The Journal of Psychology, 2000, *134*(1), 37–55

University Students' Learning Approaches in Three Cultures: An Investigation of Biggs's 3P Model

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ABSTRACT. The relationship of various learning approaches to students' academic achievement, abilities, and other characteristics was examined in a sample of university students in Hong Kong, mainland China, and the United States. The theoretical framework for this project was J. B. Biggs's (1987) theory of student learning approaches. The participants completed the Study Process Questionnaire (based on Biggs's theory) and provided a variety of demographic information. The participants' achievement scores and self-rated scores on analytical, creative, and practical abilities were also obtained. Results indicated that scores on certain subscales of the Study Process Questionnaire statistically predicted participants' achievement beyond their self-rated abilities. In addition, certain learning approaches were significantly related to the participants' ages, gender, parents' education levels, and their travel and work experiences. Implications of these findings are discussed as they relate to teaching and learning.

TRADITIONALLY, many psychologists and educators have believed that students' successes and failures are attributable mainly to individual differences in ability. For the past few decades, however, in the study of individual differences in academic achievement, investigators have also focused on the examination of variables other than ability. These variables include self-concept, self-confidence, or self-esteem (e.g., Allen, 1992; Fuertes, Sedlacek, & Liu, 1994; Kwok & Lytton, 1996; Mboya, 1993); learning motivation (e.g., Dev, 1997; Niles, 1995); instructional approaches (e.g., Johnson, Johnson, & Taylor, 1993; Mills, Dale, Cole, & Jenkins, 1995; Stipek, Feiler, Daniels, & Milburn, 1995); cognitive styles, learning styles, and thinking styles (e.g., Gregorc, 1985; Holland, 1973; Kagan,

Research for this project was supported by the Wu Jieh-Yee Research Fund as administered by the University of Hong Kong. I thank David Watkins for his constructive comments on a preliminary draft of this article

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1976; Kolb, 1976; Myers, 1978; Sternberg, 1988); home environment and family support (e.g., Chen, Lee, & Stevenson, 1996; Cutrona, Cole, Colangelo, Assouline, & Russell, 1994); the accuracy of perceived ability (e.g., Eshel & Kurman, 1991); as well as gender, ethnicity, and career self-efficacy (e.g., Hackett, Betz, Casas, & Rocha-Singh, 1992).

Learning approach, as an individual-difference variable, has also been investigated in relation to academic achievement. Early investigators (e.g., Craik & Lockhart, 1972; Marton, 1976) were interested in the "duality of levels of processing in an approach to learning, which reflected either a deep or surface engagement with the task" (Rayner & Riding, 1997, p. 16). Both Biggs (1979) and Ramsden and Entwistle (1981) independently identified a third learning approach that Biggs called "achieving." The present research is based on Biggs's (1979, 1987, 1992) theory of students' learning approaches.

Adapted from Dunkin and Biddle's (1974) presage–process–product mode, Biggs's (1979) model addresses these three components in the classroom. Presage concerns experiences before learning takes place; process pertains to strategies while learning is taking place; product is about outcomes after learning has taken place. In the present study, I focused on the process of learning as well as its relationship with presage and product. According to the 3P model, there are three common approaches to learning: surface approach, which involves a reproduction of what is taught to meet the minimum requirements; deep approach, which involves a real understanding of what is learned; and achieving approach, which involves using a strategy that will maximize one's grades (see also Entwistle, 1975; Marton, 1976).

One of the instruments used to assess learning approaches among university students is the Study Process Questionnaire (SPQ; Biggs, 1987, 1992). The SPQ was originally designed to assess the learning approaches of Canadian and Australian students. Many studies involving the SPQ have been undertaken. Biggs (1992) summarized major endeavors regarding the 3P model using the SPQ before 1992, focusing on students' motives and strategies for learning. These motives and strategies have been examined in the following contexts: cross-cultural comparisons (e.g., Kember & Gow, 1990; Wilson, 1987), the language medium of instruction (e.g., Watkins, Biggs, & Regmi, 1991), teaching and learning environments (Biggs, 1988), student characteristics (e.g., Gow et al., 1989; Watkins & Hattie, 1981), professional and staff development (e.g., Biggs, 1988), and factor structure and dimensionality of subscales (e.g., Hattie & Watkins, 1981; O'Neil & Child, 1984).

