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Test preparation strategies and test taking strategies use in Chinese high school students

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TEST PREPARATION STRATEGIES AND TEST TAKING STRATEGIES USE IN CHINESE HIGH SCHOOL STUDENTS

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ABSTRACT

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This study investigated the use of test-preparation and test-taking strategies of 429 tenth graders from a key high school in Guangzhou, China. Differences in strategy uses among low-, medium-, and high-achieving groups were determined in two subject-matter areas (Chinese language and mathematics).

Instruments used for data collection were the *Test Preparation Strategies Questionnaire (TPSQ)* and *Test Taking Strategies Questionnaire (TTSQ)*, which examined students' strategy use in cognitive/metacognitive, motivational/emotional, environmental management areas.

Results indicated that Chinese tenth graders memorized contents more often than other strategies while preparing for tests. Students planned their course of action for test preparation and selected study strategies more often than monitoring their study behaviors. High achievers expended more effort, valued testing, had more competence, had low test anxiety, used more test tactics, preferred a quite environment, managed time better, and asked assistance more

often than low achievers when preparing for tests and during tests. However, group differences were not significant in most of the cognitive and metacognitive strategies examined in this study.

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CHAPTER 1

INTRODUCTION

With over 1.2 billion people, China can hardly provide quality education for all its citizens with its limited financial resources (Luo & Wendel, 1999). The government has introduced an elite system, including key schools and college entrance examinations, to ensure the quality of education for a small group of students who have performed well on examinations throughout their school lives. In general, best schools in various regions all over the country are designated as key schools by the government to admit qualified students who receive priority investment (Wang, 1997). For example, there are about 82,000 junior high schools (grades 7, 8, and 9) and about 4 percent of them are designated as "key" schools (Luo & Wendel, 1999). Key schools are better staffed with qualified teachers and facilities and enroll students with good academic records. The reputation of a key junior high school is established chiefly on the number of students who are able to attend key senior-high schools (grades 10, 11, and 12).

As most Chinese parents and students view education as a chance for climbing the social ladder, it is very important for Chinese children to be selected for a key school for their education (Peng, 1993; Lin & Chen, 1995; Xie, 1996). Selection of students for key junior or senior high schools or colleges, however, is largely based on examination. Performances on examinations determine

educational opportunities and forms of education and training that individual students will receive in the future. As such, the examination has been a crucial feature in Chinese education (Ashmore & Cao, 1997).

According to Compulsory Education Law of the People's Republic of China, nine years of education from elementary to junior high education are compulsory. However, competition for admission to the most reputable schools is intense. In recent decades, sixth-grade students have been required to take an examination for the purpose of determining which junior high school they will attend. Upon completing three years of compulsory education in junior high school, students who wish to continue education in a reputable senior high school have to take a citywide standardized examination to determine their eligibility to enter a province-wide, citywide, or district-wide key senior high school. Those who do not meet the criteria for entrance into key senior high schools (i.e., test scores were not high enough) are placed in either a regular senior high school or a vocational senior high school. The 2003 Chinese Education Development Statistic Report indicates that only 59.6% of the students who complete junior high school have the chance to attend senior high school (Chinese Education Development Statistic Report, 2004).

Once graduated from senior high school (or toward the end of the graduating senior year), students again have to take rigorous entrance exams to qualify for college education (An, 2000). Statistics from the Ministry of Education showed that about 7.23 million eligible candidates attended the 2004 college entrance examination (Ministry of Education of People's Republic of China, 2004a) but

only 4 million candidates could be admitted to colleges (Ministry of Education of People's Republic of China, 2004b). That means only 55% of the examinees would have an opportunity to have an experience in higher education. In recent past, key high schools accounted for 95% of the university admissions from their graduating classes (Lin & Chen, 1995). The center of this uphill battle toward college entrance is the examination.

With the high pressure from the exam-driven education system, teachers include instructional activities that help increase test scores. Homework is an example that distinguishes Chinese education system from Western counterparts. Teachers assign a large amount of homework to their students in order to help them perform well on examinations, and most parents support their homework assignment practices (Lin & Chen, 1995). Over 40 percent of parents in Beijing, China, actually gave their children extra homework (Xie, Seefeldt, & Tam, 1996), and Chinese parents in Hong Kong want their children to be given a large amount of homework (Ebbeck, 1996). Consequently, it is not unusual that Chinese high school students often spend time doing homework and/or preparing for examinations until midnight (Su & Su, 1994).

Lin and Chen (1995) reported that "In the majority of schools, particularly at the secondary level, students are tested constantly, sometimes every three to five days, and sometimes everyday" (p. 154). Test strategies are taught in class occasionally. In addition, students with excellent grades or older students with more testing experiences share their test-preparation and test-taking strategies in a workshop organized by a classroom teacher before important examinations.

Yien's (2001) study with Taiwanese students indicated that effective strategies generally help improve test performance. High performers in Yien's study reported using strategies such as making inference, matching, alerting, and guessing strategies more often than their low performing peers in an English test. However, studies on test-preparation and test-taking strategies and their relationship with test performance in Chinese students are rare. As tests are an essential and integral part in the education of Chinese students, it is important to understand strategies Chinese students use to increase learning and test performance. To this end, the current study examined Chinese students' test-preparation and test-taking strategies and their relationships with test performance.

Review of Relevant Literature

Literature relevant to test-preparation and test-taking strategies are reviewed in the following section.

Test Preparation Strategies

Research has demonstrated that students who prepare for tests manifest gains in their test scores (e.g., Moss, 1995; Norton & Park, 1996). Students who were provided with test-preparation instruction scored significantly higher than their peers who did not receive such instruction (e.g. Kristobak, 2000; Reynolds & Oberman, 1987; Scruggs & Mastropieri, 1986). High-achieving students use effective strategies, such as goal-setting, planning, asking for assistance, reviewing, organizing and transforming notes, as compared to their low-achieving

students (Hong, Sas, & Sas, in press; Kitsantas, 2002; Stoynoff, 1996; Zimmerman & Martinez-Pons, 1990). Positive effects of test-preparation instruction were also shown in standardized tests (Donald, 1980; VanScoy, 1997). Donald's (1980) study revealed that a special preparation program that led students to practice and to be familiar with similar items of the SAT-verbal examination increased student performance. Another preparation program in which students were exposed to previous ACT test items and provided with general test-taking strategies also demonstrated its positive effects in improving students' ACT Math scores (Vanscoy, 1997).

Review of studies on test-preparation or general study strategies indicated that students' study behaviors include cognitive and metacognitive strategies, motivational components, and environmental management. Responsible learners regulate their own studying and performance by directing their own learning processes metacognitively, motivationally, and behaviorally (Hong, 2001; Zimmerman, 1986, 1990). Self-regulated learners plan, organize, self-instruct, self-monitor, and self-evaluate at various stages of the learning process (i.e., metacognitive component), perceive themselves as competent, self-efficacious, and autonomous (i.e., motivational component), and also select, structure, and create environments that optimize learning (i.e., behavioral component applied to environment). In the sections that follow, literature on cognitive and metacognitive strategies, motivational strategies and awareness, and strategies used for environmental optimization for learning and test preparation are reviewed.

Cognitive and Metacognitive Strategies Used in Test Preparation

Cognitive strategies are ways that learners manipulate information in response to task requirements, such as rehearsal, elaboration, organization, and summarization (Karabenick, 1987; Weinstein & Mayer, 1986). Cognitive strategies reported by students for test preparation include (a) reviewing textbooks, notes, and/or homework (Hong et al., in press; Stoynoff, 1996; Zimmerman & Martinez-Pons, 1986); (b) skimming over chapter outlines and summaries and selecting main ideas (Jerrold, 2000; Kitsantas, 2002); (c) taking good notes (Carranza, 2001; Hong et al., in press); (d) underlining and highlighting important key words and issues (Hakstian, 1971; Jerrold, 2000); (e) studying and practicing available test questions on the subject (Hong et al., in press; Perlman, 2003); (f) rehearsing and memorizing words, definition, formulas, and notes (Ainley, 1993; Elliot et al., 1999; Hong et al., in press); (g) understanding concepts and processes (Hong et al., in press); and (h) making predictions, such as making up imaginary test items beforehand (Phakiti, 2003).

These cognitive strategies are distinguished as surface-level or deep-level processing approaches (Ainley, 1993; Elliot, McGregor, & Gable, 1999; Entwistle & Ramsden, 1983; Pintrich, 1989; Pintrich & Garcia, 1991). Simply reading a whole passage over and over, focusing on details in the text, memorizing facts, reproducing the original definition and rules, or trying to remember as much as possible are examples of surface approaches. The surface processing approaches were not effective in increasing student performance. For example, Hong et al. (in press) found that while many students reported having repeated or

checked answers, these strategies did not differentiate high from low achievers in mathematics. Likewise, surface study strategies were not related to test performance in the study by Elliot et al. (1999). In a qualitative study by Entwistle and Ramsden (1983), only 5 of 16 students in the surface strategy group gained "good degree" (first or second upper class honors), whereas 16 of 26 students in the deep strategy group gained "good degree."

Deep-level processing approaches are concerned with strategies that involve elaboration, organization, and transformation processes, such as discriminating important information from unimportant information, connecting new information to existing knowledge, comparing and contrasting information being studied, challenging the veracity of information encountered, examining evidence before accepting conclusion, trying to understanding the meaning, and drawing concept maps, pictures, or diagrams (e.g., Ainley, 1993; Elliot et al., 1999; Entwistle & Ramsden, 1983; Miller et al., 1996). For example, students who reported using notetaking strategies or solving problems when preparing for math tests achieved higher in math than those who did not (Hong et al., in press). High-achieving students gave more attention to identifying and focusing on the main concepts and tried to discover crucial ideas while they prepared for tests (Warkentin & Bol, 1997). Engaged students showed significantly higher use of transformation strategies than less engaged students in their test-preparation task, thus achieving higher scores on their exam (Ainley, 1993).

Metacognitive strategies represent executive functions designed to assess and control the use of cognitive strategies (Baker & Brown, 1984; Brackney &

Karabenick, 2003; Flavell, 1979, 1985). These strategies are employed by students to plan, monitor, and regulate their learning (Pintrich, 2002; Pintrich & Johnson, 1990).

Numerous research studies have demonstrated a positive relationship between metacognitive strategy use and student achievement (Alexander, Graham, & Harris, 1998; Maqsud, 1997; Pressley, Borkowsky, & Schneider, 1987; Swanson, 1990). Successful students analyze, plan, execute, and evaluate academic tasks (Alexander & Murphy, 1998). Successful students set goals and monitor their progress by analyzing what is and is not working and why (Carranza, 2001). If self-monitoring indicates a deficiency in performance, learners' self-efficacy will be triggered to affect their subsequent motivation and choice of strategies (Zimmerman & Martinez-Pons, 1990).

Metacognitive strategies can compensate for overall ability. Swanson (1990) found that children with high metacognitive skills but low aptitude performed better than low metacognitive children with higher overall aptitude when doing a mathematical task. Children with both high metacognitive skills and aptitude frequently used strategy subroutines such as attempting to reach a goal-state by taking a sequence of steps, paying attention to the feedback information, testing out possible solutions, evaluating strategy use, making transitions from the previous inadequate strategy to another, and keeping track of the directions. Artzt and Armour-Thomas (1992) also found that metacognitive behaviors such as planning, analyzing, monitoring and evaluating contribute to the successful outcome of problem solving in high achievers.

On the contrary, low-achieving students generally lack well-developed metacognitive skills (Costa, 2001; Sternberg, 1986). Those students who do not assume responsibility for their thinking and learning would ultimately display symptoms of learned helplessness (Ganz & Ganz, 1990). Metacognitive strategies may help low-achieving students develop learning skills become successful problem-solvers (Blakey & Spence, 1990), and improve their academic achievement (Maqsud, 1997).

Motivational and Emotional Strategies Used in Test Preparation

Students regulate their learning not only by the use of cognitive and metacognitive strategies, but also by motivational strategies (Bandura, 1993; Garcia & Pintrich, 1994; Jerrold, 2000). Self-regulated learners know about and use many different strategies to regulate their motivation and emotion when preparing for tests. Students' uses of motivational and emotional strategies are indicated by their goal-oriented self-talk (Wolters, 1998; Wolters & Rosenthal, 2000); self-confidence and self-efficacy in learning and performance (Hong & Aqui, 2004; Hong & O'Neil, 2001; Pajares, 1995; Pintrich & Johnson, 1990; Zimmerman, Bandura, & Martinez-Pons, 1992); effort management (Hong & Aqui, 2004; Hong & O'Neil, 2001; Pokay & Blum, 1990; Zimmerman & Martinez-Pons, 1990; Garcia & Pintrich, 1991); task value, that is, students' beliefs about the importance and usefulness of the learning task or their interest in the task (Pintrich & DeGroot, 1990; Wigfield & Eccles, 1992; Wigfield et al., 1997); self-consequating, that is, providing themselves rewards or punishment (Jackson & Molloy, 1985; Zimmerman & Martinez-Pons, 1986); and emotion regulation, such

as reducing anxiety and relaxing (Chittooran & Miles, 2001; Mealey & Host, 1992).

Motivational strategies play an important role in test preparation. Highly motivated students work hard, persist in their effort in the face of difficulties, and have more fun in the successful accomplishment of a learning task (Robison, 1993). The higher the learner's motivation, the more likely will be the use of study strategies essential for optimal learning (Covington, 2000). However, when students lack interest or motivation, they do not pay attention to or make an effort in their learning. Thus, motivation leads to cognitive engagement, with such engagement manifesting itself in the use of various effective study strategies (Zimmerman, 1990).

It has been well documented that test anxiety often interferes with test performance (Cassady & Johnson, 2002; Hambree, 1988; Kevimaki, 1995; Hong, 1999; Hong & Karstensson, 2002; Seipp, 1991). The two-factor test anxiety model (worry and emotionality) has been supported by research studies (e.g., Benson & Bandalos, 1992; Hong, 1999; Zeidner & Nevo, 1992) along with other models (e.g., Sarason, 1984). Indicators of worry anxiety are fear of taking tests, expectation of poor performance, and thinking about consequences of failing test before or during examination. Emotionality is indicated by their physical symptoms such as wet palms, nervousness, stress, upset stomach, headache, body ache and pain, and insomnia.

Worry anxiety may be reduced through the use of certain strategies in test preparation. Some of the effective efforts at managing test worry include

changing negative thoughts, beliefs, and attitudes about personal competence and behavior, considering the test as an exiting challenge and a chance to show capability, and viewing their chance of success realistically and considering the worse situation as well (Chittooran & Miles, 2001). Likewise, strategies, such as listening to music (Thomas,1987; Russell, 1992), imagining in a quiet place, and relaxing one body part at a time are effective for reducing emotional anxiety (Chittooran & Miles, 2001).

Environmental Management Strategies Used in Test Preparation

Managing the study environment may help students who aim at learning and are concerned about their test performance. This type of strategy has been expressed as resource management (Pintrich, 2000) or environmental structuring (Zimmerman & Martinez-Pons, 1986, 1990). Kuhl (1985) includes environmental management as an important process that mediates action control in pursuing intentions. Self-regulated students tend to choose a quiet environment to study and control their thoughts not to be distracted by others until they have finished the task (Carrnza, 2001; Chittooran & Miles, 2001). Time management is another effective strategy which prevents students from cramming for the test and helps them plan and carry out their own schedules for preparing for the test (Carranza, 2001). When preparing for tests, students made an arrangement to take breaks and or studied at a preferred time period (Hong et al., in press). Help-seeking strategies can be an important proactive skill for increasing achievement in school or work (Karabenick, 1987). Some students sought for help from teachers, peers, and/or family members (Hong et al., in press; Zimmerman & Martinez-

Pons, 1986), and other students express their preference in studying in groups or by themselves (Carrnza, 2001; Chittooran & Miles, 2001).

Compared to cognitive/metacognitive strategies and motivational strategies, effects of environmental management strategies on achievement have rarely been investigated as a major item in research. In Zimmerman and Martinez-Pons's (1990) study, the effect of seeking assistance was examined. They found gifted students make greater use of seeking assistance from peers and adults than nongifted students. Hong et al. (in press) found that more high achievers reported having regulated their study environments than did low achievers by accommodating their surroundings, managing time, and/or seeking assistance.

Test Preparation Strategies in China

In China, students need to face a number of tests in different subjects throughout the elementary and secondary education period. Through a large amount of testing experiences, students may develop their own test-preparation strategies. However, studies investigating students' test-preparation strategies have not been conducted systematically. Due to differences in culture, test-preparation strategies employed by Chinese students might be different from those employed by students in the U.S. Asian students, more so than Western counterparts, possess higher achievement motivation because they hold a more adaptive view of ability and believe in learning through effort rather than through fixed ability (Dweck, 1999; Tweed & Lehman, 2002).

With academic pressures that students experience from the society (schools, parents, and competitive peers) and perhaps from their own selves, it is

suspected that Chinese students expend more efforts in test preparation. This may be the case even for those students who do not have much interest in or dislike the test. Chinese parents' high expectations in their children's education might be a source of high pressure (e.g., Ebbeck, 1996). In addition, Chinese students have lower self-perceptions of cognitive competence than students in the U.S., even though they have demonstrated higher academic achievement than their U.S. peers (Stigler, Smith, & Mao, 1985; Whang & Hancock, 1994). The Chinese culture and social structure (e.g., emphasis on testing, students' and parents' views on education and cognitive ability) might influence Chinese students' study habits and study strategies. In this research, strategies that Chinese students used while preparing for tests were explored. In addition, test-preparation strategies that have strong associations with test performance were examined.

Test Taking Strategies

Students who lack test-taking strategies might not achieve their expected level of performance, even when they prepare well for the test. Test-taking strategies help students demonstrate what they know while taking tests and improve the overall validity of the test by making scores more accurately reflect what they really know (Scruggs & Mastropieri, 1992). Ebel (1965) has stated that "...more error in measurement is likely to originate from students who have too little, rather than too much, skill in taking tests" (p. 206). Therefore, efforts directed toward increasing students' strategies in taking tests should result in

decreasing the error score and improving the precision of test interpretation (Oakland, 1972).

In a test-taking strategy training program, Scruggs and Mastropieri (1986) found that students could gain as much as 10 to15 percentile points, or 4 to 6 months of academic achievement, without teaching any of the content being tested. Another program that taught students study skills and test-taking strategies saw improved academic achievement and decreased test anxiety (Beidel, Turner, & Taylor-Ferreira, 1999). However, for test-taking training programs to be effective, it is recommended that programs be offered daily over several weeks. It was further recommended that students, especially low achievers, be provided with multiple opportunities to practice strategies to master them (Hughes & Deshler, 1993).

The preoccupation with test-taking principles does not suggest that studying test materials is unimportant. Test strategies reward those students who want their test scores to reflect their diligence and preparation. Millman and Pauk (1969) indicated that those who seek a quick and easy way to score high on examinations without seriously studying will find little help in their application of test-taking strategies on tests. Hughes and Deshler (1993) noted that students who are performing at very low levels might need to master several strategies before they become successful at learning new information and expressing their knowledge on tests.

Test-taking strategies not only include test tactics that help increase scores, but also cognitive strategies that help students remember studied materials and

understand test items. Strategies that students employ while taking tests are reviewed in the section that follows.

Cognitive and Metacognitive Strategies Used in Test Taking

Cognitive strategies students use while taking tests include using memory aids (such as drawing charts and pictures and writing down formulae); rereading questions to make sure they understood the questions correctly; looking for clues in the question; and underlining keywords (Kesselman-turkel & Peterson, 2003; Millman, Bishop, & Ebel, 1965; Moke & Shermis, 1996; Prestley, 2000). Pugalee (2004) indicated that utilizing diagrams and tables, guessing and check, and logical reasoning are three of the most likely strategies used by students in their problem-solving process. Students also placed high importance on re-reading when they could not understand the problem after the first reading.

Metacognitive strategies, such as planning, self-checking, and selecting strategies also have been used by test takers. Low- and high-achieving students use different planning strategies for solving test problems. Hegarty, Mayer, and Monk (1995) showed that when solving an arithmetic problem, unsuccessful problem solvers based their solution plan on the numbers and keywords that they select from the problem. Successful problem solvers, however, constructed a model of the situation described in the problem and based their solution plan on that model. Hegarty and her associates (1995) suggest that those successful problem solvers might keep the problem model in working memory to monitor their solution process. Likewise, students who construct global plans are more successful problem solvers than those who do not (Pugalee, 2004).

Self-checking or monitoring strategies allow students to keep track of what they have done and plan to do next. Brown (1978) indicated that a very basic form of self-awareness involved in problem-solving tasks is the realization that there is a problem related to knowing what you know and what you do not know. Baker and Brown (1984) defined comprehension monitoring as keeping track of the success with which one's comprehension is proceeding, ensuring that the process continues smoothly and taking remedial action if necessary. Students who use self-checking strategies ask themselves to determine if they recognize the problem, whether they understand what is to be found, whether they are following a successful strategy, and if not, what to do about it, and whether their answer makes sense or is reasonable. In addition, these students monitor their attempts by assessing whether the strategies are working or are worth the effort (Brown, 1978; Schurter, 2002).

