the same vein, Sachs and Gao (2000) suggest that the marked differences in the teaching learning process between the Western and non-Western countries establish the precedence for furthering research into the validation of the R-SPQ-2F with other Western and non-Western samples. One could argue that there are possible shortcomings of the existing items, scales, and subscales when used in another social and cultural context. There is limited evidence at present, we believe, to warrant the acceptance and/or universality of the revised SPQ with different countries and cultures. Indeed, research examining students in their learning approaches using the R-SPQ-2F is still in its infancy, so a number of issues remain at large concerning its valid psychometric properties.

Taken together, the results of the two research studies presented in this article highlight the importance of using multiple inventories to examine the approaches to learning of students. The two studies described in this article suggest that there are different alternatives to evaluating students’ styles of learning at university depending on the subject disciplines enrolled at large. Furthermore, the evidence presented sheds light on the present matter at hand in terms of how and whether learning approaches are influenced by the contextual, social and cultural environments that students are situated in. There may be, in our postulation, other “styles” or factors, unexamined, that may be conducive to students’
learning in the South Pacific region. The South Pacific is a developing region that brings forth an enriched culture, transpiring a traditional approach to learning into something that is contemporary, but yet untested. In our view, students in the South Pacific are at a crossroad in their learning, transgressing between the traditional forms of learning to the more “Western” or modern approach that caters for their rapidly growing ambitions. This problem has been recognised during the past decade in this region by a number of educators. Conferences and workshops have taken place to address these issues and to rethink pacific education, its focus and future directions (Pene, Taufe’ulungaki, & Benson, 2002). It remains to be seen in future research and developments on how educators could gauge further into the approaches to learning of students in this region.

Conclusion

Previous research investigating student approaches to learning (SAL) with Biggs’ (1987) SPQ has reported, in general, a two-factor solution that depicts a reproducing factor and a meaning factor. Despite the consistency of a two-factor solution, uncertainties concerning the appropriateness and applicability of Biggs’ inventories in different subject disciplines and with different cultural samples have been raised. This research involving two empirical studies situated in the South Pacific context set out to investigate the conception of study approaches advocated (Biggs, 1987, 1993a, 1993b) using two alternative inventories – the original SPQ and the revised SPQ. The first study primarily focused on examining the theoretical three dimensions of study approaches using the original SPQ with students enrolled in two separate subject disciplines. In the second study, the main focus was on the evaluation of the revised SPQ and its psychometric properties. Results ascertained from the two studies indicate support as well raise some concerns regarding the theoretical perspectives of student learning approaches. The main issue, we believe, extends beyond the
simplistic comparison of a two- or a three-factor model of learning approaches by means of statistical inference and interpretation, and seek instead various alternative explanations that take into account the socio-historical and cultural backgrounds of students. The work of Lev Vygotsky, for instance, has extensively been associated with students’ learning during the past three decades, and effort in future should therefore be directed in explaining how the socio-cultural theory may explain student approaches to learning.

There are a number of important caveats for future research. Firstly, as discussed earlier, there is a need to continue and extend the reconceptualisation of the study approaches to different social and cultural settings. The premise in this examination concerns the appropriateness and relevance of the theoretical conceptions of learning to describe students’ study habits in different countries and cultures. Prudent to this premise also, is the challenge for researchers to expand the inquiry concerning the alternative between the original SPQ and the revised SPQ in describing student approaches to learning. Secondly, the hierarchical representation of study approaches inferring from CFA has also been discussed from a theoretical perspective. Researchers could further the investigation by exploring whether the statistically-derived higher-order factors, Deep and Surface approaches, found in Study II reflect students’ “true” experiences of their understanding of different study approaches. One way of examining this research investigation would be to use qualitative and mixed methods paradigms (Creswell, 2003; Tashakkori & Teddlie, 1998). Thirdly, researchers need to expand the between-construct validity of the SPQ with other criterion-based outcomes, such as academic achievement and locus of control.
References:


Table 1: Reliability estimates for the scales and subscales of the SPQ

<table>
<thead>
<tr>
<th></th>
<th>Educational Psychology</th>
<th>Mathematics</th>
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<tbody>
<tr>
<td>SPQ total</td>
<td>.84</td>
<td>.83</td>
</tr>
<tr>
<td>Surface approach</td>
<td>.61</td>
<td>.54</td>
</tr>
<tr>
<td>Surface motive</td>
<td>.45</td>
<td>.41</td>
</tr>
<tr>
<td>Surface strategy</td>
<td>.47</td>
<td>.46</td>
</tr>
<tr>
<td>Deep approach</td>
<td>.74</td>
<td>.76</td>
</tr>
<tr>
<td>Deep motive</td>
<td>.55</td>
<td>.60</td>
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<tr>
<td>Deep strategy</td>
<td>.62</td>
<td>.65</td>
</tr>
<tr>
<td>Achieving approach</td>
<td>.72</td>
<td>.74</td>
</tr>
<tr>
<td>Achieving motive</td>
<td>.44</td>
<td>.39</td>
</tr>
<tr>
<td>Achieving strategy</td>
<td>.74</td>
<td>.79</td>
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Table 2: Fit indexes of first and second-order factor models

<table>
<thead>
<tr>
<th>Model</th>
<th>Description</th>
<th>$Df$</th>
<th>$\chi^2$</th>
<th>$CFI$</th>
<th>$GFI$</th>
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</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>EP</td>
<td>Mat</td>
<td>EP</td>
<td>Mat</td>
</tr>
<tr>
<td>1A</td>
<td>Two-factor model</td>
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<td>9</td>
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<td>1B</td>
<td>Two-factor model with shared indicators</td>
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<td>7</td>
<td>73.19</td>
<td>61.48</td>
</tr>
<tr>
<td>2A</td>
<td>Three-factor model</td>
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<td>9</td>
<td>233.44</td>
<td>203.23</td>
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<tr>
<td>2B</td>
<td>Three-factor model with correlation b/w (DA) and (AA)</td>
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<td>8</td>
<td>100.14</td>
<td>87.26</td>
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<tr>
<td>2C</td>
<td>Three-factor model with correlation b/w (DA) and (AA), and (SA) and (AA)</td>
<td>7</td>
<td>7</td>
<td>93.84</td>
<td>85.42</td>
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<tr>
<td>3A</td>
<td>Higher-order factor model with factors b/w (DA) and (AA)</td>
<td>7</td>
<td>7</td>
<td>176.26</td>
<td>151.02</td>
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<tr>
<td>3B</td>
<td>Higher-order factor model with factors b/w (DA) and (AA), and (SA) and (AA)</td>
<td>4</td>
<td>4</td>
<td>57.60</td>
<td>41.81</td>
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</table>

Note: EP = Educational Psychology, Mat = Mathematics; DA = Deep approach, AA = Achieving approach, SA = Surface approach.
Figure 1: Complete standardized solutions of Model 1B showing the relationships between the different styles of learning.

Keys: variables in circles are latent constructs and variables in squares are observable measures; RP = Reproducing, ME = Meaning, SS = Surface strategy, SM = Surface motive, AS = Achieving strategy, AM = Achieving motivation, DS = Deep strategy, DM = Deep motive. All paths are statistically significant at 5% level with the exception of *. 

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Figure 2: Latent structure of the R-SPQ-2F at item level (Model 1).

Keys: variables in circles are latent constructs and variables in squares are observable measures; SS = Surface strategy, SM = Surface motive, DS = Deep strategy, DM = Deep motive. All paths are statistically significant at 5% level.