More recent work examining learning approaches as defined by the 3P model has focused on the following: examining the differences between learning styles and learning approaches (e.g., Murray-Harvey, 1994); investigating the relationships between learning approaches and the Scholastic Assessment Test, grade point average, and individual course grades (e.g., Rose, Hall, Bolen, & Webster, 1996); and constructing other versions of the SPQ (e.g., Albaili, 1995;

Watkins & Murphy, 1994). Construct validity studies of the SPQ continue to form one of the major ways to examine the instrument and its underlying 3P model (e.g., Bolen, Wurm, & Hall, 1994; Hall, Bolen, & Gupton, 1995).

Cross-cultural studies using the SPQ also remain one of the major interests of many investigators (e.g., Niles, 1995; Watkins & Regmi, 1990; Wong, Lin, & Watkins, 1996). Some of these studies have been conducted in a number of Asian countries, including Hong Kong (e.g., Kember & Gow, 1990; Tang & Biggs, 1996). However, we cannot predict with confidence that results from Hong Kong, a Chinese context, can be generalized to university student learning in mainland China. As higher education in mainland China is becoming increasingly important for producing individuals who can meet the challenges of modernization in China as well as in the rest of the world, understanding students' learning processes has also become critical. One of my goals in the present study was to examine the validity of the SPQ in a sample of mainland Chinese university students. I also attempted to provide the most recent data on the SPQ among Hong Kong and U.S. students.

My second goal was to examine the interconnections among the three components proposed in Biggs's (1987, 1992) 3P (presage–process–product) model. According to Biggs (1995, p. 154),"Approaches to learning occupy a central place in classroom learning: they result from student characteristics interacting with the teaching environment, and themselves have a large say in the quality of the product or outcome of learning."

To fulfill this goal, I carried out two procedures. The first was to examine the relationship between students' academic achievement (product) and their learning approaches (process) as measured by the SPQ. The second was to investigate the relationship between students' learning approaches (process) and a range of student characteristics such as age, gender, socioeconomic status (SES; estimated on the basis of parental education), as well as their extracurricular experience (presage).

Work on the relationships among the three components in Biggs's model is extensive. It has been shown that student characteristics and learning context (presage) have a strong impact on the learning approaches (process) students take (e.g., Biggs, 1988; Sadler-Smith & Tsang, 1998; Watkins & Hattie, 1981) and that learning approaches (process) make a significant difference in students' academic achievement (product—e.g., Albaili, 1997; Biggs, 1988; Watkins, 1998). An additional type of study that may be informative is of the incremental validity of learning approaches beyond abilities. One of my objectives in the present study was to identify such a relationship among university students in Hong Kong, mainland China, and the United States.

Therefore, the present study was designed to achieve three major goals. The first was to examine the reliability and validity of the SPQ among university students in three cultures. The second was to investigate whether learning approaches, as measured by the SPQ, would predict academic achievement over and

above the participants' self-rated abilities. The third was to explore the relationship between students' approaches to learning and selected student characteristics, including age, gender, SES, and travel and work experience.

Method

Participants

U.S. sample. Sixty-seven students (19 men and 48 women; 33 sophomores, 21 juniors, and 13 seniors) from an introductory psychology class at the University of Iowa participated in the study. The ages of the participants ranged from 19 to 27 years ($M = 20.55$). The participants' fathers' education levels were as follows: 22.4% had high school diplomas; 26.9% had college training; 34.3% had bachelor's degrees; and 16.4% had postgraduate degrees. Also with regard to education, 53.7% of the participants' mothers had had some college training, or had high school diplomas, or had not graduated from high school. The rest of the mothers had bachelor's degrees or graduate degrees. More than half the participants (58.2%) had no work experience. The length of work experience among the remaining participants ranged from 1 to 10 years. Most students (93%) had traveled to one or two cities or countries. The number of cities or countries that the remaining participants had traveled to ranged from 3 to 40.