Students also select strategies based on the type of test items. For instance, when facing a complicated problem, some students break it down into manageable parts and number each part so they can check quickly to make sure they have answered all the parts (Kesselman-Turkel & Peterson, 2003). For certain hard questions, some students work backward to find the answer. While solving problems given in symbols, some students insert small numbers in order to reduce the amount of abstract thinking necessary (Millman et al., 1965). Strategies such as recopying problems into an easier solving format (e.g., vertical versus horizontal) or representing the problem by drawing a picture to

determine the function to be applied are also helpful to students in solving test items (Carter et al., 2005).

Phakiti (2003) found in his study on English as a foreign language and reading achievement that highly successful test-takers reported significantly higher metacognitive strategy use than did moderately successful and unsuccessful test-takers, and the use of these strategies were positively related to the reading test performance. However, some researchers argued that metacognitve strategies are not necessary related to test performance. For example, in Schraw's (1997) study, even though students with low metacognitive knowledge were less accurately monitoring their test performance than students with high metacognitive knowledge, he found metacognitive strategy was independent of test performance. Purpura (1997) also found test takers using metacognitive strategy had no direct effect on second language test performance, but significant and positive direct influence on using cognitive strategy. Purpura contended that his results confirmed the claims of Brown and Palinscar (1982), O'Malley (1987) and Wenden (1987), who suggested that combining cognitive and metacognitive strategy training would enhance learning more effectively.

Test Tactics Used in Test Taking

The term "test-wiseness" has been used widely for describing test tactics students apply to obtain high scores. In this review, test tactics are presented in two different categories, one that represents more widely known test-wiseness and the other, organization of test items.

Test-wiseness has been commonly defined as a test-taker's capacity to utilize the characteristics and formats of the test and/or the test-taking situations to receive a high score. It is viewed as independent of the test-taker's knowledge of the subject matter on which test items are constructed (Millman et al., 1965). Test-wiseness includes eliminating alternatives, such as eliminating implausible answers or answers with repeated or similar information, and choosing the best answers (Carter et al., 2005; Chaleff & Toranzo, 2000; Cipriano, 1996; Hong et al., in press; Millman et al., 1965); anticipating answer (Cipriano, 1996; Hopkins, 1998; Loulou, 1997; Millman & Pauk, 1969); guessing when only correct answers were counted (Parham, 1996; Millman et al., 1965), error-avoiding (Parham, 1996; Millman et al., 1965), and using hints in the test, such as finding a correct answer to a hard question revealed in another test question (e.g., Custer & Others, 1991; Dembo, 2004; Hughes & Deshler, 1993; Loulou, 1995, 1997) and knowing that often a term, name, date, or other facts which have been forgotten will appear somewhere else in the test (Loulou, 1997).

Test-wiseness skills can be learned by lecture or supervised study (Gibb, 1964; Wahlsrom & Boersma, 1978). Slakter, Koehler, and Hampton (1970) provided evidence that programmed text for increasing test-wiseness was effective for learning and retention of test-wiseness behaviors (e.g., stem-option, similar-option, and specific-determiner). Test-wiseness was also found to be somewhat stable over two- or four-year intervals, especially in higher grade levels (seventh- through twelfth-grade students) (Crehan, Gross, Koehler, & Slakter, 1978).

Test organization strategies concern the strategies that students use to assess the difficulties or complexities of items and to allocate time on test items or test sections before they begin to solve problems (Hong et al., in press). For example, students look at their watch at sensible intervals to make sure they are not falling behind (Dembo, 2004); divide their time according to how many points each item is worth (Loulou, 1997; Priestly, 2000; Spriano, 1996); take easy question first and mark the difficult or time-wasters for last (Dembo, 2004; Hong et al., in press; Hughes & Deshler, 1993; Parham, 1996; Priestly, 2000; Spriano, 1996).

Motivational and Emotional Strategies Used in Test Taking

Confidence has been found to be significantly related to test performance (Sherman, 1980; Sinkavich, 1995; Sjostrom & Marks, 1994; Smith, 2002). Students' self-efficacy affects choice of activities, effort expenditure, and persistence (Bandura, 1989). Students who hold low self-efficacy for learning may avoid tasks, whereas those who judge themselves efficacious are more likely to participate. When facing difficulties, self-efficacious learners are apt to work harder and persist longer than those who doubt their capabilities (Schunk, 1991). Strategies showing students' effort expenditure in test taking include trying the best they can do (Arvey et al., 1990; Hong et al., in press), going through all items, trying as many items as they can, and showing all work for partial credit (Hong et al., in press).

Test anxiety has been evidenced as having a negative association with test performance (e.g., Culler & Holahan, 1980; Hong, 1999; Hunsley, 1985; Seipp,

1991). Test anxiety contributes to disruption of cognitive and attentional processes, especially on tasks involving higher-order thinking skills (Sarason, 1988; Wine, 1980). That is, students with high anxiety tend to devote more attention to task-irrelevant thoughts (e.g., thinking about grade, thinking of doing poorly on the test). Tobias (1980, 1986) proposed that test anxiety may interfere with students' success at three different points in time: (a) preprocessing of new information (missing some proportion of instructional input, input not encoded); (b) during processing (anxiety may interfere with the cognitive operations necessary to process the information), and (c) after the processing of information and just before output. On the other hand, test anxiety may be caused by poor preparation (Stipek, 1993), ineffective study skills or test-taking skills (Birenbaum & Nasser, 1994; Culler & Holahan, 1980; Kirkland & Hollandsworth, 1980), or deficient content knowledge (Bandura, 1993; Everson, Millsap, & Browne, 1987; Musch & Broeder, 1999).

The effectiveness of test anxiety treatments has been examined. Treatments such as relaxation therapy (Dendato & Diener, 1986; Hembree, 1988), systematic desensitization (Kennedy & Doepke, 1999; Knapp & Mierzwa, 1984), cognitive-attentional training (Wine, 1980), and study-skills training (Dendato & Diener, 1986; Naveh-benjamin, 1991) have shown their effectiveness in reducing students' test anxiety.

Environmental Management Strategies Used in Test Taking

Good test takers arrange the environment to feel comfortable and maximize their performance during the test. For example, they will get a comfortable chair,

sit with familiar friends in order not to be nervous (Dembo, 2004; McCown & Runnebaum, 2001) or expose themselves to fewer distractions by choosing a seat away form the window (Kesselman-turkel & Peterson, 2003). Successful students also seek assistance during the test when needed. Asking the examiner for clarification when necessary (Dembo, 2004), for example, for word definitions or item interpretation (Millman & Pauk, 1969) and requesting to close the door to reduce noise coming from outside (Kesselman-turkel & Peterson, 2003) are examples of testing environment management behaviors.

Test-taking Strategies in China

In China, a student's course grade is mainly based on test performance. Chinese students take quizzes and examinations on sections and units of learning material throughout the semester. The types of exams administered to students vary, including selective subject exams, imitation exams for high school or college entrance exams, preliminary exams, sectional exams, mid-term and final exams, citywide exams, and so on (Lin & Chen, 1995). The school entrance exams are especially emphasized by teachers and parents, because the result of the entrance exam determines students' future development. Teachers and principals are also highly interested in their students' test performances because test scores determine the school level (i.e., key school versus regular school). Students experience high expectations and pressures as well as strong support from their parents and school personnel (Tang & Dunkelblac, 1998).

Although there is a study on Chinese students' strategies in taking English tests (Yien, 2001), no research has explored test-taking strategies systematically

in cognitive and metacognitive, test tactic, motivational and emotional, and environment management areas. In the current study, Chinese students' test-taking strategies were explored and their relationships with test performance were examined.

Purpose of the Study and Research Questions

The purpose of the study is twofold: (1) to explore Chinese students' strategies employed for test preparation and those used while taking tests and (2) to determine differences in strategies used by various levels of achievers (high-, medium-, and low-achievers) in two subject matters (Chinese language and mathematics). The research questions are:

1. Strategy use in Chinese students in general
   - 1a. What strategies do Chinese students use while they are preparing for tests?
   - 1b. What strategies do Chinese students use while they are taking tests?
2. Cognitive and metacognitive strategies
   - 2a. Do high-, medium-, and low-achievers differ in their cognitive and metacognitive strategies in test preparation?
   - 2b. Do high-, medium-, and low-achievers differ in their cognitive and metacognitive strategies in test taking?
3. Test tactics
   - 3a. Do high-, medium-, and low-achievers differ in their test tactics (test-wiseness and test organization) employed during the tests?

4. Motivational strategies

4a. Do high-, medium-, and low-achievers differ in their test motivation (confidence/self-efficacy, effort, task value, persistence) and test anxiety in test preparation?

4b. Do high-, medium-, and low-achievers differ in their test motivation (confidence/self-efficacy, effort, task value, persistence) and test anxiety in test taking?

5. Environmental management strategies

5a. Do high-, medium-, and low-achievers differ in their environmental management strategies in test preparation?

5b. Do high-, medium-, and low-achievers differ in their environmental management strategies in test taking?

6. What other test-preparation strategies and test-taking strategies Chinese students use that may be specific to Chinese culture?

Importance of the Study

Testing is an integral part of Chinese education system. Yet, there has not been systematic research in China that examines students' use of strategies related to testing. Understanding strategies used by Chinese students in cognitive and metacognitive as well as motivational and environmental management strategies would be helpful for Chinese students in improving learning and test performance. Test results reflect whether students learned material covered in class. However, information on students' test-preparation and

test-taking strategies would provide educators with useful information on students' study and problem-solving behaviors.

Likewise, specific strategies *successful* learners in China employ in their studying and test-taking can be valuable information for classroom teachers and students. Thus, students as learners and test takers who experience success in tests may shed some lights on what strategies might be helpful to Chinese students. Information on strategies used by poor performers would also be helpful for understanding achievement differences among Chinese students.

As indicated in the literature review, teaching test strategies increases grades and enhances overall test performance. For example, strategy instruction that focused in cognitive/metacognitive strategies (e.g., Andrews, 1998; Ritter & Idol-Maestas, 1986; Scruggs & Mastropieri, 1986), building self-confidence (e.g., Tuckman, 2003), and reducing test anxiety (e.g., Beidel, Turner, & Taylor-Ferreira, 1999) helped students improve their test performance. Therefore, test-preparation and test-taking strategies that are used by high achievers would be helpful information for teachers as they provide strategy instruction to students.

Definition of Terms

Several key terms were used throughout this thesis. These terms and their definitions include:

1. Cognitive strategies – Strategies that help students encode, recall, and comprehend information such as rehearsal, elaboration, and organization strategies (Stoynoff, 1996).

2. Metacognition – Knowledge about and awareness of one's thinking (Flavell, 1985); for example, knowledge of processes of thinking, awareness of one's own processes, and ability to control them. The control of metacognition involves a variety of decisions and strategies, such as taking conscious control of learning, planning and selecting strategies, self-checking the progress of learning, correcting errors, analyzing the effectiveness of learning strategies, and changing learning behaviors and strategies when necessary (Hong & O'Neil, 2001; Ridley, Schutz, Glanz, & Weinstein, 1992).
3. Motivation – The process whereby goal-directed activity is instigated and sustained (Pintrich & Schunk, 1996). Level of motivation is reflected in the choice of courses of action and in the intensity and persistence of effort. Self-efficacy beliefs contribute to motivation in several ways: They determine the goals people set for themselves, how much effort they expend, how long they persevere in the face of difficulties, and their resilience to failures (Bandura, 1994).
4. Confidence – A feeling or consciousness of one's power or of reliance on one's circumstance; the quality or state of being certain (Morris, 1981).
5. Self-efficacy – Student's belief in how well they could perform in a learning task and their judgment of responsibility for their own performance (Bandura, 1997).

6. Self-regulation – The degree that students are metacognitively, motivationally, and behaviorally active participants in their own learning process (Zimmerman, 1995). Self-regulated learners engage in metacognitive activities (e.g., planning, self-checking) and are highly motivated (e.g., exhibit a high sense of self-efficacy and expend efforts) (Hong & O'Neil, 2001; Zimmerman, 1989, 1990).
7. Test anxiety – Test anxiety refers to the individual's disposition to react with extensive worry, intrusive thoughts, mental disorganization, tension, and physiological arousal when exposed to evaluative situations (Spielberger, Anton, & Bedell, 1976; Spielberger & Vagg, 1995).
8. Task value – An incentive to engage in academic activities, which represents a composite construct encompassing perceived importance, usefulness, and interest (Wigfield & Eccles, 1992).
9. Test-wiseness – A subject's capacity to utilize characteristics and formats of a test and/or test-taking situations to receive a high score. It is logically independent of the learner's knowledge of the subject matter for which the items are supposedly measured (Millman et al., 1965).
10. Environmental Management strategies – strategies of environmental structuring which intend to optimize the students' immediate learning or testing environment, such as eliminating noise, arranging adequate lighting, arranging a place to study or for testing, seeking information and seeking assistance (Zimmerman, 1989).

Limitations of the Study

The first limitation for this study involves the sample. Subjects were selected from a key high school in Guangzhou. Although a developmental pattern could be examined by studying various grades, only tenth graders were used for the current study. It is intended that follow-up studies were conducted based on the current findings. High schools in Guangzhou are considered typical for schools in metropolitan areas in China. However, generalization of the findings should be limited to Guangzhou, and caution should be exercised if results are to be generalized to other geographic areas of China. The findings should not be generalized to students from rural areas or from non-key schools.

The study is also limited in the adequacy of the measures on the students' level of achievement. High, medium, low and academic achievers were identified only in terms of Chinese language and mathematics final exam scores, not by scores in all other subject matters. Thus, the study findings should be implicated in these two areas.

The current study used one final examination in two subject areas to define student achievement levels. Although the final exam was considered most important to students for its weight on the course grade, more than one exam scores could have defined students' achievement level more accurately.

CHAPTER 2

METHODOLOGY

Participants and Setting

Participants were selected from a high school in Guangzhou, a major metropolitan city in southern China and the capital of Guangdong province. Guangzhou, with a population over 10 million, located in the Pearl River Delta alongside Hong Kong, is the biggest city in southern China as well as a busy port. Besides its flourishing commerce, Guangzhou is also famous historically and culturally. There are several well-regarded universities in Guangzhou, such as Zhongshan University, South China University of Technology, and Ji-nan University. There are also educational establishments under the Department of Education of Guangdong province and the Education Bureau of Guangzhou. These establishments include the Office of Regional Superintendent which establishes educational guidelines and evaluation standards, Educational Development and Evaluation Center, Office of Research on Curriculum and Teaching, Recruitment and Examination Center, Adult Education and Development Center, and Educational Technology and Information Center. Governed directly by the Department of Education of central government, Guangzhou is regarded as the education center in Guangdong province. Thus,

participants from Guangzhou are considered to be representative of the population of Chinese students in large cities in China.

The school selected for this study was a public district-wide key high school in Guangzhou. Key schools are better staffed with qualified teachers and facilities and enroll students with good academic records. Key schools in Guangzhou are evaluated and authorized by the Department of Education of Guangdong province or the Education Bureau of Guangzhou. Under the criterion managed by the government, key schools are divided as province-wide, citywide, and district-wide key schools. Each type of key school enrolls students of similar achievement levels. For example, achievement scores of students in key district-wide high schools are close to those of the citywide key schools but higher than the non-key schools. Thus, the students participating in this study were similar to other district-wide high schools, with higher enrollment academic achievement on average than that of non-key schools.

Tenth graders were selected from a high school for the current study. This school serves seventh-grade through twelfth-grade students. There were ten tenth-grade classes in this school, and all tenth-grade students who were present on the day of data collection (N = 531) participated in this study. Questionnaires with incomplete pages and those showing playful responses (e.g., responses with a zigzag pattern or with all 2's) were eliminated, resulting in 446 participants in the study. After removing 16 outliers (see the data analysis section for more information) and one student who did not have test scores, there were 429 participants in the final database.

Instruments

Test Preparation Strategy Questionnaire (*TPSQ*; Hong, 2004) and *Test Taking Strategy Questionnaire* (*TTSQ*; Hong & Peng, 2004) were used. The *TPSQ* measured students' test-preparation strategies in the cognitive, metacognitive, motivational and emotional, and environmental management areas, and *TTSQ* measured students' test-taking strategies in the cognitive, metacognitive, test tactics, motivational and emotional, and environmental management areas.

Translation and Back-translation

The English version of these two questionnaires were translated into Chinese and then back-translated into English in four stages. Translation was carried out by Peng and back-translation was conducted by a person who went to schools in China until eleventh grade and to U.S. schools from eleventh grade through college and is relatively fluent in both English and Chinese. The back-translated items were matched with the original items. Items that showed discrepancies between original items and back-translated items were marked for another round of translation and back-translation. After the second round, back-translated items were matched again with the original items. For items that still showed discrepancies were analyzed for cultural implications by Peng and Hong. For example, in *TPSQ*, the original item, "As I study, I judge whether I am *learning* the materials for tests", was translated into Chinese as "As I study, I judge whether I am *studying* the materials for tests" at the first round of translation and back-translation. However, the word *studying* was changed to *understanding* in the subsequent review due to the following: In Chinese, the word *learning* and

studying are both written by one word (学习), whereas in English, they are not the same. Thus, in order to represent the meaning of the original item as closely as possible in Chinese, *learning* was translated into *understanding*.

The revised Chinese version *TPSQ* and *TTSQ* were field-tested with six students from the target population (see below). The findings from the field test were incorporated in the final revision of the questionnaires in Chinese.

Test-preparation Strategy Questionnaire

The *TPSQ* consisted of 100 items that assessed participants' test-preparation strategies. There were three sections in the questionnaire: cognitive/metacognitive (42 items), motivational and emotional (30 items), and environmental management (28 items) (see Appendix V). Each section included an open-ended question to gather strategies that were not listed in the questionnaire (e.g. "What else do you think or do when you study for tests? If you think or do things that are not described in this questionnaire, please write in the space below"). Participants rated themselves on a four-point Likert scale on a frequency dimension. Low/high scores indicated less/more frequent use of the strategy the particular item measured. The response choices were: 1 = almost never; 2 = sometimes; 3 = often; 4 = almost always.

Cognitive/Metacognitive

In the cognitive/metacognitive section, 24 items pertained to cognitive strategies and 18 items regarded metacognitive strategies. The cognitive strategies category included 6 subcategories: reviewing, outlining/note-taking, solving, repeating, memorizing, and understanding, with four items in each

subcategory. Examples of items are as follows: Reviewing: "When I study for tests, I review notes."; Outlining/Note-taking: "I write down important information when I study for tests."; Solving: "When I study for tests, I solve items in quizzes and tests that I took in the past."; Repeating: "I practice or rework many times until I think I am ready for the test."; Memorizing: "I memorize facts, definitions, formulas, or rules when preparing for tests."; and Understanding: "When I prepare for tests, I make sure I understand concepts."

The metacognitive strategies category included 3 subcategories: planning, self-checking and strategy selection, with six items in each subcategory. Examples of items are: Planning: "I determine what to study before I begin."; Self-checking: "As I study, I judge whether I am learning the material for tests."; and Strategy selection: "I have my own, special, strategy for understanding concepts."

Motivational and Emotional Strategy

There were 30 items in the motivational and emotional strategy category, including 6 subcategories: confidence/self-efficacy, effort, test anxiety-worry, task value, persistence, and test anxiety-emotionality. Each subcategory of confidence/self-efficacy, effort, and task value consisted of 6 items and 4 items in test anxiety-worry, test anxiety-emotionality, and persistence. Examples of items are: Confidence: "For most of test preparations, I am confident that I will study as well as I planned."; Effort: "I work as hard as possible in my test preparation."; Test anxiety-worry: "While I am preparing for tests, I think about failing tests and I lose my concentration."; Test anxiety-emotionality: "When I prepare for tests, I feel

very panicky thinking about the test."; Task value: "It is important for me to learn materials so that I do well on my tests."; and Persistence: "I keep studying even on difficult material."

Environmental Management

Environmental management strategies category included 7 subcategories: design, alone/peer, background noise, intake, time management, seeking assistance, and place, with 4 items in each subcategory. Examples of items are: Design: "I tend to study lying on the floor when I am preparing for tests."; Alone/peer: "I like to study in a group for test preparation"; Background noise: "I seek a quite area for studying for tests."; Intake: "Before I study for tests, I make sure that I am not hungry or too full."; Time management: "I make sure to take a break from time to time when I study for tests."; Seeking assistance: "I ask my peers or teacher when I have a question."; and Place: "I can study in any place for test preparation."