Hong Kong sample. Six hundred and fifty-two students (229 men, 422 women, and 1 participant who did not indicate gender) from the University of Hong Kong volunteered to participate in this study. Of all participants, 623 (95.6%) were undergraduate freshmen, 19 (2.9%) were starting to pursue their postgraduate certificates, and 6 (.9%) were starting to work toward their master's degrees. Four students did not indicate their year in college. The ages of the students ranged from 18 to 30 years ($M = 19.22$). The majority (78.5%, $N = 512$) of the participants' fathers' had high school diplomas or had not graduated from high school. The education levels of the remaining fathers were distributed as follows: 11.7% ($N = 76$) had college training; 8% ($N = 52$) had bachelor's degrees; and 1.7% ($N = 12$) had postgraduate degrees. Mothers' education levels were as follows: 90.2% ($N = 588$) had high school degrees or had not graduated from high school; 6% ($N = 39$) had college training; 3.5% ($N = 23$) had bachelor's diplomas; and .3% ($N = 2$) had postgraduate degrees. A majority of the participants had no working experience (85%). The number of years of working experience of the remaining participants ranged from 1 to 20. A small number of the participants (10.6%; $N = 69$) had not been outside Hong Kong. The number of cities and countries the remaining participants had traveled to ranged from 1 to 50, with a median of 3.

Mainland China sample. One hundred and ninety-three students (101 men and 92 women) from two universities in Nanjing, mainland China, participated in the

study. The numbers of students from each of the four levels of classes were roughly evenly distributed (56 freshmen, 41 sophomores, 49 juniors, 45 seniors, and 2 who did not indicate grade level). The ages of the students ranged from 16 to 24 years (M = 20.27). The education levels of the participants' fathers were distributed as follows: 61.1% (N = 118) had high school diplomas or had not graduated from high school; 22.3% (N = 43) had college training; 16.1% (N = 31) had bachelor's degrees; and .5% (N = 1) had a postgraduate degree. Mothers' education levels were as follows: 80.3% (N = 155) had high school diplomas or had not graduated from high school; 13.5% had college training; and 6.2% had bachelor's degrees. The majority of students (97.9%) had no work experience. The remaining participants had worked 1 or 2 years. The number of cities or countries the participants had traveled to ranged from 1 to 20, with a median of 5.

Measures

The SPQ. The SPQ (Biggs, 1987, 1992) is a self-report test consisting of 42 items on six subscales, with 7 items on each subscale. For each item, the respondents are asked to rate themselves on a 5-point scale ranging from *never or only rarely true of them* (1) to *almost always true of them* (5). Results of most studies showed internal consistencies ranging from the mid 50s to the low or mid 70s for the six subscales and from the low 70s to the low 80s for the three scales (for details, see Albaili, 1995; Watkins, 1998).

The original SPQ (Biggs, 1987) was constructed to assess the learning approaches of Australian university students. Subsequently, the SPQ has been used in many cross-cultural studies (e.g., Albaili, 1995; Kember & Gow, 1990; Niles, 1995; Watkins & Regmi, 1996). The majority of these studies showed the validity of the SPQ, resulting in two factor solutions (deep and surface approaches). The amount of the variance accounted for by the two factors ranged from high 60% to mid 70%. The six subscales are Surface Motive, Surface Strategy, Deep Motive, Deep Strategy, Achieving Motive, and Achieving Strategy. The three overall scales based on the three approaches to learning are Surface (motive and strategy), Deep (motive and strategy), and Achieving (motive and strategy). Motive describes why students learn; strategy describes how students learn (see Table 1 for sample items).

Abilities. Participants rated their abilities on a 10-point Likert-type scale (following Simpson, Licht, Wagner, & Stader's 1996 study, which used single-item scales). The three kinds of abilities assessed were analytical, creative, and practical, on the basis of Sternberg's (1985) triarchic theory of intelligence.

Academic achievement. Because of the different grading systems used in the three countries, the achievement measure used for each sample was different. For the U.S. sample, the cumulative grade point average (GPA) was used. For the

TABLE 1
Study Process Questionnaire

Subscale	Sample item
Surface Motive	I choose my courses largely with a view to the job situation when I graduate rather than because of how much they interest me.
Deep Motive	I find that studying gives me a feeling of deep personal satisfaction.
Achieving Motive	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.
Surface Strategy	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.
Deep Strategy	While I am studying, I think of real-life situations to which the material that I am learning would be useful.
Achieving Strategy	I summarize suggested readings and include these as part of my notes on a topic.

Nanjing sample, average college entrance examination scores were used for freshmen, and average scores of the previous academic year were used for sophomores, juniors, and seniors. For the Hong Kong sample, the participants' scores on the advanced level tests (A-level tests), which serve as the university entrance examination scores in Hong Kong, were used. The use of a different kind of achievement score for each culture was considered appropriate because the scores were used to identify the ways that achievements were operationalized in each culture rather than to compare achievement mean scores across the different cultural groups.