Field Testing: TPSQ

One-on-one field testing was conducted with six tenth graders. The purposes of this procedure were to determine whether the questionnaire items were understandable for students with various achievement levels and whether meaning of words or sentences might get lost in translation from English to Chinese. Students were selected as high, medium, and low achievers as designated by their classroom teachers. Students were asked to read each item in the questionnaires and comment on the items they had questions about.

The comment suggested by one high achiever concerned the syntax. The original Item 27 of part 3 reads: "When I have a question, I ask someone who might know the material." This particular student suggested that *question* and *material* are not parallel in the sentence and it would be better if it is changed to "When I have a question, I ask someone who might know the answer to this question." This comment, however, was not incorporated in the revision as the intent of the item was to have a broader implication to mean someone who knows the *material* in general than the specific *question*. Also, it was important to keep the questionnaire items consistent. That is, the word *material* was used throughout the questionnaire.

Test-taking Strategy Questionnaire

The *TTSQ* consisted of 108 items that assessed participants' test-taking strategies (see Appendix VII). There were four sections in the questionnaire: cognitive/metacognitive (30 items), test tactics (36 items), motivational and emotional (30 items), and environmental management (12 items). Each section included an open-ended question to gather strategies that were not listed in the questionnaire (e.g. "What else do you do when you take a test? If you use certain strategies or do things that are not described in this questionnaire, please write in the space below"). Similar to the *TPSQ*, participants rated themselves on a four-point Likert scale on a frequency dimension. Low/high scores indicated less/more frequent use of the strategy the particular item measured. The response choices were: 1 = almost never; 2 = sometimes; 3 = often; 4 = almost always.

Cognitive/Metacognitive

In this section, 16 items measured students' cognitive strategies and 16 items regarded students' metacognitive strategies.

The cognitive strategies category included 4 subcategories: using memory aids, repeating, cue using or underlining, and understanding, with 4 items in each subcategory. Examples of the items are: Using memory aids: "I write down on the test facts, definitions or formulas I memorized."; Repeating: "I repeat reading questions."; Cue using or underlining: "I underline key words in the test items."; and Understanding: "I try to understand just what the test question is asking."

The metacognitive strategies items were constructed under the same subcategories as those of the *TPSQ*. The category included 3 subcategories: planning, self-checking, and strategy selection, with 4 items in each subcategory. Examples of metacognitive strategies in *TTSQ* are: Planning: "I develop a plan for the solution of a problem before I begin."; Self-checking: "I keep track of my progress during the test"; and Understanding: "I draw graphs, charts, diagrams, tables or concept maps to understand test items."

Test Tactics

The test tactics section included 20 items in test-wiseness and 16 items of test organization strategies. The test-wiseness category included 5 subcategories: eliminating alternatives; anticipating answer, guessing, error-avoiding, and using hints within the test, with 4 items in each subcategory. Examples of items are: Eliminating alternatives: "I rule out choices that contradict the question."; Anticipating answer: "I try to think of an answer before reading the choices.";

Guessing: "I guess if there is no penalty for answering wrong."; Error-avoiding: "I read the instructions carefully."; and Using hints within the test: "I use information obtained from other questions and options."

The test organization strategies category included 4 subcategories: time-using, assessing item and/or allocating time, marking, and sequencing with 4 items in each subcategory. Examples of items are: Time-using: "I work as rapidly as possible with reasonable assurance of accuracy."; Assessing item and/or allocating time: "First, I count how many questions there are, then measure time for each item.", Marking: "I mark omitted items or items which could use further consideration."; Sequencing: "I answer easy questions first and then work on difficult questions."

Motivational and Emotional Strategy or Awareness

Similar to the *TPSQ,* this category consisted of six subcategories: confidence/self-efficacy, effort, test anxiety-worry, test anxiety-emotionality, task value, and persistence. Confidence, effort, and task value subcategories were composed of 6 items and 4 items in each subcategory of test anxiety-worry, test anxiety-emotionality, and persistence. Examples of items are: Confidence: "While taking tests, I feel confident that I will receive an excellent score for the test."; Effort: "I work as hard as possible on my test items."; Test anxiety-worry: "While taking tests, I think about failing test and I lose my concentration."; Test-anxiety in emotionality: "I feel very panicky when I take tests."; Task value: "It is important for me to do well on my tests."; and Persistence: "I keep working even on difficult items."

Environmental Management

The environmental management strategies included 3 subcategories: design, intake, and seeking assistance, with 4 items in each subcategory. Items in the test-taking situation are also similar as those in the *TPSQ*. Examples of items are: Design: "Before I take test, I make sure I have a good chair and desk space."; Intake: "I make sure that I am not hungry or too full while taking tests."; and Seeking assistance: "I ask examiner/teacher for clarification when necessary, if it is permitted."

Field Testing: TTSQ

The same subjects who participated in the one-on-one field testing for the *TPSQ* were again field-tested for the *TTSQ.* On the *TTSQ,* they did not have any comments on the *TTSQ items*. Due to the uncertainty regarding whether Chinese tenth graders were properly exposed to the word *concept map*, each student was asked to explain two words, *concept map* and *map*. Their interpretations of the two words represented the similar meaning. The low achiever presented an example of *map* by drawing arrows and quadrangles and said that *concept map* is a map with quadrangles filled with concepts. Middle and high achievers explained similarly: *Concept map* uses arrows to show the relationship among different concepts. A *map* includes arrows to show relationships among study materials. These responses indicated that students adequately understood the meaning of the words, *concept map* and *map* included in the questionnaire.

Achievement Scores

Students' Chinese language and mathematics examination scores on the semester final examination were used to examine the differences between high-, medium-, and low-achievers in their test-preparation and test-taking strategies. A school administrator (an assistant to principal but is different from assistant principal; a school has one or two school administrators) transmitted the test scores to the researcher that were stored in an electronic format.

Procedure

Data Collection Procedure

A letter including the purpose and procedure of the study was sent to the principal via email first, indicating that the researcher would visit the school and classes in person toward the end of the semester. The principal was already contacted a few months ahead of the data collection time, when the researcher sought out schools and classes to solicit school administrators and teachers for the current study. The advanced contact was necessary due to the timing and travel cost involved in data collection in China.

Teachers involved in actual data collection were homeroom teachers. Before the data collection, the principal and a school administrator were informed of the procedures via email with an electronic document and in person with a paper document of a detailed data collection procedure. Principal or school administrator gathered the participating teachers and gave the data collection procedure a week before the data collection. The procedure document included

the purpose of the study, the approximate time that will be required for data collection, the description of the cover page (including name of the school, grade, class, student ID, name, and gender) and questionnaires with an instruction that the directions be read to all students in class. Teachers were assured confidentiality by indicating in the procedure document that names of school and students would not be open to public and the completed questionnaires would be accessed only by the researcher.

In each participating class, the homeroom teacher distributed the questionnaires in a self-study session, encouraged students to participate with sincerity in the study. The teacher read the directions of the questionnaire to students and stressed that students not spend too much time on each question and answer all the items. Students were also informed that it will take about 30 to 40 minutes to complete the questionnaires. Students, then, began to fill in the questionnaires (*TPSQ* first and then *TTSQ*) while the teachers were monitoring students in the class.

At the end of the semester, test scores on final examinations in Chinese language and mathematics were collected by the school administrator immediately after the final exam and emailed to the researcher.

Grouping Procedure

To examine test-preparation and test-taking strategies used by different levels of achievers, participants were grouped into low-, medium-, and high-achieving groups. This procedure was applied to Chinese language and mathematics separately. The grouping was conducted using the following criteria: low (bottom

quarter, i.e., lowest to 25th percentile), medium (middle 25%, i.e. 37.5th percentile to 62.5th percentile), and high (upper quarter, 75th percentile to highest). With this procedure, students with achievement scores falling between 25th and 37.5th percentiles and between 62.5th and 75th percentiles were excluded in the analysis of group comparisons, achieving a clear distinction among the three groups. However, for other statistical analyses that do not involve group comparisons, all participants were included.

In the Chinese language area, there were 120 low, 133 medium, and 123 high achievers that met the above criteria. In mathematics, 122 low, 124 medium, and 108 high achievers represented the three groups. The sample sizes for each group are satisfactory for the statistical analysis employed in this study (see *Data Analysis Procedure*).

Data Analysis Procedure

Two types of data—quantitative and qualitative—were gathered in this study. The quantitative dataset was from participants' responses to the questionnaire items with the Likert scale. The qualitative dataset was participants' responses to the open-ended questions (e.g., "What else do you think or do when you study for tests? If you think or do things that are not described in this questionnaire, please write in the space below"). The data analysis procedure we employed is described separately for quantitative and qualitative data analyses.

Quantitative Data Analysis

After the data were entered into the SPSS data editor, data screening procedure took place and input errors were corrected. Grouping for high, medium,

and low achievers for the two subject matters (Chinese language and mathematics) followed (see Grouping Procedure above), so the further data screening and outlier detection can take place for each group.

Univariate and multivariate outliers were examined. Excluded in this analysis were the *style* variables such as design (formal vs. informal study setting) or place (set place vs. any place to study) due to its bipolar nature of scale (i.e., high or low scores do not necessarily indicate high or low style, but indicate different styles. Multivariate outliers were examined within each category (cognitive, metacognitive, motivation, etc.) using Mahalanobis Distance at $p < .001$ (Tabachnick & Fidell, 2001). Nine multivariate outliers were detected. Each of the nine cases was examined to determine if the combination of scores were peculiar and if so, whether the pattern of the responses indicates sincerity or playfulness. All nine cases did not show special patterns to spare from removing. Although multivariate outliers were found in only one or two of many subcategories in this study, once they were detected as outliers, the cases were dropped from the database for simplicity. Univariate outliers were examined by *z* scores. Cases with *z* values larger |3| were inspected. Again, all other variables were inspected to discern response patterns. Cases with a large *z* score with reasonable patterns (e.g., student in high-achieving group who rated 4 in average, almost always, on preparing tests by solving problems) were kept. The results of univariate outlier examination suggested that seven cases be removed. Thus, 16 cases were removed from the database, resulting in 429.

The reliability estimates were computed before conducting data analyses to examine research questions. Items of the variables (subscales) with low reliability estimates were closely inspected for item meaning and item discrimination. A few items causing low estimates were removed and reliabilities were re-estimated. Four *style* subscales (i.e., *TPSQ* intake and time management; *TTSQ* sequence and design) were not subjected to reliability computation due to their nature of items (details in Chapter 3). Reliability estimates are presented in Table 1 and Table 2 (Due to the large number of variables tested, the reliability estimates and descriptive statistics are presented together in the Results section, see Table 1 and Table 2 on Chapter 3, page 48–52).

Next, assumptions for profile analysis were tested. The profile analysis is robust to violation of normality, linearity assumptions were met, homogeneity of variance/covariance matrices were met at .001 level with multivariate Box's *M* tests. Of all subscale scores, only two variables (*TPSQ* outlining and *TTSQ* self-checking) did not meet the univariate homogeneity of variance with $.01 < p < .05$. Since the sample sizes for the three groups were similar and large, and the Levene's *F* not being extreme, it was decided that no further actions were necessary for the two variables. Multicollinearity and singularity were absent meeting the requirements of the profile analysis.

Next, means and standard deviations for all students for each of the low, medium, and high achievement groups in Chinese language and mathematics were computed for all *TPSQ* and *TTSQ* variables.

Finally, to determine whether high, medium, and low achievers differ in their perceived use of various strategies (e.g., do high achievers use reviewing strategy more often than outlining, as compared to medium or low achievers?), profile analysis (multivariate approach to repeated measures analysis) was performed. The results of this test revealed whether there was an interaction between the group (high vs. medium vs. low achievers) and various strategy measures. When interaction effects were not found, main effects were tested (i.e., group differences and measure differences, separately). When interaction effects were substantially significant, tests for simple effects were followed. These analyses were conducted for each *TPSQ* and *TTSQ* category (e.g., cognitive strategies for test preparation).

The between-subjects factor was the achievement level (high vs. medium vs. low) in mathematics and Chinese language, and the within-subject factor was various measures gathered from the two questionnaires (e.g., cognitive, metacognitive, environmental management). For those variables showing significant group differences, multiple comparisons were conducted. A few *style* variables in Environmental management scale were analyzed using univariate approach but not multivariate approach (see above). The sequencing variable of Test Organization scale was analyzed item by item because the items represented different sequencing style. Due to conducting multiple tests for various measures, a conservative alpha level was adopted for testing hypotheses or the conservative Scheffé or Bonferroni criterion was used, where appropriate.

Qualitative Data Analysis

Students' narrative responses to the open-ended questions were translated into English. Student responses that were similar to the items listed in the main part of the questionnaires were removed from the qualitative data when qualitative coding took place.

Categories were elicited from participants' responses using the following procedure (Hong, Topham, Carter, Wozniak, Tomoff, & Lee, 2000): (a) all responses were listed and complied into a computer file; (b) each response was judged and tentatively labeled; (c) the tentative labels were inspected to determine if there were common categories and subcategories that can be elicited; (d) all participants' responses were mapped onto the tentative categories and then categories were inspected for further revision; (e) after the categories were formed, each participant's responses were re-evaluated to map them onto the proper category and each participant's statements were reorganized according to the categories identified.

CHAPTER 3

RESULTS

This chapter reports (1) reliability estimates and descriptive information of test-preparation and test-taking strategies, (2) findings on achievement group differences in test-preparation and test-taking strategies from profile analyses and univariate analyses, and (3) qualitative findings of additional test strategies Chinese students reported having used in addition to those examined by the questionnaire items.

Reliability

Reliability (internal consistency) estimates on subscale scores showed that some items performed poorly in the current Chinese student sample. Because each subscale was composed of four to six items, with the removal of problematic items, there were still three or more items in each scale to estimate reliability. Items removed from computation for subscale scores were: Item 22 ("Before I take tests, I usually feel that I needed more time for test preparation or I should have studied more for the test") and Item 9 ("When I study for tests, I think about how important it is to get good test scores") in *TPSQ* Motivation strategies; Item 15 ("I make sure that my body feels comfortable before I begin to study for tests"), Item 7 ("I can study in any places for tests preparation"), and

Item 21 ("I like to study in different places, rather than in the same place, for test preparation") in *TPSQ* Environmental Management strategies; Item 2 ("I don't think about eating or about feeling hungry just before taking tests"), Item 3 ("I ask examiner/teacher for clarification when necessary, if it is permitted"), and Item 6 ("I do not hesitate to ask questions to examiner/teacher when a question is not clear, if it is permitted") in *TTSQ* Environmental Management strategies.

Internal consistency (coefficient alpha) estimates for test-preparation strategies (*TPSQ*) were: .87 for cognitive strategy, .85 for metacognitive strategy, and .80 for motivational strategy. The scale-level estimates were not computed for the environmental management strategy which included *style* categories with each item representing different style. Computing internal consistency among items would not make sense for these subscales (see below for information on these items). The reliability estimates of each *subscale* ranged from .52 (Solving) to .78 (Test Anxiety: Emotionality). The reliability estimates for each *TPSQ* scale and subscale scores are listed in Table 1.

With test-taking strategy scores (*TTSQ*), internal consistency estimates for each *subscale* were: .83 for cognitive strategy, .81 for metacognitive strategy, .90 for test tactic, and .84 for motivational strategy. As mentioned above, the scale-level estimates were not computed for the environmental management strategy which includes certain *style* items. The reliability estimates of each *subscale* ranged from .53 (Confidence) to .87 (Test Anxiety: Emotionality). The reliability estimates for *TTSQ* scale and subscale scores are presented in Table 2.

The subscales with different *style* items were *Intake* and *Time Management* in *TPSQ* Environmental Management, *Sequencing* in *TTSQ* Test Organization subcategory, and *Design* in *TTSQ* Environmental Management.

Descriptive Results on Strategy Scores

Test-Preparation Strategies

Research Question 1a: What Strategies Do Chinese Students Use While They Are Preparing for Tests?

Table 1 presents means and standard deviations for all students and for low, medium, and high achievement groups in Chinese language and mathematics for *TPSQ* subscales. As shown in Table 1, cognitive strategy consisted of 6 subscales. Overall means for all participants ranged from 2.29 to 2.69: Reviewing (M = 2.57; SD = .55), Outlining/Note-taking (M = 2.54; SD = .60), Solving (M = 2.29; SD = .51), Repeating (M = 2.30; SD = .56), Memorizing (M = 2.69; SD = .52), and Understanding (M = 2.44; SD = .52). The correlation coefficients among six subscales of cognitive strategy are presented in Table 3.

In Chinese language, medium and high achievers scored higher on average than did low achievers except on Solving. Results of the statistical significance tests on group differences are presented in later sections. Also presented later are the differences among subscale scores within each scale (e.g., comparisons among six subscales within the cognitive strategy scale). The latter determined whether there were differences among subscale strategies (e.g., Do Chinese students use strategies for memorization more often than those for

Table 1

Reliability Estimates, Means, and Standard Deviations by All Students and Low, Medium, and High Achievement Group, in Chinese Language and Mathematics for TPSQ Subscales

		Chinese Language				Math		
		All students	Low	Medium	High	Low	Medium	High
		(*N* = 429)	(*n* = 120)	(*n* = 133)	(*n* = 123)	(*n* = 122)	(*n* = 124)	(*n* = 108)
	α	*M* (*SD*)	*M* (*SD*)	*M* (*SD*)	*M* (*SD*)	*M* (*SD*)	*M* (*SD*)	*M* (*SD*)
Cognitive	.87							
Review	.54	2.57 (.55)	2.54 (.54)	2.67 (.54)	2.56 (.56)	2.53 (.53)	2.64 (.55)	2.50 (.55)
Outline/Note	.66	2.54 (.60)	2.50 (.51)	2.58 (.64)	2.59 (.64)	2.52 (.58)	2.50 (.58)	2.54 (.62)
Solve	.52	2.29 (.51)	2.31 (.50)	2.30 (.54)	2.28 (.53)	2.31 (.44)	2.28 (.51)	2.23 (.58)
Repeat	.66	2.30 (.56)	2.27 (.54)	2.34 (.58)	2.31 (.60)	2.31 (.50)	2.29 (.63)	2.27 (.57)
Memorize	.62	2.69 (.52)	2.62 (.51)	2.77 (.55)	2.69 (.52)	2.67 (.50)	2.71 (.54)	2.69 (.50)

Understand	.54	2.44 (.52)	2.41 (.52)	2.47 (.56)	2.47 (.49)	2.44 (.52)	2.46 (.54)	2.47 (.49)
Metacognitive	.85							
Plan	.64	2.37 (.52)	2.35 (.49)	2.35 (.51)	2.38 (.52)	2.28 (.45)	2.38 (.53)	2.38 (.58)
Self-check	.68	2.28 (.51)	2.25 (.53)	2.33 (.53)	2.48 (.45)	2.21 (.49)	2.29 (.53)	2.34 (.53)
Strategy	.68	2.35 (.53)	2.37 (.52)	2.35 (.56)	2.38 (.52)	2.31 (.51)	2.36 (.53)	2.35 (.54)
Motivational	.80							
Confidence	.54	2.42 (.45)	2.37 (.43)	2.42 (.47)	2.48 (.45)	2.30 (.41)	2.40 (.43)	2.53 (.51)
Effort	.65	2.83 (.48)	2.73 (.44)	2.91 (.48)	2.86 (.50)	2.74 (.48)	2.82 (.47)	2.95 (.48)
Task Value	.53	2.91 (.45)	2.76 (.41)	3.02 (.45)	2.93 (.45)	2.77 (.39)	2.90 (.46)	3.03 (.43)
Persistence	.65	2.73 (.55)	2.63 (.50)	2.78 (.55)	2.80 (.59)	2.63 (.49)	2.78 (.56)	2.82 (.55)
Anxiety: Worry	.62	3.01 (.65)	2.79 (.63)	2.97 (.64)	3.19 (.67)	2.78 (.58)	2.99 (.72)	3.23 (.61)
Anxiety: Emotionality	.78	3.09 (.64)	2.88 (.58)	3.07 (.65)	3.26 (.64)	2.99 (.60)	3.05 (.71)	3.23 (.60)
Environmental								
Design	.57	1.99 (.62)	2.10 (.62)	1.96 (.61)	1.96 (.61)	2.06 (.62)	2.06 (.66)	1.89 (.57)
Alone/Peer	.57	2.13 (.56)	2.24 (.54)	2.06 (.55)	2.13 (.58)	2.20 (.54)	2.11 (.54)	2.05 (.58)
Noise	.56	2.23 (.59)	2.31 (.55)	2.19 (.65)	2.22 (.58)	2.37 (.56)	2.18 (.58)	2.15 (.63)
Assistance	.63	2.57 (.57)	2.49 (.53)	2.58 (.60)	2.65 (.56)	2.52 (.52)	2.62 (.59)	2.56 (.58)
Place	.62	2.40 (.77)	2.34 (.71)	2.44 (.75)	2.37 (.82)	2.34 (.81)	2.45 (.73)	2.39 (.80)