Results

On each set of the data obtained from the three samples, the following statistical analyses were conducted by using SPSS (Norusis, 1994). The reliability of each of the six subscales and of the three overall scales (Deep, Surface, and Achieving) in the SPQ was estimated by using Cronbach's alpha. The validity of the questionnaire was obtained by a principal axis factor analysis followed by an oblimin rotation. The predictive validity of learning approaches on academic achievement scores beyond their self-rated abilities was assessed by using a stepwise multiple regression analysis. A stepwise multiple regression procedure was also used to explore the relationships between students' scores on the SPQ and their demographic characteristics such as age, gender, SES, and extracurricular experience.

TABLE 2
Study Process Questionnaire Subscales and Scales: Means, Standard Deviations, and αs

Subscale/scale	*M*			*SD*			α		
	US	HK	NJ	US	HK	NJ	US	HK	NJ
Surface Motive	3.53	2.98	2.62	.63	.59	.69	.59	.60	.63
Surface Strategy	3.05	2.65	2.30	.62	.58	.58	.65	.65	.66
Deep Motive	3.13	3.19	3.42	.65	.58	.55	.65	.66	.46
Deep Strategy	3.22	3.25	3.49	.60	.59	.61	.74	.76	.73
Achieving Motive	3.16	3.00	3.21	.69	.70	.67	.71	.75	.61
Achieving Strategy	2.75	3.13	3.18	.80	.74	.71	.78	.77	.77
Surface	3.29	2.82	2.45	.52	.51	.56	.71	.75	.76
Deep	3.18	3.24	3.43	.57	.53	.52	.81	.82	.76
Achieving	2.96	3.06	3.20	.66	.61	.59	.83	.82	.78

Note. HK = Hong Kong. NJ = Nanjing. For the United States, $N = 67$; for Hong Kong, $N = 652$; and for Nanjing, $N = 193$.

Subscale and Scale Reliabilities for the SPQ

Except for the alpha coefficient for the Deep Motive subscale for the Nanjing sample, the alpha estimates of internal consistency for the SPQ subscales and the three overall scales were similar across the three data sets (see Table 2). Furthermore, these alpha coefficients were consistent with those obtained by Biggs (1987) for his Australian sample as well as with those obtained by other investigators (e.g., Kember & Gow, 1990; Watkins, 1998; Watkins & Dahlin, 1997). For the U.S. sample, the alpha coefficients ranged from .59 to .78, with a median of .68. For the Hong Kong sample, the alpha coefficients ranged from .60 to .77, with a median of .71. For the Nanjing sample, the alpha coefficients ranged from .63 to .77, with a median of .65. The alpha coefficients for the three overall scales were mostly in the high .70s and mid .80s (see Table 2).

Factor Analysis

Table 3 summarizes the results obtained from a principal axis factor analysis, followed by an oblimin rotation procedure (Norusis, 1994) for each of the three samples. On the basis of Biggs's original theory, there should be three factor solutions, with each of the three learning approaches (deep, surface, achieving) as one of the factors. However, many researchers (e.g., Bolen, Wurm, & Hall, 1994; Rowell, Dawson, & Pollard, 1993; Watkins & Dahlin, 1997; Wong et al., 1996) have suggested that there were only two factor solutions—deep and

TABLE 3
Oblimin-Rotated Two-Factor Model for the Study Process Questionnaire

Subscale	US		HK		NJ	
	Factor 1	Factor 2	Factor 1	Factor 2	Factor 1	Factor 2
Surface Motive	–.02	.76	.05	.85	.02	.86
Surface Strategy	–.08	.82	–.13	.89	–.10	.87
Deep Motive	.89	–.18	.86	–.08	.78	.09
Deep Strategy	.76	–.26	.88	–.10	.84	–.17
Achieving Motive	.65	.48	.55	.51	.63	.43
Achieving Strategy	.82	.19	.75	.08	.82	–.13
% of variance	41.6	27.0	45.7	24.8	40.6	28.2
Cumulative %	41.6	68.6	45.7	70.5	40.6	68.7
Eigenvalue	2.50	1.62	2.74	1.49	2.43	1.69

Note. HK = Hong Kong. NJ = Nanjing. For the United States, $N = 67$; for Hong Kong, $N = 652$; and for Nanjing, $N = 193$.

surface. The achieving subscales were usually found to either load on one of the other two factors or be divided between the other two factors. In the present study, data for each of the three samples resulted in two factor solutions—Deep and Surface, with the Achieving subscales loaded on the Deep subscales for all three samples. These two factors explained 69%, 71%, and 69% of the variance in the American, Hong Kong, and Nanjing samples, respectively.

Relationship Between Learning Approaches and Achievement

For each sample, a stepwise multiple regression procedure was performed, with the SPQ subscale scores being the predictor variable for academic achievement, and with the three self-rated abilities being forced into the regression model first. For all three samples, certain SPQ subscales were found to make unique contributions to individual differences in academic achievement beyond the participants' self-rated abilities.

Specifically, the ways in which the SPQ subscale scores significantly contributed to the participants' achievements beyond their self-rated abilities were as follows: For the U.S. sample, Deep Strategy contributed positively to achievement (explained 10% of the variance beyond abilities). For the Nanjing sample, Achieving Motive contributed positively, whereas Surface Motive contributed negatively to achievement (explained 6% of the variance beyond abilities). For the Hong Kong sample, 7 of the 11 subject areas examined were found to be related to learning approaches. These were applied mathematics, chem-

istry, Chinese language and culture, Chinese history, history, the use of English, and geography.

Furthermore, the unique contribution of the SPQ scores was, to some extent, subject specific. In general, for chemistry and geography, Surface Motive and Surface Strategy contributed positively to academic achievement, whereas for the remaining subjects, achieving and deep approaches were associated with higher achievement scores; Surface Strategy was found to be negatively related to achievement scores. The amount of variance accounted for by the SPQ subscales ranged from 1% to 9% (beyond abilities; see Table 4).

Relationship Between Learning Approaches and Student Characteristics

A stepwise multiple-regression procedure was applied to each of the three sets of data, with the student characteristics being the predictor variable for the SPQ subscale scores. Results showed that student characteristics such as age, gender, SES, as well as traveling and working experience statistically predicted the participants' scores on the SPQ subscales. In general, except for the variables of age and gender, these student characteristics were significantly and positively related to achieving and deep approaches and negatively correlated with surface approaches.

Specifically, for the U.S. sample, the following results were obtained: (a) The participants' fathers' education level (SES) accounted for 7% of the variance ($\beta = .27$) in their scores on Deep Strategy; (b) their travel experience accounted for 8% of the variance ($\beta = -.28$) in their scores on Surface Strategy; and (c) age accounted for 6% and 7% of the variance in Achieving Motive ($\beta = -.25$) and in Achieving Strategy ($\beta = -.26$), respectively.

The results for the Hong Kong sample were as follows: (a) The length of work experience ($\beta = .11$) and gender ($\beta = .15$) together accounted for 4% of the variance in the Achieving Strategy scores; (b) the length of work experience ($\beta = .11$) and their travel experience ($\beta = .10$) accounted for 2% of the variance in the Deep Strategy scores; (c) the length of work experience ($\beta = .10$) accounted for 10% of the variance in Deep Motive scores; and (d) their travel experience ($\beta = -.10$) accounted for 1% of the variance in the Surface Strategy scores.

The regression results obtained from the Nanjing sample were as follows: (a) age ($\beta = -.36$) and length of work experience ($\beta = .15$) accounted for 13% of the variance in the Achieving Motive scores; (b) the participants' college class levels ($\beta = -.16$) and gender ($\beta = -.15$) accounted for 5% of the variance in the Deep Motive scores; (c) the participants' college class levels ($\beta = -.48$) and their travel experience ($\beta = .18$) accounted for 23% of the variance in their use of Achieving Strategy; and (d) in the meantime, the participants' college class levels ($\beta = -.32$) and their travel experience ($\beta = .20$) accounted for 12% of the variance in their use of Deep Strategy (see Table 5 for details).