Table 2

Reliability Estimates, Means, and Standard Deviations by All Students and Low, Medium, and High Achievement Group, in Chinese Language and Mathematics for TTSQ Subscales

		Chinese Language				Math		
		All students	Low	Medium	High	Low	Medium	High
		(*N* = 429)	(*n* = 120)	(*n* = 133)	(*n* = 123)	(*n* = 122)	(*n* = 124)	(*n* = 108)
	α	*M* (*SD*)	*M* (*SD*)	*M* (*SD*)	*M* (*SD*)	*M* (*SD*)	*M* (*SD*)	*M* (*SD*)
Cognitive	.83							
Memory Aid	.55	2.30 (.53)	2.24 (.56)	2.36 (.57)	2.32 (.48)	2.35 (.52)	2.27 (.55)	2.21 (.50)
Repeat	.65	2.33 (.56)	2.28 (.51)	2.39 (.57)	2.35 (.61)	2.33 (.52)	2.32 (.63)	2.32 (.61)
Cue using	.83	2.80 (.72)	2.62 (.68)	2.92 (.70)	2.87 (.70)	2.76 (.68)	2.82 (.76)	2.74 (.70)
Understand	.61	2.84 (.53)	2.70 (.51)	2.89 (.54)	2.92 (.50)	2.78 (.52)	2.80 (.55)	2.91 (.51)
Metacognitive	.81							

Plan	.65	2.53 (.57)	2.44 (.52)	2.57 (.58)	2.58 (.60)	2.46 (.52)	2.49 (.61)	2.60 (.56)
Self-check	.65	2.30 (.58)	2.27 (.50)	2.33 (.58)	2.30 (.63)	2.27 (.54)	2.30 (.63)	2.27 (.57)
Strategy	.57	2.44 (.47)	2.43 (.46)	2.45 (.45)	2.47 (.51)	2.41 (.43)	2.41 (.46)	2.46 (.50)
Test-wiseness	.88							
Eliminate	.75	3.07 (.61)	2.94 (.62)	3.15 (.55)	3.14 (.59)	2.98 (.64)	3.12 (.62)	3.12 (.53)
Anticipate	.69	2.46 (.60)	2.43 (.54)	2.55 (.61)	2.47 (.64)	2.41 (.56)	2.53 (.61)	2.41 (.61)
Guess	.62	2.69 (.55)	2.63 (.49)	2.77 (.58)	2.69 (.57)	2.66 (.50)	2.76 (.57)	2.65 (.54)
Error-avoid	.55	2.70 (.52)	2.63 (.49)	2.72 (.51)	2.77 (.53)	2.64 (.49)	2.71 (.54)	2.72 (.49)
Hints	.76	2.81 (.58)	2.74 (.57)	2.82 (.59)	2.88 (.57)	2.83 (.59)	2.89 (.58)	2.73 (.55)
Test Organization	.76							
Time-use	.59	2.90 (.52)	2.75 (.45)	2.98 (.52)	2.98 (.54)	2.78 (.50)	2.96 (.56)	2.98 (.49)
Assess/Allocate	.61	2.31 (.59)	2.35 (.55)	2.26 (.60)	2.33 (.63)	2.34 (.58)	2.30 (.54)	2.27 (.64)
Mark	.73	2.92 (.65)	2.74 (.64)	3.00 (.64)	3.06 (.61)	2.86 (.59)	2.92 (.70)	3.05 (.63)
Motivational	.84							
Confidence	.53	2.50 (.41)	2.39 (.41)	2.53 (.43)	2.60 (.39)	2.38 (.36)	2.48 (.37)	2.60 (.45)
Effort	.67	2.94 (.47)	2.77 (.46)	2.99 (.45)	3.05 (.47)	2.84 (.43)	2.93 (.51)	3.04 (.42)
Task Value	.69	2.87 (.51)	2.78 (.48)	2.93 (.51)	2.91 (.53)	2.77 (.44)	2.90 (.56)	2.92 (.51)
Persistence	.64	2.69 (.58)	2.64 (.52)	2.72 (.58)	2.76 (.61)	2.61 (.52)	2.69 (.58)	2.75 (.62)

Anxiety: Worry	.71	2.90 (.61)	2.73 (.59)	2.85 (.61)	3.05 (.61)	2.80 (.58)	2.87 (.64)	3.02 (.62)
Anxiety: Emotionality	.87	3.05 (.72)	2.78 (.70)	3.06 (.79)	3.24 (.64)	2.94 (.72)	3.04 (.81)	3.17 (.73)
Environmental								
Intake	.58	2.07 (.65)	2.17 (.69)	2.12 (.64)	1.97 (.63)	2.06 (.60)	2.06 (.69)	2.04 (.72)
Assistance	.68	3.06 (.83)	2.87 (.83)	3.04 (.90)	3.19 (.76)	2.97 (.77)	3.01 (.89)	3.10 (.86)

understanding?). This presentation format applies to all reports on descriptive results. This arrangement was necessary for simplicity in the presentation of the findings from multiple profile analyses that were used for both group difference tests and strategy difference tests.

In mathematics, medium and high achievers also scored higher in 4 subscales (Reviewing, Outlining/Note-taking, Memorizing, and Understanding) compared to low achievers. However, group means were similar in Solving strategy and in Repeating strategy (significance tests follow in the next section).

Table 3

Correlations Among Sub-strategies in TPSQ Cognitive Strategies

	1	2	3	4	5	6
1. Review	—					
2. Outline	.52	—				
3. Solving	.56	.51	—			
4. Repeat	.44	.45	.52	—		
5. Memorize	.46	.37	.36	.52	—	
6. Understand	.38	.47	.50	.43	.38	—

Note. All correlations were significant, $p < .01$.

Metacognitive strategy consisted of 3 subscales. Overall means for all participants ranged from 2.28 to 2.37: Planning ($M = 2.37$; $SD = .52$), Self-

checking (*M* = 2.28; *SD* = .51), and Strategy selection (*M* = 2.35; *SD* = .53). Table 4 shows correlation coefficients among three subscales in Metacognitive strategy. As can be seen in Table 1, in Chinese language, the high-achieving group had higher means in all subscales compared to the medium- and low-achieving groups. In mathematics, medium and high achievers scored higher on average in Planning and Self-checking than did low achievers, and the group means were similar in Strategy selection (significance tests follow).

Table 4

Correlations Among Sub-strategies in TPSQ Metacognitive Strategies

	1	2	3
1. Plan	—		
2. Self-check	.66	—	
3. Strategy Selection	.54	.63	—

Note. All correlations were significant, $p < .01$.

Motivational/Emotional strategy category consisted of 6 subscales. Overall means for all participants ranged from 2.42 to 3.09: Confidence (*M* = 2.42; *SD* = .45), Effort (*M* = 2.83; *SD* = .48), Task value (*M* = 2.91; *SD* = .45), Persistence (*M* = 2.73; *SD* = .55), Anxiety: Worry (*M* = 3.01; *SD* = .65), and Anxiety: Emotionality (*M* = 3.09; *SD* = .64). Test anxiety scores (Worry and Emotionality) were recoded for profile analysis; thus, high scores on anxiety scales indicated a

lower level of anxiety. Table 5 provides correlation coefficients among all subscales in Motivational/Emotional strategy. In both Chinese language and mathematics, medium- and high-achieving students had higher means than did low-achieving students in all six subscales (see Table 1) (significance tests follow).

Table 5

Correlations Among Sub-strategies in TPSQ Motivational/Emotional Strategies

	1	2	3	4	5	6
1. Confidence	—					
2. Effort	.39**	—				
3. Task Value	.31**	.58**	—			
4. Persistence	.46**	.58**	.43**	—		
5. Anxiety: Worry	-.01	.10	.16**	-.11*	—	
6. Anxiety: Emotionality	.07	.04	.13**	-.05	.66**	—

Note. Anxiety: Worry and Anxiety: Emotionality were recoded.

* $p < .05$. ** $p < .01$.

Environmental management strategy consisted of 7 subscales. Overall means for all participants ranged from 1.99 to 2.57: Design (M = 1.99; SD = .62) (a high score represents a preference to informal design such as studying on the floor or bed), Alone/Peer (M = 2.13; SD = .56) (a high score represents a preference to study with peer), Background noise (M = 2.23; SD = .59) (a high

score represents a preference for background noise), Assistance (*M* = 2.57; *SD* = .57) (a high score represents a preference for assistance), and Place (*M* = 2.40; *SD* = .77) (a high score represents a preference for studying in a specific place). Correlation coefficients among subscales were presented in Table 6. Two subscales (Intake and Time management) that included different *style* items (i.e., each item represents different style, thus averaging scores would not make sense) were excluded from descriptive analysis but will be presented under univariate analysis of variance.

Table 6

Correlations Among Sub-strategies in TPSQ Environmental Management Strategies

	1	2	3	4	5
1. Informal Design	—				
2. Alone/Peer	.29**	—			
3. Noise	.30**	.32**	—		
4. Assistance	-.04	.004	-.13**	—	
5. Place	-.11*	-.15**	-.01	-.26**	—

Note. * $p < .05$. ** $p < .01$.

In Chinese language, the low-achieving group scored higher on average in Design, Alone/Peer, and Background noise than did the other two groups,

whereas the high-achieving group scored higher in Assistance and the medium-achieving group scored higher in Place than the other two remaining groups. In mathematics, the low-achieving group also scored higher on average in Alone/Peer (preferring to work with) and Background noise (preferring to have background sound) compared to the other two groups. In Design (preferring to informal design), the low- and medium-achieving groups had the same mean which was higher than that of the high-achieving group. The mean of the medium-achieving group was higher in Assistance (preferring for assistance) and Place (preferring to study in a specific place) than the other two groups. The mean scores across groups on those five sub-strategies were similar (see Table 1). Significance tests for the group differences are presented further below.

Test-taking Strategies

Research Question 1b: What Strategies Do Chinese Students Use While They Are Taking Tests?

Means and standard deviations for all students and for low, medium, and high achievement groups in Chinese language and mathematics for *TTSQ* subscales are provided in Table 2. As shown in Table 2, cognitive strategy consisted of 4 subscales. Overall means for all participants ranged from 2.30 to 2.84: Memory aid (M = 2.30; SD = .53), Repeating (M = 2.33; SD = .56), Cue using (M = 2.80; SD = .72), and Understanding (M = 2.84; SD = .53). Table 7 presents correlation coefficients among all subscales in cognitive strategy. In Chinese language, the means of medium achievers in Memory aid, Repeating, and Cue using were higher than the means of the other two groups, and high achievers had a higher

mean in Understanding compared to medium and low achievers. However, the pattern was not the same in mathematics. Compared to the remaining two groups, low achievers scored higher on average in Memory aid, medium achievers in Cue using, and high achievers in Understanding. Group means were similar in Repeating. Findings on significance tests are presented below.

Table 7

Correlations Among Sub-strategies in TTSQ Cognitive Strategies

	1	2	3	4
1. Memory Aid	—			
2. Repeat	.49	—		
3. Cue	.34	.32	—	
4. Understand	.34	.42	.56	—

Note. All correlations were significant, $p < .01$.

Metacognitive strategy consisted of 3 subscales. Overall means for all participants ranged from 2.30 to 2.53: Planning (M = 2.53; SD = .57), Self-checking (M = 2.30; SD = .58), and Strategy selection (M = 2.44; SD = .47). Table 8 provides correlation coefficients among all subscales. Both in Chinese language and mathematics, the high-achieving group scored higher on average in Planning than did the low- and medium-achieving groups, whereas group

means were similar in Self-checking and Strategy selection (significance tests follow).

Table 8

Correlations Among Sub-strategies in TTSQ Metacognitive Strategies

	1	2	3
1. Plan	—		
2. Self-check	.60	—	
3. Strategy Selection	.54	.52	—

Note. All correlations were significant, $p < .01$.

Test-wiseness strategy consisted of 5 subscales. Overall means for all participants ranged from 2.43 to 3.07: Eliminating (M = 3.07; SD = .61), Anticipating (M = 2.46; SD = .60), Guessing (M = 2.69; SD = .55), Error-avoiding (M = 2.70; SD = .52), and Using hints (M = 2.81; SD = .58). Correlation coefficients among all subscales in test-wiseness strategy are presented in Table 9. In both Chinese language and mathematics, medium achievers scored higher on average in Eliminating, Anticipating, and Guessing than did low and high achievers; high achievers scored higher in Error-avoiding than did medium and low achievers. High achievers in Chinese language reported using hints more often than did low and medium achievers; medium achievers in mathematics

reported using hints more often than did low and high achievers. However, the mean scores on the subscales were similar (significance tests follow).

Table 9

Correlations Among Sub-strategies in TTSQ Test-wiseness Strategies

	1	2	3	4	5
1. Eliminate	—				
2. Anticipate	.31	—			
3. Guess	.46	.50	—		
4. Error-avoid	.57	.44	.48	—	
5. Hints Using	.53	.41	.53	.55	

Note. All correlations were significant, $p < .01$.

Test organization strategy consisted of 4 subscales. Overall means for all participants ranged from 2.31 to 2.92: Time-using (M = 2.90; SD = .52), Assessing/Allocating (M = 2.31; SD = .56), Marking (M = 2.92; SD = .68). Table 10 displays correlation coefficients among subscales in test organization. Sequencing that included different *style* items (i.e., answer easy questions or difficult questions first; start the test from the first item) was excluded from descriptive analysis. In Chinese language and mathematics, medium and high achievers scored higher on average than did low achievers in Time-using. Low achievers reported higher in Assessing/Allocating than did medium and high

achievers; high achievers reported higher in Marking than did low and medium achievers. Mean scores were similar across groups on the subscales (significance tests follow).

Table 10

Correlations Among Sub-strategies in TTSQ Metacognitive Strategies

	1	2	3
1. Time Using	—		
2. Assessing	.23	—	
3. Marking	.58	.26	—

Note. All correlations were significant, $p < .01$.

Motivational/Emotional strategy consisted of 6 subscales. Overall means for all participants ranged from 2.50 to 3.05: Confidence (M = 2.50; SD = .41), Effort (M = 2.94; SD = .47), Task value (M = 2.87; SD = .51), Persistence (M = 2.69; SD = .58), Anxiety: Worry (M = 2.90; SD = .61), and Anxiety: Emotionality (M = 3.05; SD = .72). Table 11 presents correlation coefficients among subscales in Motivational/Emotional strategy. In Chinese language and mathematics, the high-achieving group had higher means in six subscales compared to the other two groups, except on Task value by Chinese language achievement group (significance tests follow).

Table 11

Correlations Among Sub-strategies in TTSQ Motivational/Emotional Strategies

	1	2	3	4	5	6
1. Confidence	—					
2. Effort	.35**	—				
3. Task Value	.16**	.59**	—			
4. Persistance	.28**	.50**	.50**	—		
5. Anxiety: Worry	.27**	.27**	-.02	-.12*	—	
6. Anxiety: Emotionality	.28**	.32**	.06	-.05	.71**	—

Note. Anxiety: Worry and Anxiety: Emotionality were recoded.

* $p < .05$. ** $p < .01$.

Environmental management strategy consisted of 3 subscales. Overall means for all participants ranged from 2.07 to 3.06: Intake ($M = 2.07$; $SD = .65$) (a high score represents a concern for eating before or during tests), Assistance ($M = 3.06$; $SD = .83$). Correlation between Intake and Assistance was -.47, $p < .01$. Design that included different *style* items (i.e., to be comfortable, having good chair and desk space; concerning where to sit) was excluded from descriptive analysis. High achievers in both Chinese language and mathematics scored higher on average in Assistance than did low and medium achievers. For Intake, low achievers in Chinese language had a higher mean than medium and

high achievers, whereas in mathematics, the means were similar across groups (significances tests are presented below).

Group Differences in Test-Preparation and Test-Taking Strategies

Cognitive and Metacognitive Strategies in Test Preparation

Research Question 2a: Do low-, Medium-, and High-achievers Differ in Their Cognitive and Metacognitive Strategies in Test Preparation?

Cognitive strategy in Chinese language. As indicated in the previous section, the results of subscale score differences (i.e., differences among strategies within each scale) are also reported here along with those of group differences. Descriptive statistics for the three groups were presented in Table 1 in the previous section.

Results from profile analysis indicated that there was no significant interaction effect on the combined *TPSQ* cognitive strategy scores between Chinese language group and sub-strategies, $p = .46$ (Wilks' criterion was used to evaluate multivariate significance throughout this research). That is, all cognitive strategies (e.g., Outlining, Memorizing, etc.) showed similar pattern across the three achievement groups.

The high-, medium-, and low-achievers in Chinese language were not different in overall cognitive strategies, $p = .29$. However, 6 cognitive strategy measures (i.e., Reviewing, Outlining/Note-taking, Solving, Repeating, Memorizing, and Understanding) were found significantly different, $F(5, 369) = 58.22$, $p < .0005$, with partial $\eta^2 = .44$, indicating substantial differences among

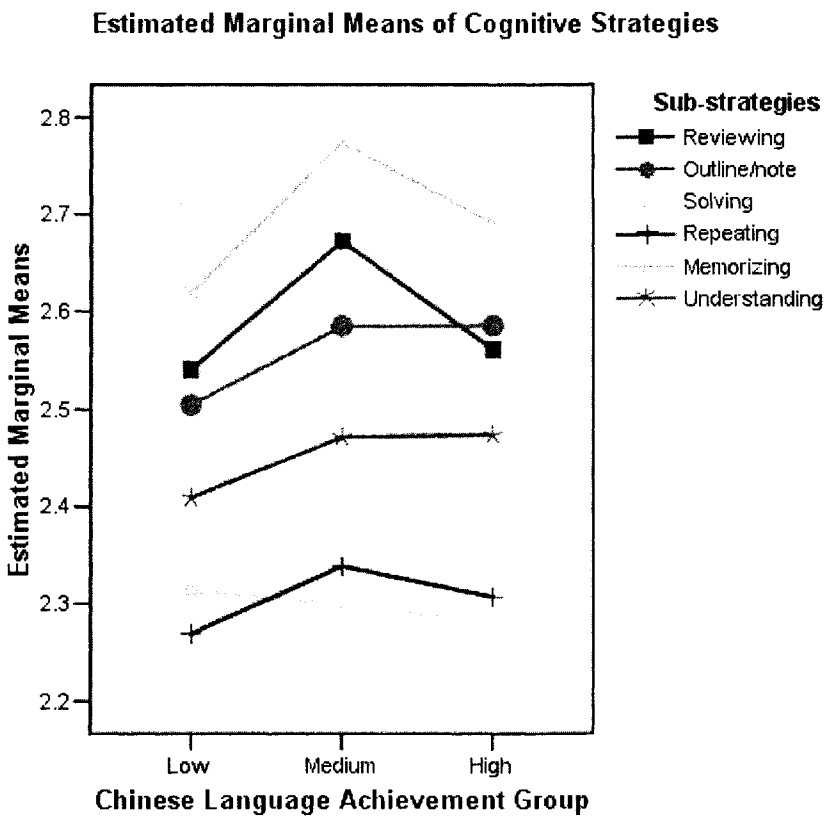


Figure 1. Profile of six *TPSQ* cognitive strategies (reviewing, outlining/note-taking, solving, repeating, memorizing, and understanding) by Chinese language achievement group.

the measures. The follow-up test of pairwise comparisons of the 6 measures (strategies) indicated that, of the six cognitive strategies, memorization was the most frequently used strategy by all students (i.e., independent of achievement group), $p = .01$ to $p < .0005$. Reviewing and Outlining/Note-taking were the next highest in the reported use, showing significantly higher means than that of Solving ($ps < .0005$) and Repeating ($ps < .0005$). Reviewing had a higher mean than Understanding ($p < .0005$) and Outlining/Note-taking had a higher mean than Understanding ($p = .01$). There was no significant difference between

Reviewing and Outlining/Note-taking, $p > .05$. The mean of Understanding was significantly higher than that of Solving ($p < .0005$) and Repeating ($p < .0005$). Figure 1 shows the profile of six cognitive strategies.

Cognitive strategy in mathematics. The interaction between the mathematics group and sub-strategies in *TPSQ* cognitive strategy was not statistically significant, $p = .32$. As shown with Chinese language, high-, medium-, and low-achievers in mathematics were not different in overall cognitive strategies, $p = .84$. However, again similar to the results with Chinese language achievement group, 6 sub-strategies were significant different, $F(5, 347) = 57.66$, $p < .0005$, with partial $\eta^2 = .45$.