TABLE 4
Predictive Validity of Learning Approaches: R^2, ßs, and *F*s

	US	Nanjing	Hong Kong						
Achievement	GPA	Entrance	AM	CC	CH	CI	GE	HI	UE
N	67	185	81	639	319	59	163	133	646
R^2_{Ability}	.03	.02	.06	.03	.02	.04	.00	.09	.04
R^2_{Approach}	.10	.06	.09	.02	.02	.09	.03	.04	.01
R^2_{Total}	.13	.08	.15	.05	.04	.13	.03	.13	.05
$ß_{\text{Approach 1}}$	$.34_{DS}$**	$.20_{AM}$**	$.32_{AM}$**	$.09_{DM}$*	$.15_{SM}$**	$.31_{DS}$*	$.17_{SS}$*	$.20_{AS}$*	$-.12_{SS}$**
$ß_{\text{Approach 2}}$		$-.22_{SM}$**		$-.10_{SS}$*					
F	2.28	3.27**	3.45**	6.36***	3.35**	1.95	1.35	4.96***	8.87***
df	4, 62	5, 179	4, 76	5, 633	4, 314	4, 54	4, 158	4, 128	4, 641

Note. AM = applied mathematics; CC = Chinese language and culture; CH = chemistry; CI = Chinese history; GE = geography; HI = history; UE = use of English. Subscripts: AM = achieving motive; AS = achieving strategy; DM = deep motive; DS = deep strategy; SM = surface motive; SS = surface strategy.
*$p < .05$. **$p < .01$. ***$p < .001$.

TABLE 5
Predictive Validity of Demographic Variables for Learning Approaches: R^2, ßs, and *F*s

Subscale	R_1^2	R_2^2	$ß_1$	$ß_2$	*F*	*df*
U.S.						
Achieving motive	$.06_{Age}$		$-.25^{*}$		4.50*	1, 65
Achieving strategy	$.07_{Age}$		$-.26^{*}$		4.93*	1, 65
Deep strategy	$.07_{SES}$		$.27^{*}$		5.07*	1, 65
Surface strategy	$.08_{Travel}$		$-.28^{*}$		5.63*	1, 65
Hong Kong						
Achieving strategy	$.02_{Sex}$	$.02_{Work}$	$.11_{Sex}^{***}$	$.15_{Work}^{***}$	10.00***	2, 544
Deep motive	$.01_{Work}$		$.10^{*}$		5.19*	1, 545
Deep strategy	$.01_{Work}$	$.01_{Travel}$	$.11_{Work}^{**}$	$.10_{Travel}^{*}$	6.33**	2, 545
Surface strategy	$.01_{Travel}$		$-.11^{**}$		6.62**	1, 546
Nanjing						
Achieving motive	$.10_{Age}$	$.03_{Work}$	$-.36_{Age}^{***}$	$.14_{Work}^{*}$	12.59***	2, 176
Achieving strategy	$.20_{Class}$	$.03_{Travel}$	$-.48_{Class}^{***}$	$.18_{Travel}^{**}$	25.93***	2, 176
Deep motive	$.03_{Class}$	$.02_{Sex}$	$-.16_{Class}^{*}$	$-.15_{Sex}^{*}$	4.53**	2, 177
Deep strategy	$.08_{Class}$	$.04_{Travel}$	$-.32_{Class}^{***}$	$.20_{Travel}^{**}$	11.55***	2, 177

Note. Subscript 1 indicates the first student characteristic that statistically contributed to a specific learning approach. Subscript 2 indicates the second student characteristic that statistically contributed to a specific learning approach.
$^{*}p < .05$. $^{**}p < .01$. $^{***}p < .001$.

Discussion

I achieved the three goals specified earlier for this study by analyzing the data collected from university students in the three countries, using the participants' scores on the SPQ, their self-rated abilities, their academic achievements, and a variety of demographic information. The low reliability coefficient for the Deep Motive subscale for the Nanjing sample was consistent with Watkins's (1998) finding in his two samples from Nepal. This low coefficient may be attributable to the fact that the SPQ was not originally designed for the participants in Nanjing (also see Watkins, 1998) but was normed on Hong Kong university students. This possibility might indicate that the Deep Motive subscale needs to be revised before it is used again for students in mainland China. However, this low reliability coefficient might also be attributable to a chance factor because this was the first study in which the SPQ was used for assessing the learning approaches of students from mainland China. Nevertheless, the rest of the reliability coefficients were sufficiently high to allow for further statistical analyses (see Table 1).

Results also indicated that the SPQ is a valid instrument for assessing stu-

dents' approaches to learning. As predicted, there were two factors. This result was consistent with what Watkins (1998) obtained in his samples in the United Arab Emirate and in Hong Kong (in the remaining 6 countries he studied, the Achieving subscales, Motive and Strategy, split between the other two factors). The two factors also supported the results obtained by Marton and his collaborators (Marton & Booth, 1997; Marton & Saljo, 1976a, 1976b) and by Entwistle (1979, 1981).

One of the major goals of the present study was to examine the interrelations among the three components proposed in Biggs's (1979) presage–process–product (3P) model, which I achieved in two ways. First, I examined the relationships between process and product in the 3P model by identifying the predictive validity of learning approaches (as measured by the SPQ) for academic achievement, controlling for students' self-rated abilities. I also examined the relationships between presage and process in the 3P model by identifying the predictive validity of selected student characteristics for their learning approaches.

Process and Product

According to Biggs (1987, 1995), academic achievement should be correlated reliably and positively with achieving approach, negatively with surface approach, and sometimes positively with deep approach. Research findings on this hypothesis had been mixed, although largely supportive. For example, although Watkins (1998) found statistically significant correlations in the predicted directions, Wilson (1987) found no relationship between academic achievement scores and the SPQ scores. Rose et al. (1996) found that only the achieving approach to learning significantly but negatively contributed to the prediction of GPA.

Results from the present study were also mixed. Consistent with Biggs's prediction, but contrary to the Rose et al. (1996) finding, U.S. students who used deep strategy tended to have higher GPAs regardless of their self-rated abilities. Results from the Nanjing sample lent full support to Biggs's prediction. Although students who used deep motive for learning tended to obtain significantly higher achievement scores, students who used surface motive for learning tended to obtain significantly lower achievement scores, regardless of their self-rated abilities.

The results from the Hong Kong sample revealed more details about the relationship between learning approaches and academic achievement because scores on 11 subjects of the A-level tests were used. The relationship between learning approaches and academic achievement varied, depending, to some extent, on the school subject. Surface motive and surface strategy positively and significantly contributed to students' achievement in chemistry and geography, and surface strategy significantly but negatively contributed to students' achievement in Chinese language and culture and use of English. In the meantime, achieving motive and achieving strategy and deep strategy were significantly and

positively related to students' achievement in applied mathematics, Chinese history, and history.

These results from Hong Kong were consistent with Biggs's (1979, 1988) findings indicating that the relationship between learning approaches and academic performance was task specific. Biggs found that scores on the surface approach were associated with better achievement when the learning task required simply a recall of facts and details. However, when the learning task required qualitative complexity, scores on the deep approach were associated with better achievement.

This phenomenon has also been addressed by Ramsden and Entwistle (1981) in a symposium that focused on the critical effect of the context of learning on the adopted learning approaches (Ramsden, 1979). Ramsden concluded that students' learning approaches were not consistent. Instead, they varied from department to department and from task to task. Therefore, in the present study, it was possible that different learning approaches were associated with better achievement in different subject areas because (a) the nature of different subjects determined the way students dealt with their learning tasks and (b) the way students were assessed in different subjects determined the ways by which students pursued their knowledge. The results might also be attributable to (c) "perceived relevance" (Fransson, 1977). That is, students may perceive some subjects as meaningful and useful in their future careers, and thus use the deep or achieving approach; students may perceive some other subjects as irrelevant to their future careers, and thus use the surface approach.

Presage (Age and Gender) and Process

In his 3P model, Biggs (1987, 1995) stated that students' learning approaches are a result of the interaction between student characteristics and the teaching context in relation to learning approaches. I limited the scope of the present study to the examination of the student characteristics of age, gender, parents' education, students' working and travel experiences—characteristics that are consistent with Biggs's model. As argued by Meyer, Dunne, and Richardson (1994) and endorsed by Sadler-Smith and Tsang (1998), "Gender differences constitute potentially important and neglected sources of variation in student learning which, when detected in context, can and should be explicitly managed by academic practitioners" (p. 469). As pointed out by Sadler-Smith and Tsang, few studies have examined the impact of age and gender on students' approaches to learning. Furthermore, the findings documented in the literature in this regard are mixed. Although some studies (e.g., Rose et al., 1996; Wilson, Smart, & Watson, 1996) revealed no gender difference in the approaches to learning, some other studies (e.g., Sadler-Smith, 1996; Sadler-Smith & Tsang; Watkins & Hattie, 1981) indicated significant group differences based on both age and gender.