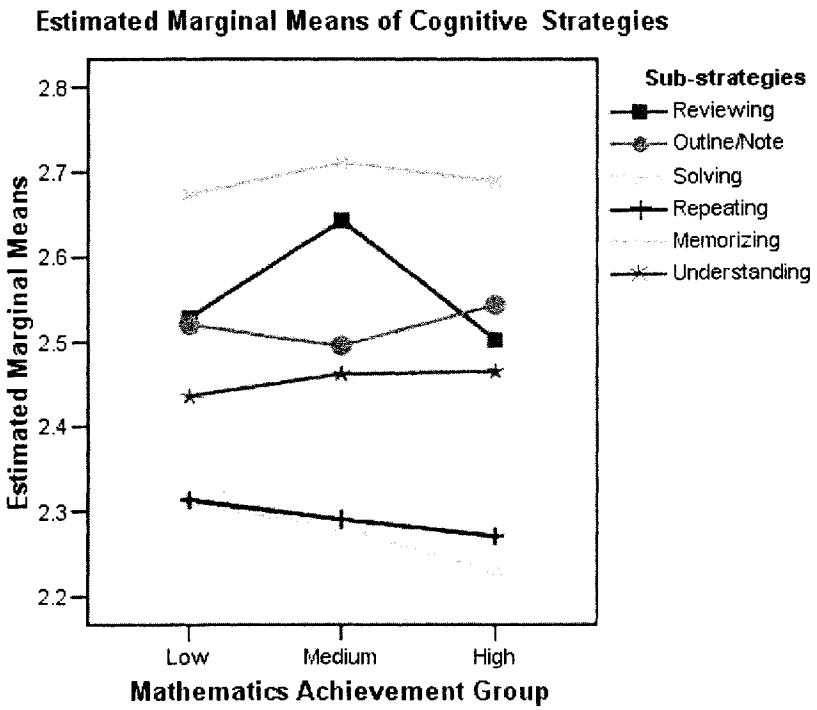


Figure 2. Profile of six *TPSQ* cognitive strategies (reviewing, outlining/note-taking, solving, repeating, memorizing, and understanding) by mathematics achievement group.

The follow-up pairwise comparisons of the 6 measures revealed that Memorizing strategy was the most frequently used by all students, $p < .0005$. The mean of Reviewing was significantly higher than the means of Understanding ($p = .02$), Solving ($p < .0005$), and Repeating ($p < .0005$). The mean of Outlining/Note-taking was significantly higher than the means of Solving ($p < .0005$) and Repeating ($p < .0005$). The mean of Understanding strategies was also significantly higher than that of Solving ($p < .0005$) and Repeating ($p < .0005$). Figure 2 shows the profile of six cognitive strategies.

Metacognitive strategy in Chinese language. The interaction between Chinese language group and sub-strategies was not statistically significant on the combined metacognitive strategies, $p = .18$. The group main effect was not statistically significant, indicating that the reported use of the metacognitive strategies were not different across the three groups, $p = .92$. However, three metacognitive strategies (Planning, Self-checking, Strategy selection) were statistically significantly different, $F(2, 372) = 9.90$, $p < .0005$, with partial $\eta^2 = .05$. The results of pairwise comparisons revealed that the means of Planning and Strategy selection were significantly higher than that of Self-checking, $ps = .001$. There was no significant difference between Planning and Strategy selection, $p > .05$. Figure 3 presents the profile of three metacognitive strategies.

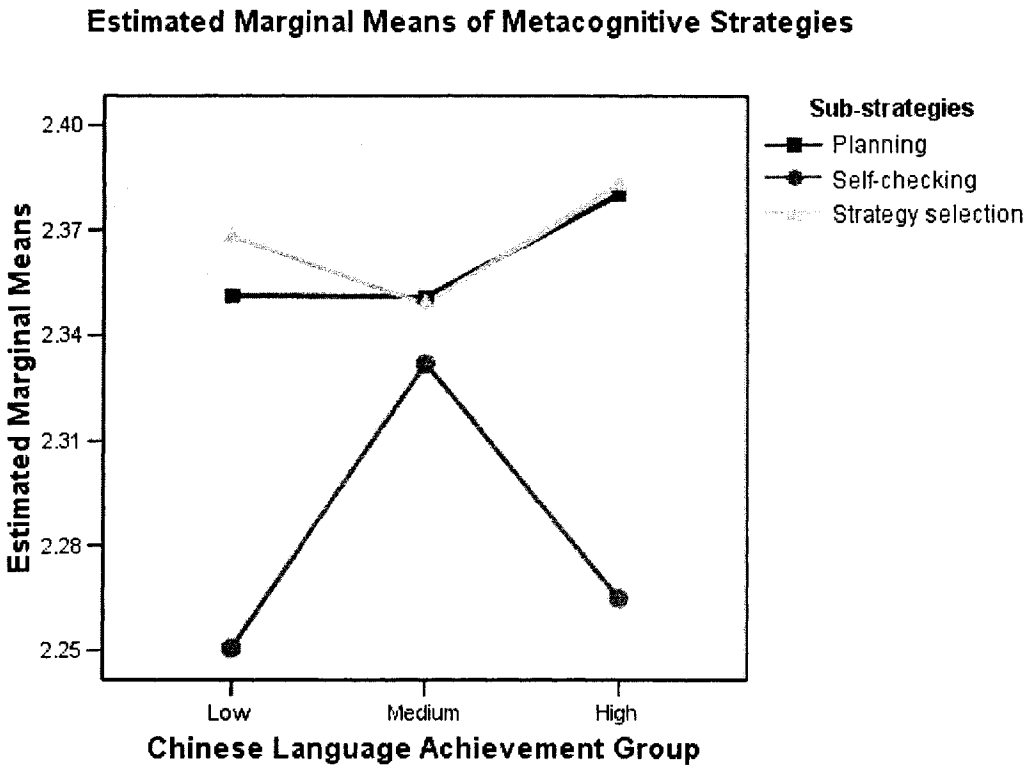


Figure 3. Profile of three *TPSQ* metacognitive strategies (planning, self-checking, and strategy selection) by Chinese language achievement group.

Metacognitive strategy in mathematics. The interaction effect between mathematics group and sub-strategies was not statistically significant on the combined metacognitive strategy scores, $p = .53$. The group main effect again failed to show a statistically significant difference, $p = .25$. Differences among metacognitive strategies were also found statistically significant, $F(2, 350) = 5.38$, $p = .01$, with partial $\eta^2 = .03$, a small effect. The follow-up test of pairwise comparisons showed that Planning and Strategy selection again had significantly higher mean scores than Self-checking ($ps < .05$). No significant difference was

found between Planning and Strategy selection, $p > .05$. Figure 4 presents the profile of three metacognitive strategies by the mathematics achievement group.

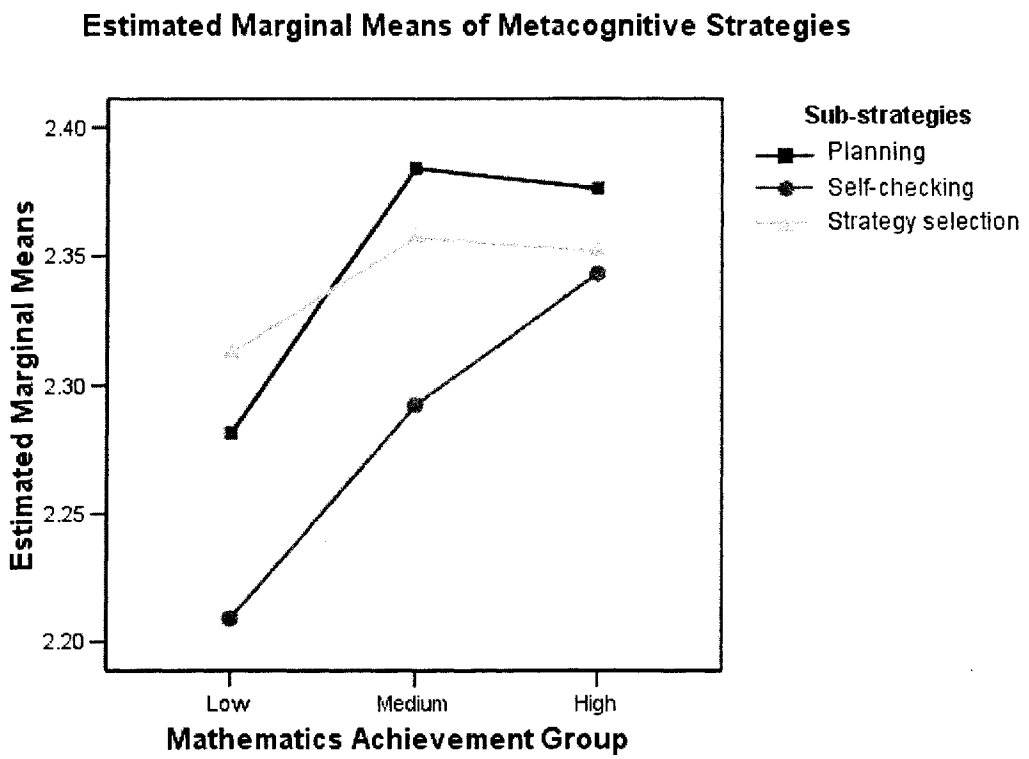


Figure 4. Profile of three *TPSQ* metacognitive strategies (planning, self-checking, and strategy selection) by mathematics achievement group.

Motivation/Emotional Strategies in Test Preparation

Research Question 4a: Do High-, Medium-, and Low-achievers Differ in Their Test Motivation (Confidence/self-efficacy, Effort, Task Value, Persistence) and Test Anxiety in Test Preparation?

Chinese language. A statistically significant interaction was found on the combined motivational/emotional strategies between achievement group and sub-strategies, $F(10, 738) = 2.43$, $p = .01$, with partial $\eta^2 = .03$, indicating a small

practical significance. The two multivariate main effects (group and measure differences) were both statistically and practically significant (report following), thus it was decided that main effects be reported instead of pursuing with follow-ups of the small multivariate interaction effect.

The group main effect was statistically significant, $F(2,373) = 17.00$, $p < .0005$, with partial $\eta^2 = .08$. Results of multiple comparisons among groups indicated that both the high- and medium-achieving groups were significantly different from the low-achieving group, with the former using motivational/emotional strategies more frequently than the latter, $ps < .0005$. However, statistically significant difference was not found between the high- and medium-achieving groups, $p = .40$. Figure 5 presents the profile of six motivational/emotional strategies uses by the Chinese language achievement group.

Post hoc tests of univariate multiple comparisons were conducted to examine differences among Chinese language achievement group (high vs. medium vs. low) in six sub-strategies. Statistically significant group differences were found in Effort, Task value, Worry anxiety, and Emotionality (see Figure 5).

For Effort, a statistically significant difference was found between the low- and medium-achieving groups ($p = .02$), with the medium-achieving group reporting more effort expenditure than did the low-achieving group. However, no statistically significant difference was found between the medium- and high-achieving groups.

For Task value, the mean of medium achievers was statistically significantly higher than that of low achievers ($p < .0005$), and the mean of high achievers

was significantly higher than that of low achievers (p = .01), indicating that both the medium- and high-achieving groups had more positive value on studying for tests than did the low-achieving group. There was no statistically significant difference between medium and high achievers (p = .26).

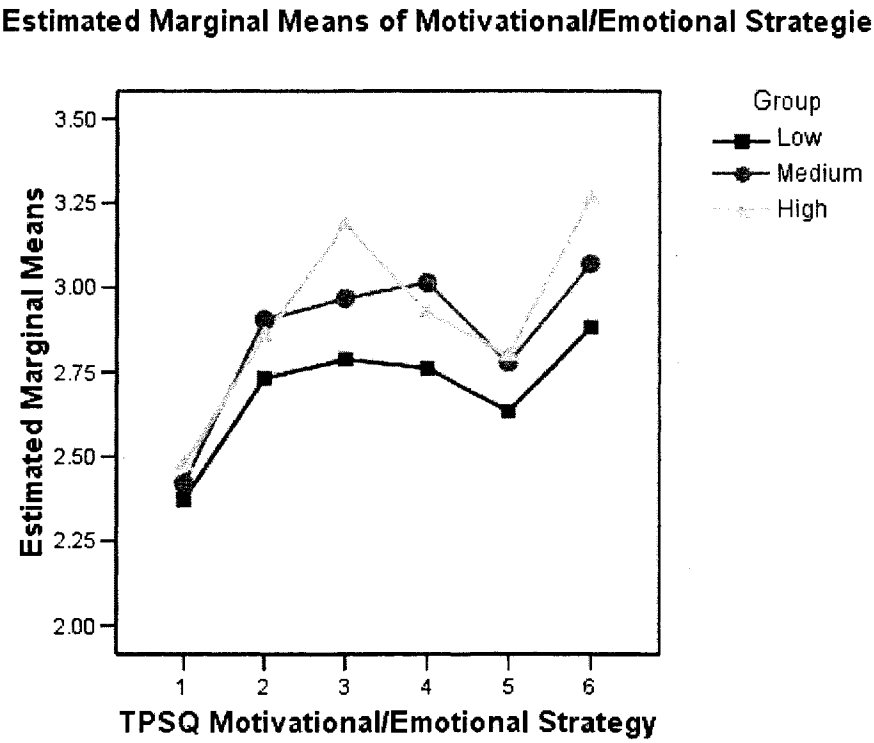


Figure 5. Profile of Chinese language achievement group on six *TPSQ* motivational/emotional strategies. 1 = Confidence; 2 = Effort; 3 = Worry anxiety; 4 = Task value; 5 = Persistence; 6 = Emotionality anxiety.

For Worry anxiety, mean differences between the low- and high-achieving groups (p < .0005), and between the medium- and high-achieving groups were statistically significant (p = .03). The high-achieving group had a higher mean in Worry anxiety compared to the other two groups. However, no statistically

significant difference was observed between the low- and medium-achieving groups.

For Emotionality in test anxiety, the results were similar to those found in Worry anxiety. High achievers scored higher in Emotionality than low achievers ($p < .0005$) as well as medium achievers ($p < .05$), indicating that high achievers had less emotional anxiety during the test. The low- and medium-achieving groups did not show a statistically significant difference ($p = .06$).

Group differences were not significant in Confidence ($p = .19$ to $p = .68$) and Persistence ($p = .06$ to $p = .95$).

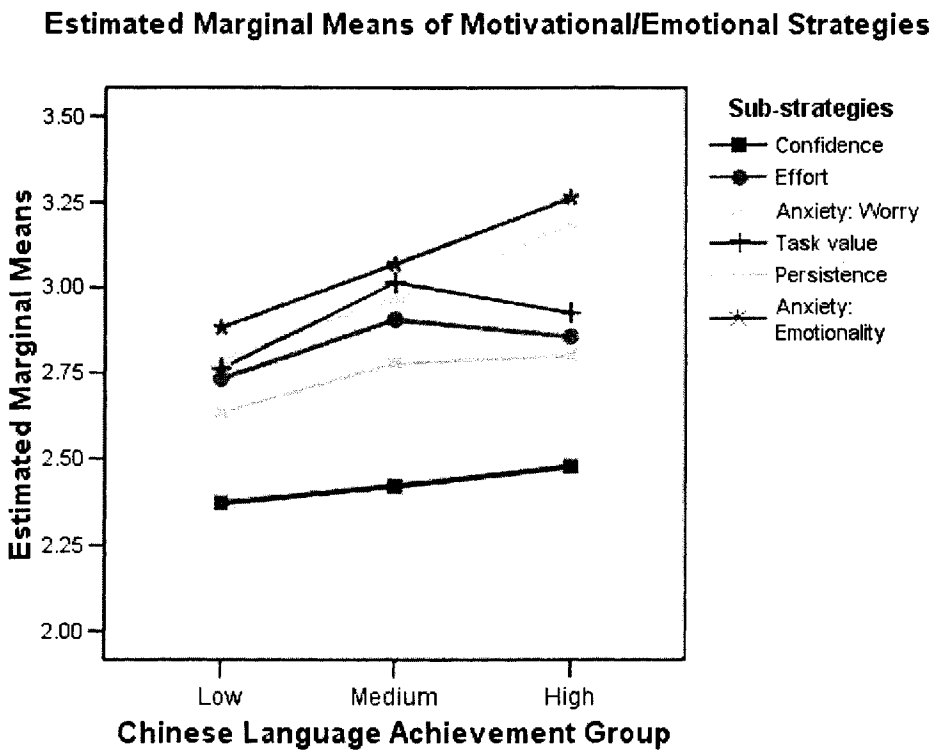


Figure 6. Profile of six *TPSQ* motivation/emotional strategies (confidence, effort, anxiety: worry, task value, persistence, and anxiety: emotionality) by Chinese language achievement group.

Six measures (sub-strategies) in motivational/emotional strategy were also statistically significantly different, $F(5, 369) = 88.24$, $p < .0005$, with partial $\eta^2 = .55$. The pairwise comparisons indicated that all six strategies were significantly different among each others ($p = .04$ to $p < .005$), except for one nonsignificant pair: Worry anxiety and Task value ($p = .53$). Profile of six motivational/emotional strategies is presented in Figure 6.

Mathematics. There was no significant interaction effect between group and sub-strategies on the combined motivational/emotional strategy scores, $F(10, 694) = 1.46$, $p = .15$, with small partial η^2 of .02.

A significant group effect was obtained on the combined motivational strategy scores, $F(2, 351) = 21.94$, $p < .0005$, with partial $\eta^2 = .11$. Pairwise comparisons revealed that significant differences existed among all pairs of three groups ($p = .004$ to $p < .0005$) (see Table 1 and Figure 7).

The high-achieving group had a significantly higher mean than the low-achieving group in Confidence ($p = .001$), Effort strategy ($p = .01$), Task value ($p < .0005$), Persistence ($p = .03$), and Emotional anxiety ($p = .01$). High achievers and medium achievers did not differ in those five measures ($p = .06$ to $p = .70$) (see Table 1 for mean strategy scores in each group).

For Worry anxiety, significant differences were found among the three groups ($p = .03$ to $p < .0005$), with low achievers reporting the highest level of worry anxiety, followed by medium achievers, and then by high achievers.

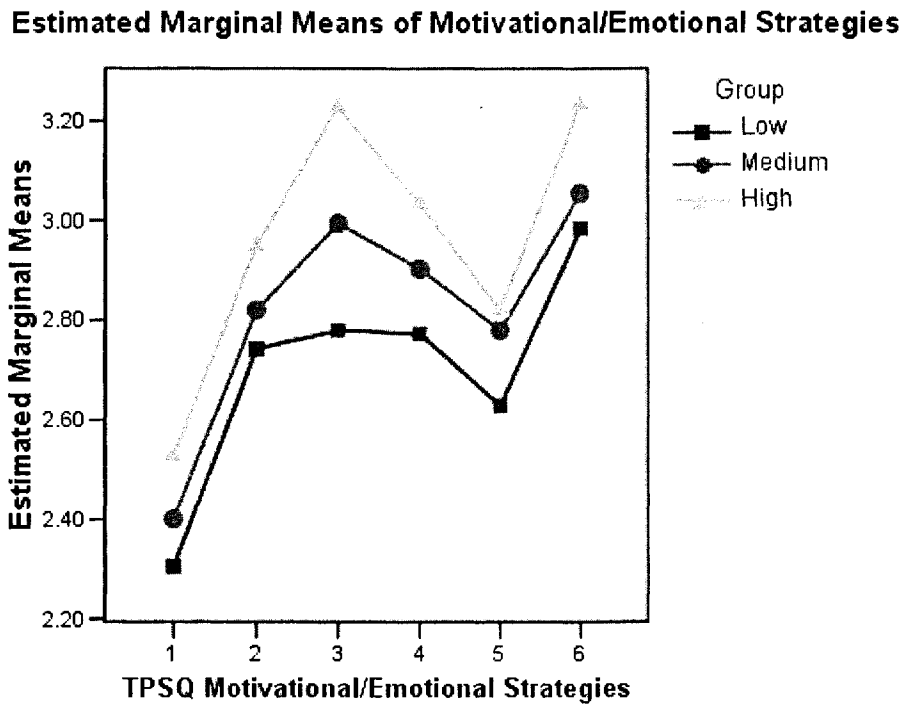


Figure 7. Profile of mathematics achievement group on six *TPSQ* motivational/emotional strategies. 1 = Confidence; 2 = Effort; 3 = Worry anxiety; 4 = Task value; 5 = Persistence; 6 = Emotionality anxiety.

Statistically significant differences existed in the six motivational/emotional strategies, $F(5, 347) = 87.86$, $p < .0005$, partial $\eta^2 = .56$. Pairwise comparisons indicated that except for two nonsignificant pairs, Task value and Worry anxiety ($p = .21$) and Task value and Effort ($p = .09$), all six strategies were significantly different among each others ($p = .02$ to $p < .005$). Profile of different levels of six motivational/emotional strategies is presented in Figure 8.

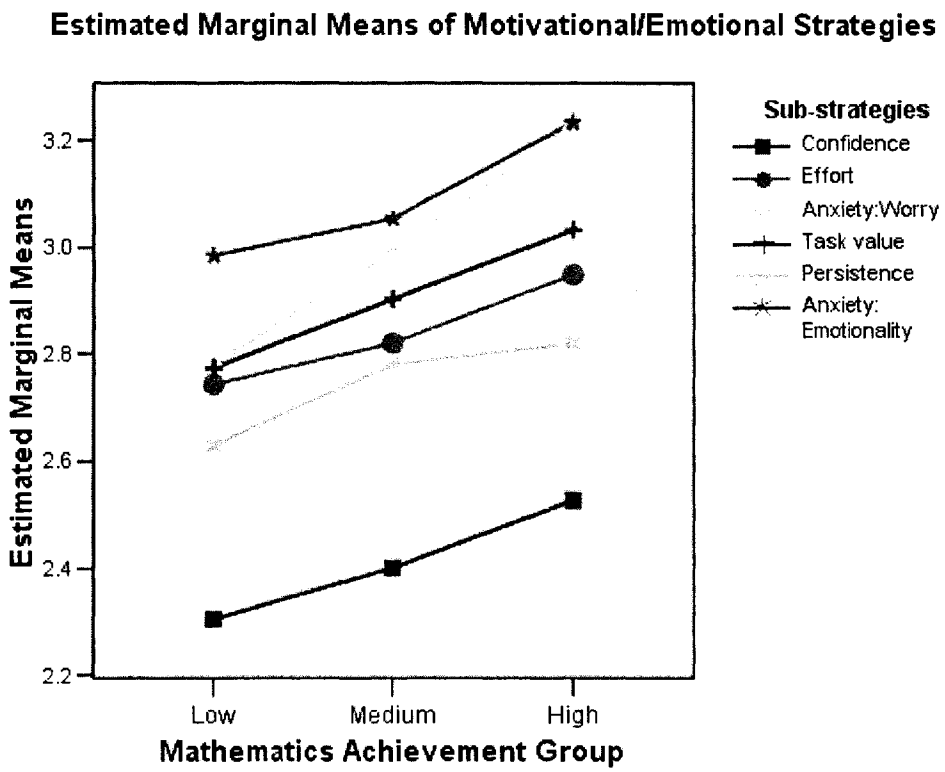


Figure 8. Profile of six *TPSQ* motivational/emotional strategies (confidence, effort, anxiety: worry, task value, persistence, and anxiety: emotionality) by mathematics achievement group.

Environmental Management Strategies in Test Preparation

Research Question 5a. Do High-, Medium-, and Low-achievers Differ in Their Environmental Management Strategies in Test Preparation?

Chinese language. Univariate analyses indicated that there are no statistically significant group differences in all sub-strategies (significance level = .01 for these analyses): Design (p = .13), Alone/Peer = .04, Background noise (p = .28), Assistance (p = .07), and Place (p = .58).

The means of 4 *style* items in Intake sub-strategy ranged from 2.12 to 2.84: Item 4: "I like to eat when I study for tests" (M = 2.16, SD = .90); Item 11: "I don't think about eating or about feeling hungry during test preparation" (M = 2.84, SD = .89); Item 18: "Before I study for tests, I make sure that I am not hungry or too full" (M = 2.47, SD = .87); and Item 25: "Before I study for tests, I often feel that I am hungry or that I need to eat something" (M = 2.12, SD = .83). As indicated in Method, these were different styles of Intake strategies, thus statistical comparisons among means of these items are not meaningful. Univariate analyses of group differences showed no statistical significances in these items, all ps > .01.

For Time management strategy, 4 *style* items in that subscale ranged from 2.29 to 2.97: Item 5: "I make sure to take a break from time to time when I study for tests" (M = 2.29, SD = .87), Item 12: "I choose when I want to study for important tests (e.g., morning, afternoon, or evening)" (M = 2.66, SD = .90); Item 19: "I tend to cram because I study the night before the test" (M = 2.97, SD = .87); and Item 26: "I study in small blocks of time when there are a lot of materials to study" (M = 2.61, SD = .82). A statistically significant group difference was found only in Item 19 in univariate analyses, $F(2, 369) = 5.62$, p = .004, partial η^2 = .03. Pairwise comparisons showed that the low-achieving group scored significantly lower than the medium-achieving group (p = .003), indicating that low achievers reported having a higher tendency to cram for tests. The difference between low and high achievers was not statistically significant, p > .05. Figure 9 shows the difference of means on Item 19 in Environmental management.

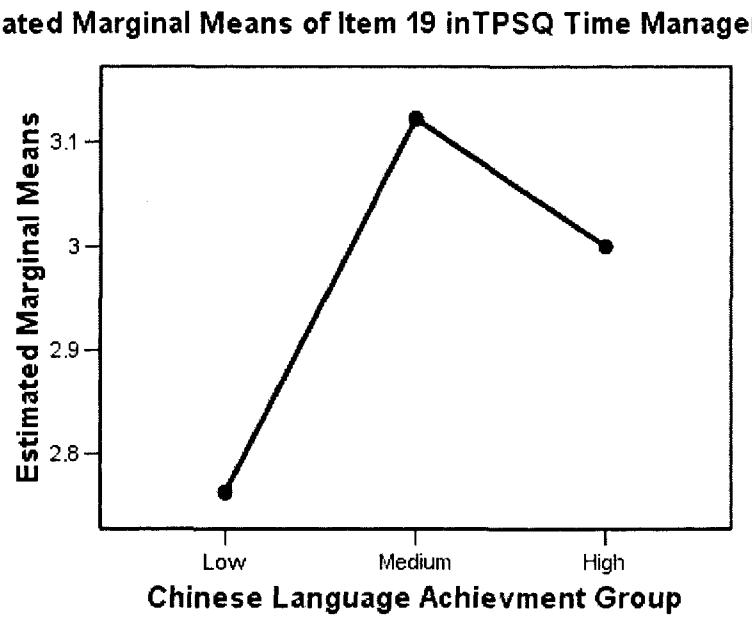


Figure 9. Profile of Item 19 in *TPSQ* environmental management strategies by Chinese language achievement group.

Mathematics. Results of univariate analyses demonstrated that no significant group differences existed in Design (p = .06), Alone/Peer (p = .12), Assistance (p = .41), and Place (p = .51). Unlike Chinese language group, a statistically significant difference was found in Background noise (significance level = .01), $F(2, 351) = 4.89$, $p < .01$, with partial $\eta^2 = .03$ (a small effect). A post hoc test revealed that the low-achieving group reported significantly higher preference for studying in background noise than did the medium- and high-achieving groups ($ps < .05$). No statistically significant difference was found between high and medium achievers (p = 1.00) (see Figure 10).

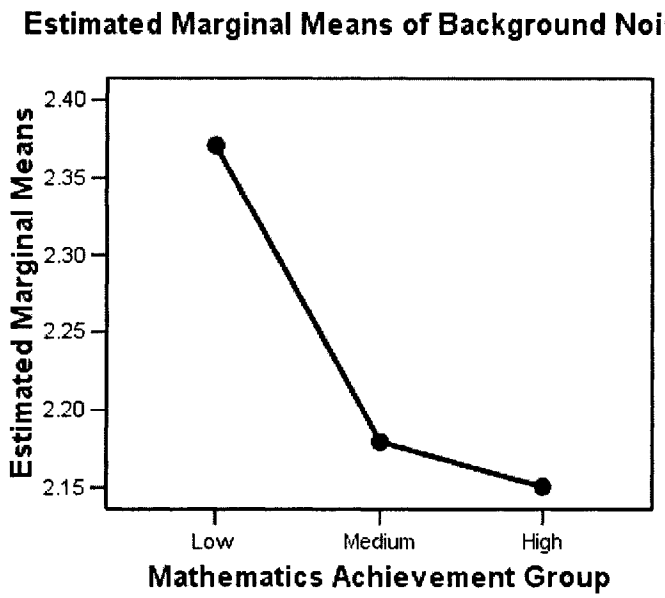


Figure 10. Profile of background noise in *TPSQ* environmental management strategies by mathematics achievement group.

Four *style* items in Intake sub-strategy ranged from 2.10 to 2.82 in mathematics achievement group: Item 4: "I like to eat when I study for tests" (M = 2.16, SD = .92); Item 11: "I don't think about eating or about feeling hungry during test preparation" (M = 2.83, SD = .91); Item 18: "Before I study for tests, I make sure that I am not hungry or too full" (M = 2.50, SD = .91); and Item 25: "Before I study for tests, I often feel that I am hungry or that I need to eat something" (M = 2.10, SD = .84). Univariate analyses indicated a significant group difference only in Item 4, $F(2, 350) = 6.92$, $p = .001$, with partial $\eta^2 = .04$ (significance level = .0125). Multiple comparisons revealed that the low-achieving group had a significantly higher mean than the high-achieving group ($p = .001$), indicating that low achievers had a higher tendency to eat when they study for tests than did high achievers (see Figure 11).

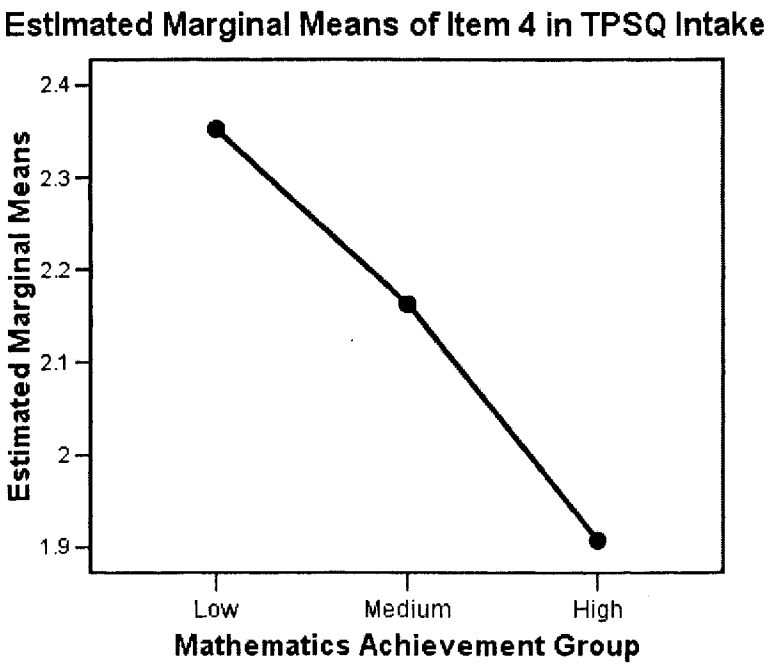


Figure 11. Profile of Item 4 in *TPSQ* environmental management strategies by mathematics achievement group.

Four *style* items in Time management sub-strategy ranged from 2.26 to 2.96 in mathematics achievement group: Item 5: "I make sure to take a break from time to time when I study for tests" (M = 2.26, SD = .87), Item 12: "I choose when I want to study for important tests (e.g., morning, afternoon, or evening)" (M = 2.66, SD = .90); Item 19: "I tend to cram because I study the night before the test" (M = 2.96, SD = .87); and Item 26: "I study in small blocks of time when there are a lot of materials to study" (M = 2.58, SD = .83). Univariate analyses showed that group differences in all 4 items were not statistically significant, ps > .01 (significance level = .01).

Research Question 2b: Do Low-, Medium-, and High-achievers Differ in Their Cognitive and Metacognitive Strategies in Test Taking?

Cognitive strategy in Chinese language. The interaction between Chinese language achievement group and sub-strategy measures was not statistically significant on the combined cognitive strategy scores, $p = .26$. The main effect for group differences (low vs. medium vs. high) on the combined cognitive strategy score was significant, $F(2, 372) = 6.27$, $p = .002$, with partial $\eta^2 = .03$. Pairwise comparison tests indicated that both the high- and medium- achieving groups used cognitive strategies more frequently than did the low-achieving group ($p = .02$ for the difference between high and low achievers, $p = .003$ for the difference between medium and low achievers). No significant difference was observed between the medium- and high-achieving groups, $p = 1.00$. Post Hoc tests of multiple comparisons on each sub-strategy indicated that significant group differences were found in Cue using ($p = .001$) and Understanding ($p = .002$). Both high and medium achievers reported having a higher tendency to use Cue and Understanding strategies than did low achievers, $ps < .05$. There was no statistically significant difference between medium and high achievers in those two sub-strategies ($ps > .05$). Figure 12 shows the profile of four cognitive strategies by the Chinese language achievement group.

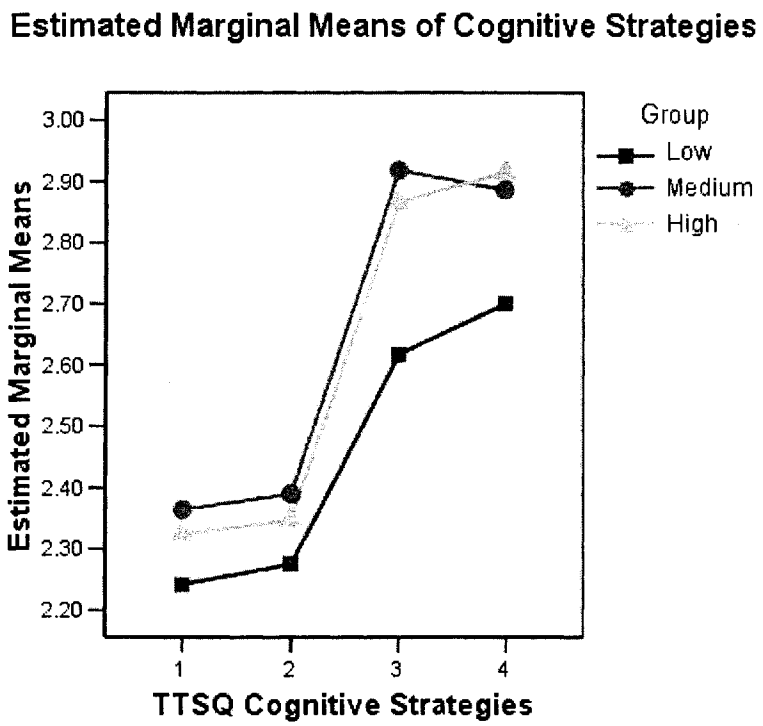


Figure 12. Profile of Chinese language group on four *TTSQ* cognitive strategies. 1 = Memory aid; 2 = Repeating; 3 = Cue using; 4 = Understanding.

Four measures in cognitive strategy were significant different, $F(3, 370) = 119.83$, $p < .0005$, with partial $\eta^2 = .49$. The means of Cue using and Understanding were significantly higher than those of Memory aid and Repeating strategies, $ps < .0005$. Figure 13 presents the profile of four *TTSQ* cognitive strategies by Chinese language achievement group.

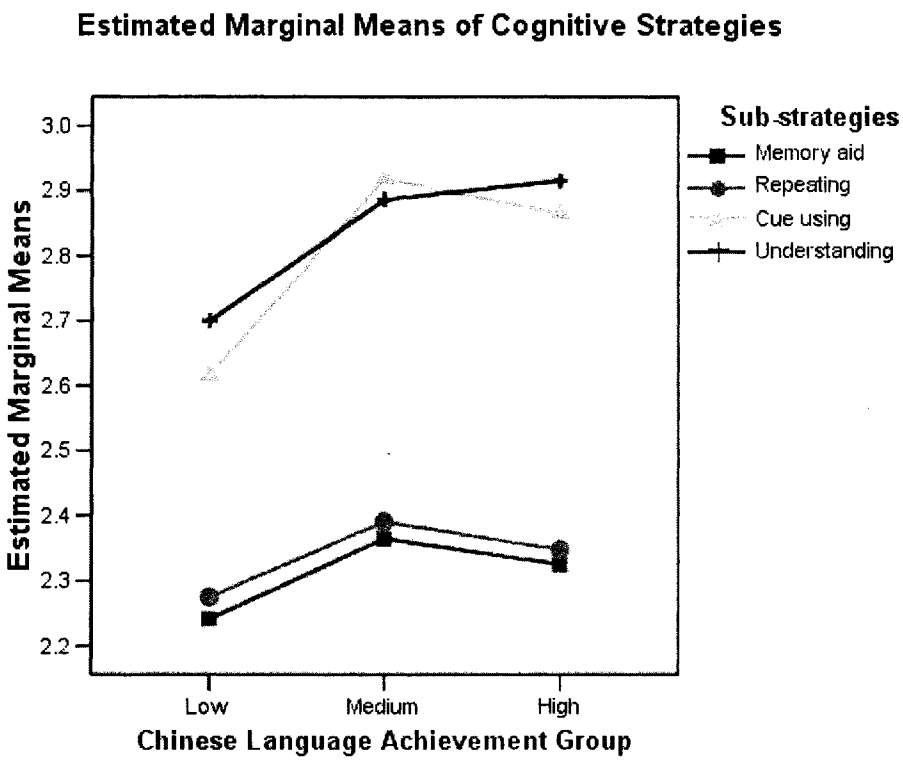


Figure 13. Profile of four *TTSQ* cognitive strategies (memory aid, repeating, cue using, and understanding) by Chinese language achievement group.

Cognitive strategy in mathematics. A statistically significant group by measures (sub-strategies) interaction was found, $F(6, 696) = 2.47$, $p = .02$, with partial $\eta^2 = .02$, showing a small practical significance. Figure 14 also presents that the interaction was caused by small means differences among measures crossing the groups. However, differences among measures (for all achievement groups; i.e., the main effect for sub-strategies) were statistically, $F(3, 348) = 119.43$, $p < .0005$, and substantially significant (partial $\eta^2 = .51$), although the group main effect was not significant ($p = .98$). Thus, it was decided not to pursue the follow-up of the small interaction effect, but continue with the significant main

effect. Follow-up tests of pairwise comparisons revealed that students reported having employed Cue using and Understanding strategies more often than Memory aid and Repeating strategies (*ps* < .0005) (see Figure 14).

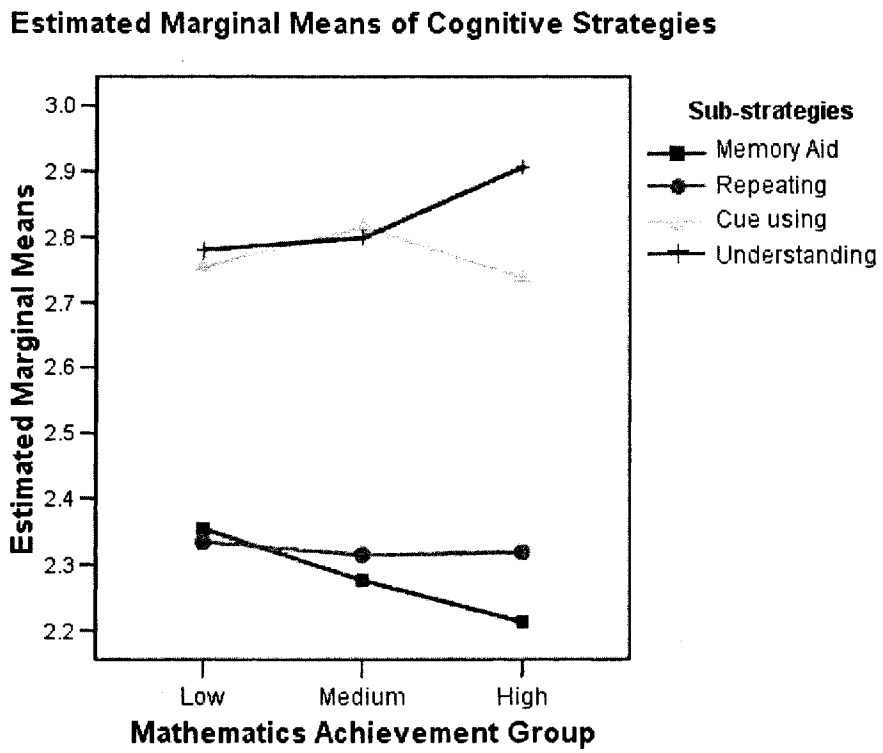


Figure 14. Profile of four *TTSQ* cognitive strategies (memory aid, repeating, cue using, and understanding) by mathematics achievement group.

Metacognitive strategy in Chinese language. There was no significant interaction effect on the combined *TTSQ* metacognitive strategy scores between Chinese language group and sub-strategies, $p = .29$. The high-, medium-, and low-achieving groups in Chinese language were not different in the combined metacognitive strategies, $p = .37$. However, three metacognitive strategy

measures were found significantly different, $F(2, 371) = 36.60$, $p < .0005$, with partial $\eta^2 = .44$. Results from pairwise comparisons indicated that all three strategies were significantly different among each others ($p = .003$ to $p < .0005$). Planning was the most frequently used strategy by Chinese students, followed by Strategy selection and then Self-checking. Figure 15 shows the profile of three metacognitive strategies by Chinese language achievement group.