In the present study, a mixture of results were identified across the three cultural groups. For the U.S. sample, only age was found to be a good predictor of the achieving approach (motive and strategy). For the Hong Kong sample, only gender was found to be a good predictor for achieving strategy. For the mainland Chinese sample, age was identified as a good predictor of achieving motive, and gender was identified as a good predictor of deep motive. Specifically, in both the U.S. and the mainland Chinese samples, the older the participants, the lower were their achieving approach scores. Although this result is in line with findings by Clarke (1986), it is not consistent with some of the other findings. For example, Richardson (1995), Sadler-Smith (1996), and Watkins and Hattie (1981) found that mature older students scored significantly higher on the deep approach and vice versa on the surface approach than their younger counterparts did.

With regard to group differences in learning approaches based on gender, in the mainland Chinese sample, male students scored significantly higher on the Deep Motive subscale than their female counterparts. Although this finding supported Sadler-Smith (1996), it disconfirmed Watkins and Hattie's (1981) results. Recently, Sadler-Smith and Tsang (1998) identified an interaction of age and gender in their effect on learning approaches. In the present study, I also found that Hong Kong female students scored significantly higher on their Achieving Strategy subscale than their male counterparts did.

Presage (Socioeconomic Status and Travel/Work Experience) and Process

As yet, there are no studies on the relationships among learning approaches and SES with students' travel or work experiences. In the present study, I made an initial attempt to examine these relationships on the basis of the assumption that SES and students' extracurricular experiences, including their work and travel experiences, should be considered part of the student characteristics in the presage in Biggs's 3P model. Thus, these students' characteristics should be related to the learning approaches the participants adopted.

Results from the present study indicated that although parent education levels did not make a difference in learning approaches among Hong Kong and mainland Chinese students, higher parent education levels were associated with the use of deep learning strategy among the U.S. students. However, with no exception and for all three groups, travel and work experiences were significantly and positively associated with deep and achieving approaches.

Travel and work experiences were significantly and negatively associated with the use of surface strategy. Although no studies can be found that examine the relationship between learning approaches and students' work experience, there is strong evidence that effective thinking can be facilitated by experience (travel and work experiences being two different kinds of experience) and that inadequate experience may interfere with effective thinking (e.g., Astin, 1989;

Batchelder & Root, 1994; Gordon, 1990; Hattie, Marsh, Neill, & Richards, 1997; Petersen, Leffert, & Graham, 1995; Zhang, 1999).

Conclusions and Implications

This research had two limitations. First, I was aware of the danger that self-confidence might affect the way the participants rated themselves on the three single-item ability scales; therefore, I also used a single-item scale to assess the participants' self-confidence about their future success in college life. Partial correlational analysis indicated that the participants' self-confidence did not change the patterns of correlations between learning approaches and academic achievement. Second, knowing that the sample sizes from the three cultures were very different, I eliminated from the scope of this study the comparison of means across the three groups on the variables under investigation.

Results from the present study enhance the understanding of university students' learning approaches across three cultures. Although these results were not exactly the same across all analyses conducted for all three cultural groups, three major conclusions can be drawn. First, the SPQ was a reliable and valid instrument for assessing the learning approaches of participants from all three cultural groups. Second, learning approaches were good predictors of students' academic achievement over and above their self-rated abilities. Third, student characteristics, including age, gender, parent education levels, and work and travel experience, did make a difference in the learning approaches students adopted.

What are the implications of these results? How could we as educators use this information in the enhancement of teaching and learning? I would argue that the results of the present study can help us to enhance teaching and learning in at least three ways.

First, given that results of the present study indicated that deep and achieving approaches tended to lead to better achievement, the question that arises is how to create a learning environment that is more conducive to effective learning. According to many investigators (e.g., Biggs, 1995; Marton & Saljo, 1976b; Ramsden & Entwistle, 1981; Sternberg, 1997), the way students are assessed has a strong impact on how they approach their study. Therefore, using assessments that encourage a deep approach to learning becomes crucial.

Second, given the fact that the results of the present study suggested that students' work and travel experiences were significantly and positively related to deep and achieving approaches and negatively related to the surface approach, enriching students' extracurricular experience seems to become one of the important tasks for educators. However, what experiences would have a positive impact on effective learning approaches? This question needs to be answered by results from further investigations.

Third, although it is hard to come to any conclusion as to the impact of age, gender, and parent education levels on learning approaches, because substantial

differences were found among the three cultural groups in the present study and among previous studies, it does seem reasonable that teachers should be alert to these differences. At a minimum, this result should cause teachers to recognize individual differences and to make an effort to motivate students to learn in a more effective way.

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Received September 24, 1998