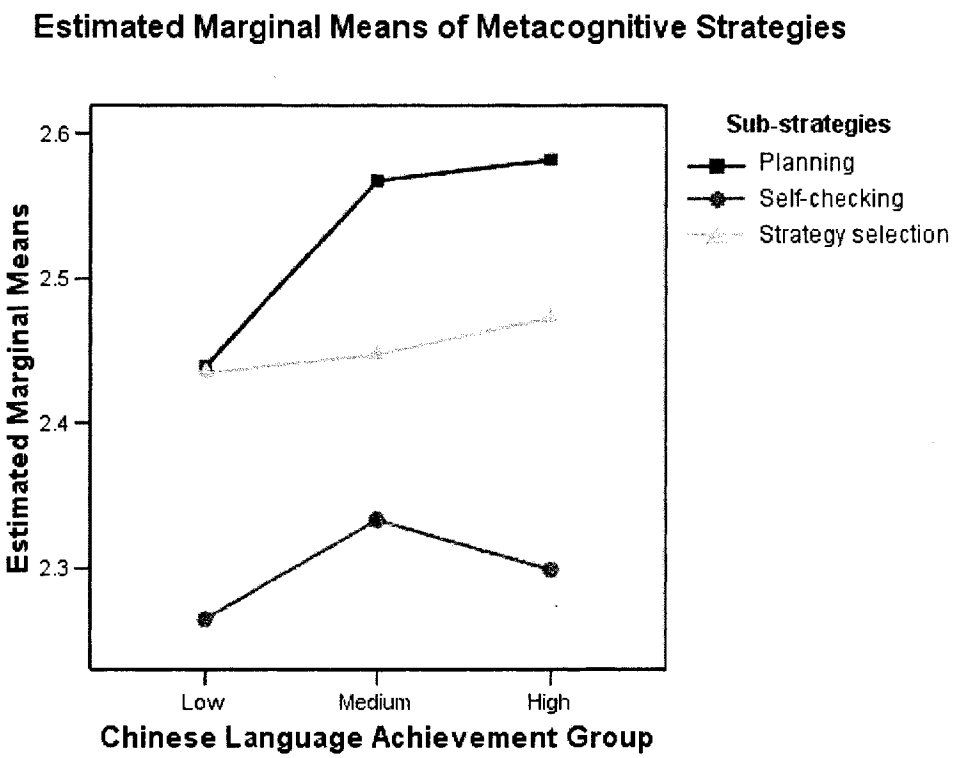


Figure 15. Profile of three *TTSQ* metacognitive strategies (planning, self-checking, and strategy selection) by Chinese language achievement group.

Metacognitive strategy in mathematics. No significant interaction effect was found between mathematics group and sub-strategies on the combined *TTSQ* metacognitive strategy scores, $p = .26$. Group differences were also not

statistically significant, $p = .52$. Significant differences were found among 3 measures, $F(2, 349) = 36.12$, $p < .0005$, with partial $\eta^2 = .17$. Results from pairwise comparisons on sub-strategies were similar to those with Chinese language achievement group. That is, statistically significant differences were obtained among all three measures: the mean of Planning was significantly higher than that of Strategy selection ($p = .003$) and of Self-checking ($p < .0005$); Strategy selection had a significantly higher mean than Self-checking ($p < .0005$). Figure 16 shows the profile of three metacognitive strategies by mathematics achievement group.

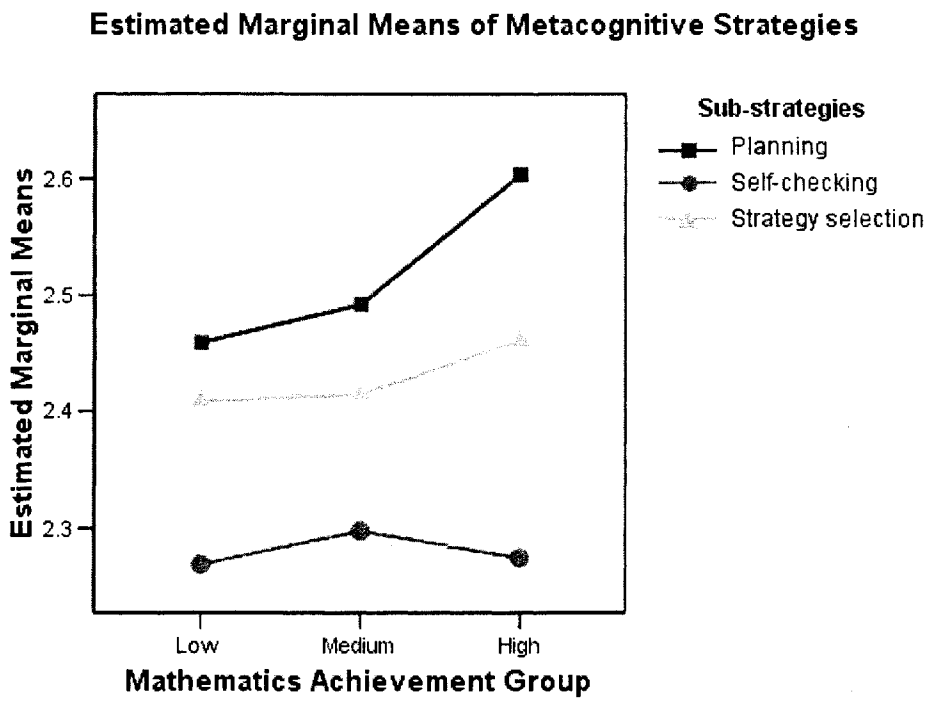


Figure 16. Profile of six *TTSQ* metacognitive strategies (planning, self-checking, and strategy selection) by mathematics achievement group.

Research Question 3a: Do Low-, Medium-, and High-achievers Differ in Their Test Tactics (Test-wiseness and Test Organization) Employed During the Tests?

Test-wiseness strategy in Chinese language. The interaction between mathematics group and sub-strategies on the combined *TTSQ* test-wiseness strategy scores was not significant, $p = .19$. However, the group main effect was significant, $F(2, 373) = 3.49$, $p = .03$, with partial $\eta^2 = .02$, indicating that the group difference was statistically significant, but not practically significant. Follow-up pairwise group comparisons did not show statistical significance between any pair of groups. Figure 17 presents the profile of Chinese language group in five *TTSQ* test-wiseness strategies. In the univariate-level follow-up multiple comparisons, group difference was revealed only in Eliminating, with both the high- and medium-achieving groups had higher means than did the low-achieving group, $ps < .05$. Group differences were not statistically significant in the other sub-strategies, $p = .08$ to $p = .83$.

Five sub-strategies were also statistically significantly different, $F(4, 370) = 76.30$, $p < .0005$, with partial $\eta^2 = .45$. Pairwise comparisons of the five measures revealed that Eliminating strategy had the highest mean among the five strategies, indicating that it was the most frequently used strategy by all students, $p < .0005$. Hints using was the next highest in the reported use, with a significantly higher mean than Anticipating ($p < .0005$), Guessing ($p = .001$), and Error avoiding ($p = .001$). The mean of Anticipating strategy was significantly lower than all of the other 4 strategies, $ps < .0005$. There was no significant

difference between Guessing and Error avoiding strategies, p = 1.00. Profile of five test-wiseness strategies by Chinese language achievement group is presented in Figure 18.

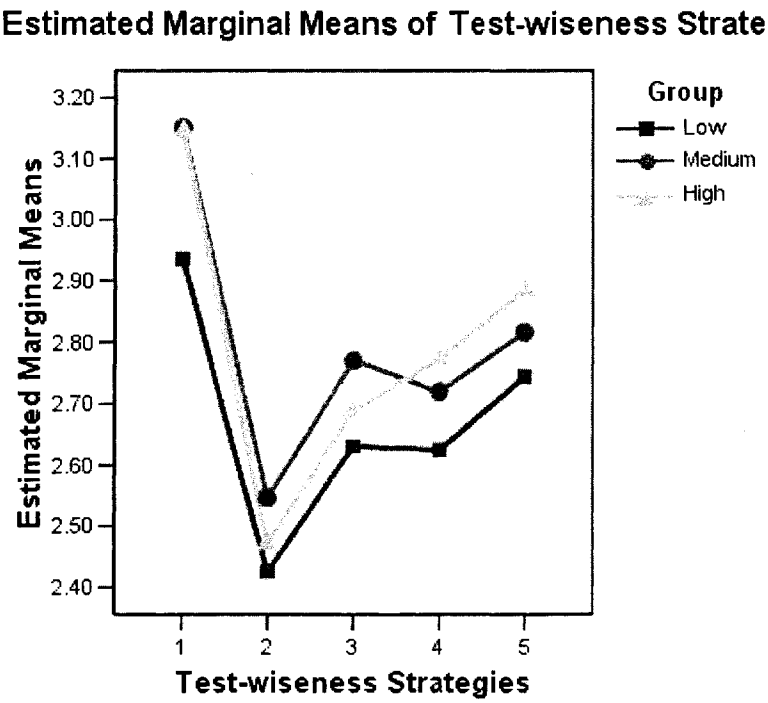


Figure 17. Profile of Chinese language achievement group on five *TTSQ* test-wiseness strategies. 1 = Eliminating; 2 = Anticipating; 3 = Guessing, 4 = Error-avoiding; 5 = Hints using.

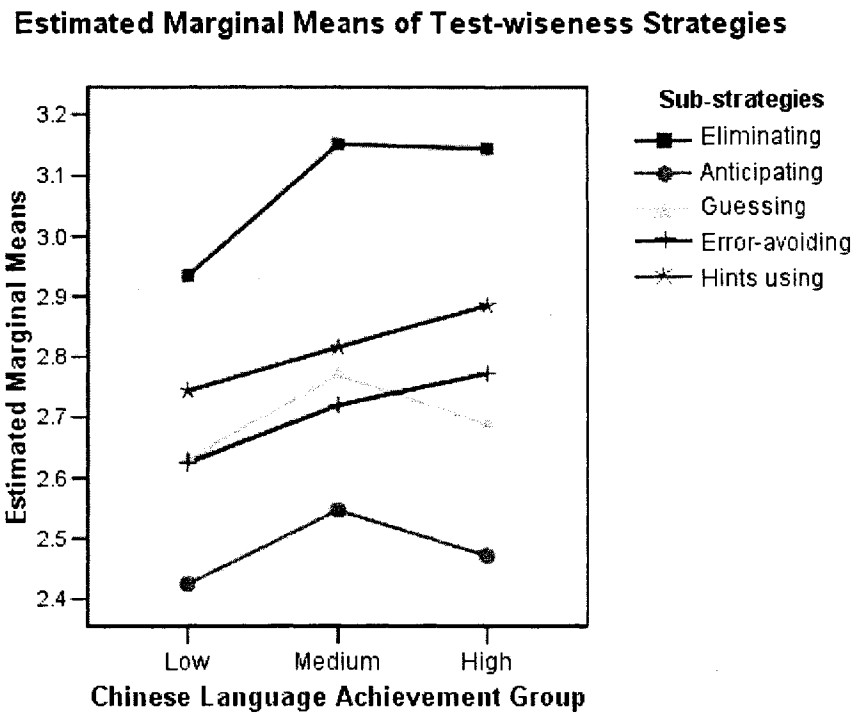


Figure 18. Profile of five *TTSQ* test-wiseness strategies (eliminating, anticipating, guessing, error-avoiding, and hints using) by Chinese language achievement group.

Test-wiseness strategy in mathematics. The interaction effect between mathematics achievement group and sub-strategies on the combined test-wiseness strategy scores was not significant, $p = .10$. No significant differences were observed among the three groups, $p = .16$. Similar to the results with Chinese language achievement group, five sub-strategies were significantly different, $F(4, 348) = 75.87$, $p < .0005$, partial $\eta^2 = .47$. As expected, results of pairwise comparisons of the 5 measures revealed that Eliminating strategy was the most frequently used strategy by all students, $p < .0005$. Hints using was the next highest in the reported use, with a significantly higher mean compared to

Anticipating, Guessing, and Error avoiding strategies (*p*s < .0005). Anticipating strategy was significantly lower than the other 4 strategies, *p*s < .0005. The mean difference between Guessing and Error avoiding strategy was not statistically significant, $p = 1.00$. Figure 19 shows the profile of five test-wiseness strategies by mathematics achievement group.

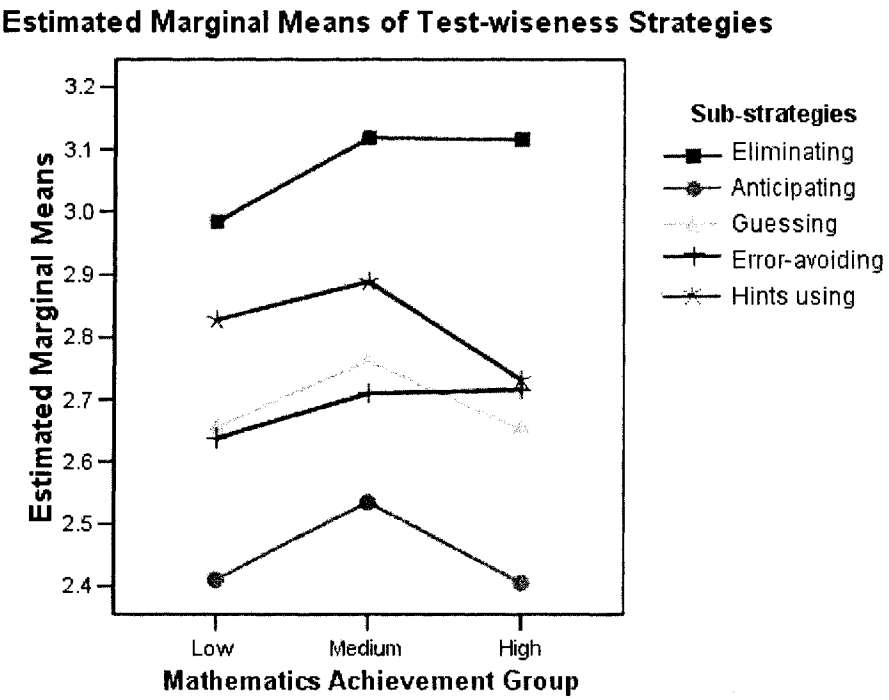


Figure 19. Profile of five *TTSQ* test-wiseness strategies (eliminating, anticipating, guessing, error-avoiding, and hints using) by mathematics achievement group.

Test organization strategy in Chinese language. There was a significant interaction effect on the combined *TTSQ* test organization strategy score between Chinese language achievement group and sub-strategies, $F(4, 744) = 4.80$, $p < .0005$, with partial $\eta^2 = .03$. Simple main effects were computed

following the significant interaction, instead of main effects. First, the three groups were compared for each sub-strategy using adjusted error variances and alpha level (.02) for multiple testing. The three groups were significantly different in Time using, $F(2, 373) = 6.22$, $p < .005$, and Marking strategies, $F(2, 373) = 10.45$, $p < .0005$, but not in Assessing, $p = .51$. Post hoc comparisons indicated

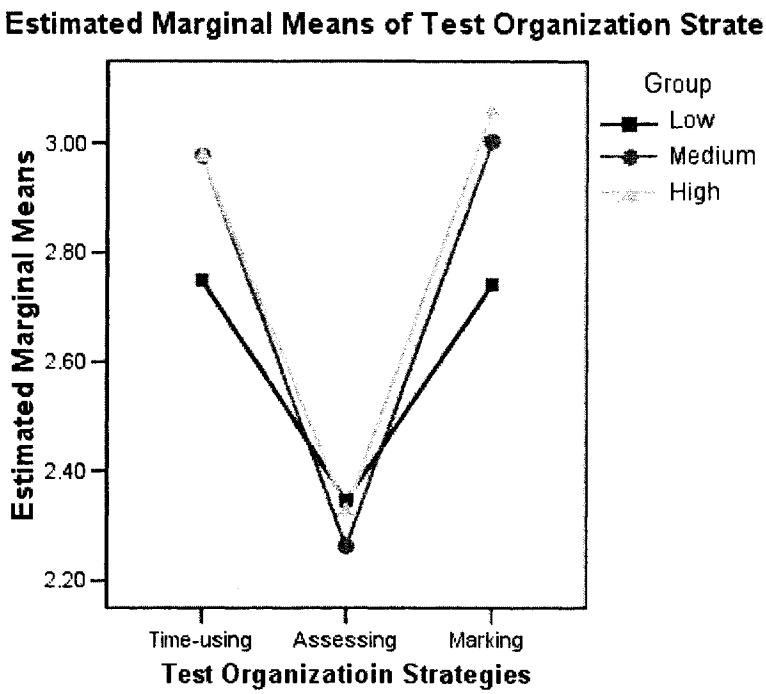


Figure 20. Profile of Chinese language achievement group on three *TTSQ* test organization strategies (time-using, assessing, and marking).

that in both Time using and Marking, significant differences were found between low and medium achievers ($p = .001$) and low and high achievers ($p = .002$), but not between medium and high achievers ($p = 1.00$). Next, within each achievement group, the three sub-strategies were compared. The findings were consistent in that in all three groups, the three measures were significantly

different, $F(2, 118) = 27.52$, $p < .0005$, partial $\eta^2 = .32$, for low achievers; $F(2, 131) = 77.81$, $p < .0005$, partial $\eta^2 = .54$, for medium achievers; $F(2, 121) = 60.19$, $p < .0005$, partial $\eta^2 = .50$, for high achievers. In all three groups, mean differences were statistically significant between Time using and Assessing strategies (all *p*s < .0005) and between Assessing and Marking (all *p*s < .0005), whereas the difference between Time using and Marking was not statically significant ($p = .22$ to $p = 1.00$). See Figure 20 and Figure 21 for profile.

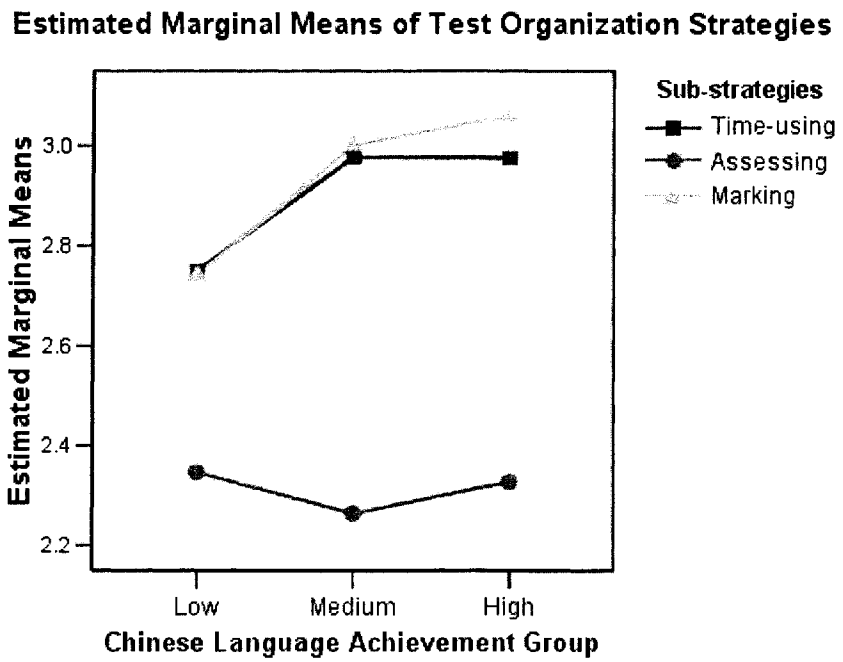


Figure 21. Profile of three *TTSQ* test organization strategies (time-using, assessing, and marking) by Chinese language achievement group.

Sequencing sub-strategy that included different *style* items was analyzed separately from the other 3 sub-strategies. The means of 4 *style* items in sequencing sub-strategy ranged from 1.94 to 2.93: Item 9: "I answer easy

questions first and then work on difficult questions" (M = 2.92, SD = .79); Item 18: "I answer difficult question first and then work on easy questions" (M = 1.94, SD = .99); Item 27: "I just start the test from the first item, finish the test, and then go back to first item if there is still time" (M = 2.51, SD = .83); and Item 36: "If I don't know the correct answer right away, I skip that question and come back to it later" (M = 2.93, SD = .82). Results from univariate tests indicated that all items were not statistically significant different, ps > .01 (significance level = .01).

Test organization strategy in mathematics. A statistically significant group by sub-strategies interaction effect on the combined test organization strategy scores, $F(4, 700) = 3.10$, $p = .02$, with a small effect size, partial $\eta^2 = .02$. With the probability value of .02 and the effect size of .02, it was decided not to pursue follow-ups of the interaction effects. Instead, main effects were examined. In mathematics, the group main effect on the combined test organization strategy scores was not statistically significant ($p = .18$). However, a significant difference was found among three measures, $F(2, 350) = 146.41$, $p < .005$, with partial $\eta^2 = .46$. Time using strategy and Marking strategy had significantly higher means than Assessing/Allocating strategy (ps < .0005). The difference between Time using and Marking was not significant ($p = .53$). Profile of three test-organization strategies by mathematics achievement group is presented in Figure 22.

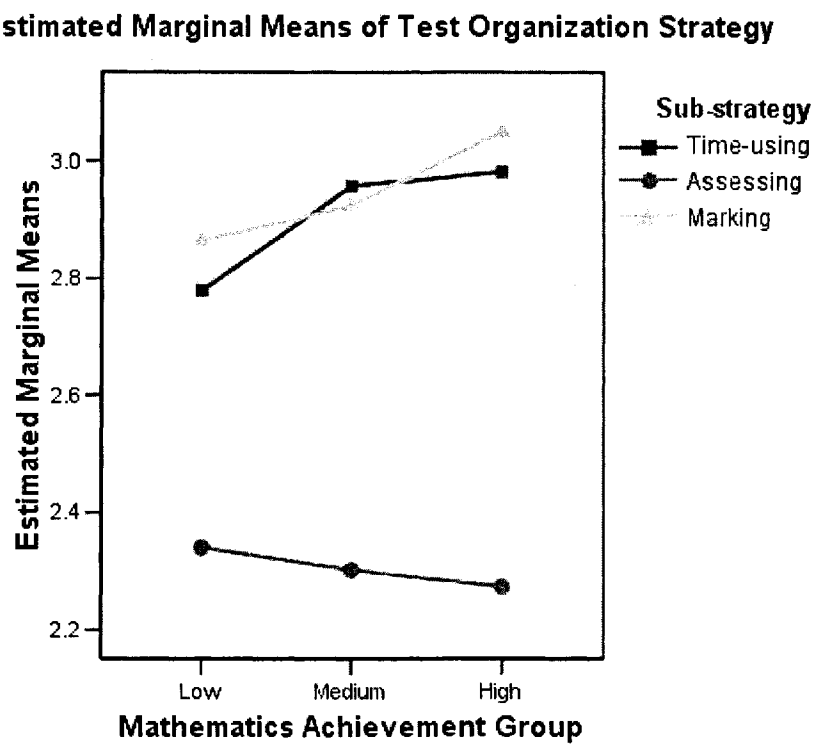


Figure 22. Profile of three *TTSQ* test organization strategies (time-using, assessing, and marking) by mathematics achievement group.

The means of 4 *style* items in Sequencing sub-strategy ranged from 1.93 to 2.94: Item 9: "I answer easy questions first and then work on difficult questions" (M = 2.88, SD = .80); Item 18: "I answer difficult question first and then work on easy questions" (M = 1.93, SD = 1.00); Item 27: "I just start the test from the first item, finish the test, and then go back to first item if there is still time" (M = 2.54, SD = .81); and Item 36: "If I don't know the correct answer right away, I skip that question and come back to it later" (M = 2.94, SD = .82). No significant group differences were found in Sequencing strategies (p = .13 to p = .99).

Research Question 4b: Do high-, Medium-, and Low-achievers Differ in Their Test Motivation (Confidence/Self-efficacy, Effort, Task Value, Persistence) and Test Anxiety in Test Taking?

Chinese language. The group by sub-strategies interaction effect on the combined motivational/emotional strategy scores was significant, $F(10, 736) = 1.94$, $p = .04$, with partial $\eta^2 = .03$. Again, with the probability value of .04 and the effect size of .03, it was decided not to pursue follow-ups of the interaction effects. Instead, main effects were examined.

The group main effect was significant, $F(2, 372) = 18.69$, $p < .0005$, with partial $\eta^2 = .09$. Pairwise comparisons showed that the high- and medium-achieving groups had significantly higher means than did the low achieving group, $ps < .0005$, indicating that high and medium achievers scored significantly higher in overall motivational/emotional strategy than low achievers.

Results from post hoc univariate tests of multiple comparisons demonstrated that group differences were statistically significant in Confidence, Effort, Worry anxiety, and Emotional anxiety (see Figure 23). The medium- and high-achieving groups scored significantly higher on Confidence, Effort, and Emotional anxiety than did the low-achieving group, with low and high achievers having higher level of confidence, expending more effort, and having less emotionality than low achievers while taking tests, $p = .03$ to $p < .0005$. For Worry anxiety, mean differences were significant between the high- and medium-achieving groups, $p = .02$, and the high- and low-achieving groups, $p < .0005$. Group differences were

not statistically significant in Task value (p = .06 to p = .97) and Persistence (p = .27 to p = .89).

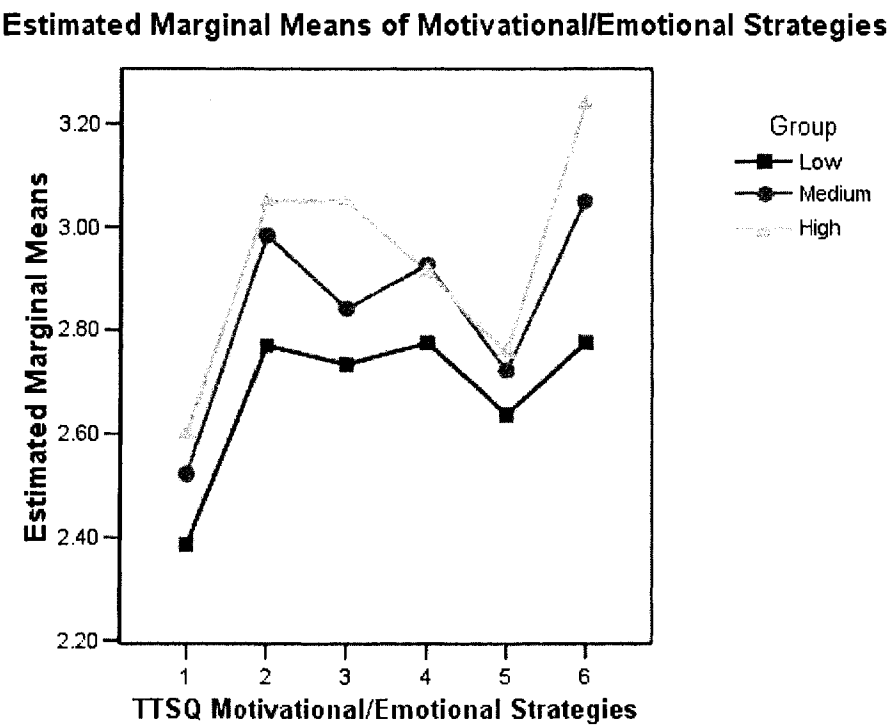


Figure 23. Profile of Chinese language achievement group on six *TTSQ* motivational/emotional strategies.1 = Confidence; 2 = Effort; 3 = Worry anxiety; 4 = Task value; 5 = Persistence; 6 = Emotionality anxiety.

There were significant differences among all six measures in motivational/emotional strategy, $F(5, 368) = 18.69$, $p < .0005$, with partial $\eta^2 = .49$. Emotionality in test anxiety was reported significantly higher than all other sub-strategies (p = .02 to $p < .0005$) except Effort (p = .35). The mean of Effort was significantly higher than those of Confidence and Persistence ($ps < .0005$). Worry anxiety and Task value had significantly higher means than Confidence and

Persistence (*p*s < .05). Confidence was significantly lower than all of the sub-strategies (*p*s < .0005). Profile of six motivational/emotional strategies is presented in Figure 24.

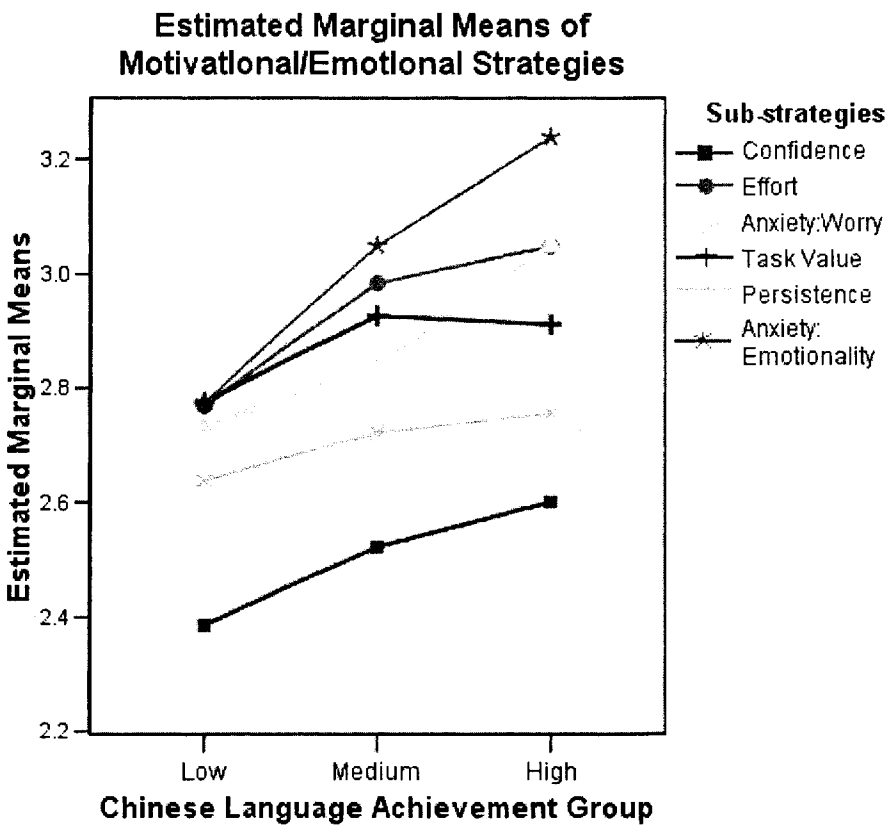


Figure 24. Profile of three *TTSQ* motivational/emotional strategies (confidence, effort, anxiety: worry, task value, persistence, and anxiety: emotionality) by Chinese language achievement group.

Mathematics. The interaction between group and sub-strategies on the combined motivational/emotional strategies was not statistically significant, *p*

= .97. However, a significant difference was found among the three groups, $F(2, 350) = 10.29$, $p < .0005$, with partial $\eta^2 = .59$ (see Figure 25). Pairwise

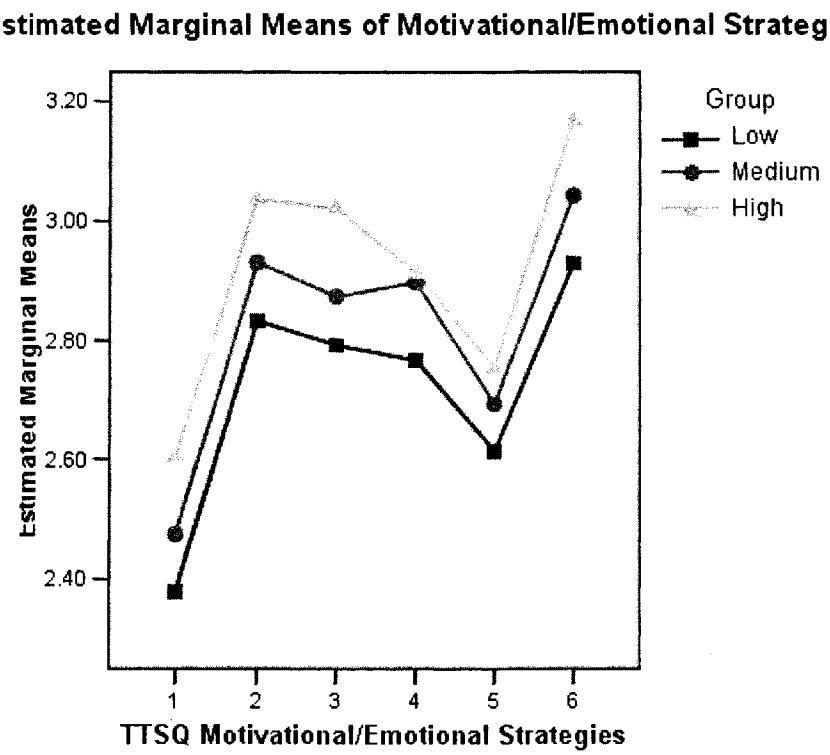


Figure 25. Profile of mathematics achievement group on six *TTSQ* motivation/emotional strategies. 1 = Confidence; 2 = Effort; 3 = Worry anxiety; 4 = Task value; 5 = Persistence; 6 = Emotionality anxiety.

comparisons indicated that the high-achieving group was significantly different from the low-achieving group, with the high-achieving group having a higher mean in overall six measures, *p*s < .0005. No statistically significant differences were found between the medium and low achievers, $p = .07$, as well as between the medium and high achievers, $p = .06$. Post hoc tests demonstrated significant group differences in Confidence, Effort, and Worry anxiety. The high-achieving

group reported significantly higher level of confidence than did the low- and medium-achieving groups, *p*s < .05, and reported expending more Effort (*p* = .004) and had less Worry anxiety (*p* = .02) during the test than did the low-achieving group.

The six sub-strategies were significantly different, $F(5, 366) = 71.96$, $p < .0005$, with partial $\eta^2 = .51$. Results from pairwise comparisons were the same as those with Chinese language achievement group. Profile of six motivational/emotional strategies is presented in Figure 26.

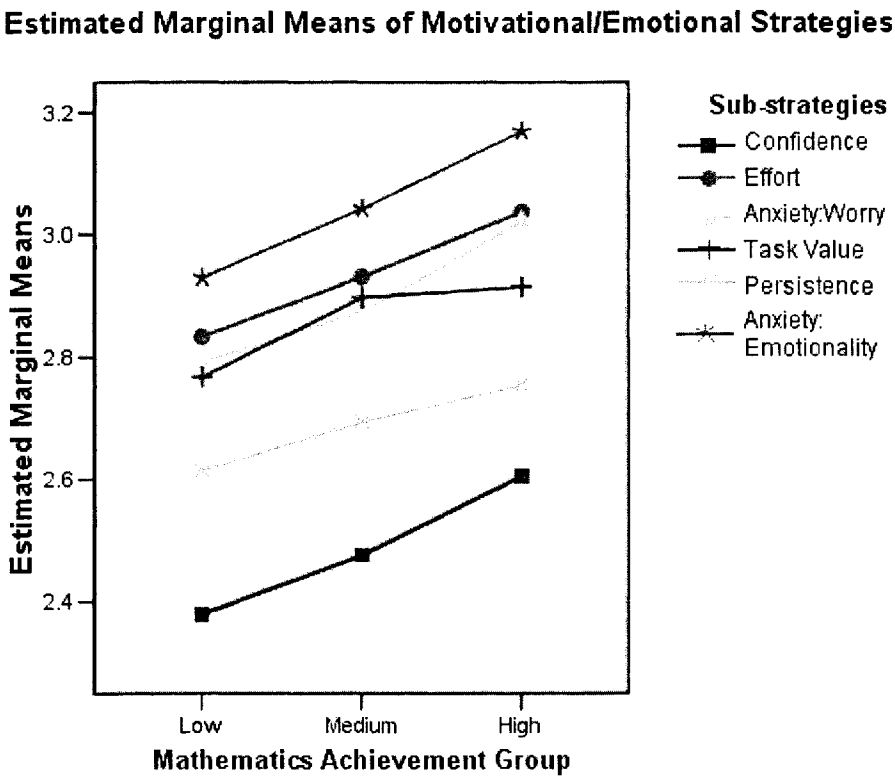


Figure 26. Profile of six *TTSQ* motivational/emotional strategies (confidence, effort, anxiety: worry, task value, persistence, anxiety: emotionality) by mathematics achievement group.

Research Question 5b: Do high-, Medium-, and Low-achievers Differ in Their Environmental Management Strategies in Test Taking?

Chinese language. Univariate analyses resulted in only one statistically significant group difference: Assistance, $F(2, 372) = 4.37$, $p = .01$, partial $\eta^2 = .02$ (significance level = .03). Pairwise tests on Assistance strategy indicated that high achievers used Assistance more frequently than did low achievers during tests, $p = .01$ (see Figure 27). Difference between low and medium achievers was not significant, $p = .32$.

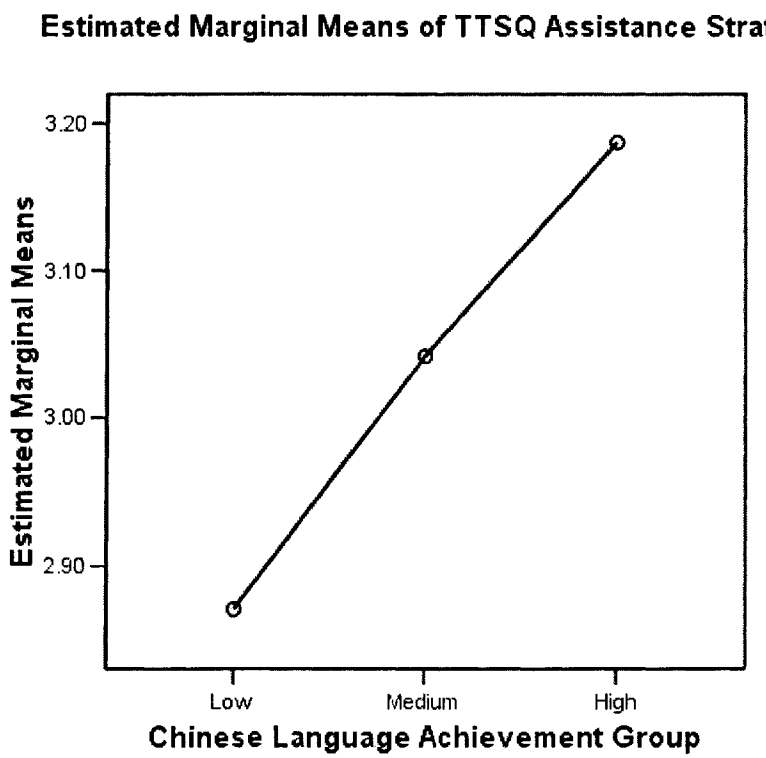


Figure 27. Profile of assistance strategy in *TTSQ* environmental management strategies by Chinese language achievement group.

The means of 4 *style* items in Design sub-strategy ranged from 2.30 to 2.62: Item 1: "I make sure I am comfortable before I begin to solve test items" (M = 2.62, SD = .75); Item 4: "I do not think of comfort of chair or desk space before I start taking tests" (M = 2.57, SD = .95); Item 7: "Before I take test, I make sure I have a good chair and desk space" (M = 2.30, SD = .85); and Item 10: "I don't care where I sit for tests" (M = 2.50, SD = .95). Univariate analyses of group differences showed no statistical significances in these items, all ps > .05.

Mathematics. Group differences were not significant in Intake and Assistance, all ps > .05.

The means of 4 *style* items in Design sub-strategy ranged from 2.26 to 2.60: Item 1: "I make sure I am comfortable before I begin to solve test items" (M = 2.60, SD = .75); Item 4: "I do not think of comfort of chair or desk space before I start taking tests" (M = 2.56, SD = .93); Item 7: "Before I take test, I make sure I have a good chair and desk space" (M = 2.26, SD = .85); and Item 10: "I don't care where I sit for tests" (M = 2.50, SD = .95). Univariate analyses indicated that there were no significant group differences in all of the items, ps > .01 (significance level = .01).

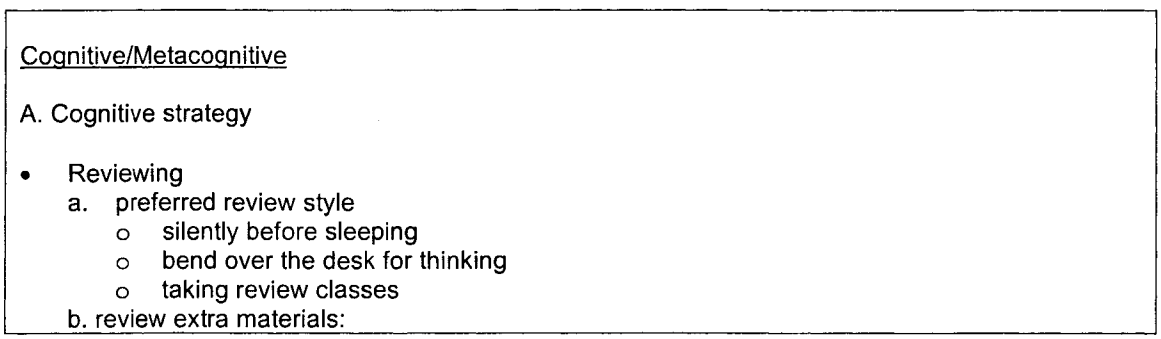
Qualitative Findings from Open-ended Questions

To explore strategies that Chinese students employed in test preparation and during tests that were not examined by Likert-style questionnaire items, students were asked to write those strategies. The findings of qualitative analysis of research question 6 on students' written strategies are described in this section.

Cognitive/Metacognitive Strategies

Cognitive strategies. Additional cognitive strategies were found in six areas: reviewing (e.g., review error collection, supplementary content that teacher mention in class); recalling (e.g., recall content and questions that teacher explained in class); focusing (e.g., focus on teacher's summarization, the materials that I haven't mastered well, or problems that I could not solve previously); memorizing (e.g., the most important concept and fact); subject matters (e.g., memorize humanities subject matter; spend more time on understanding science subjects); and practice/exercise (e.g., do extra exercise). Figure 28 presents all instances for each sub-strategy and frequency for each instance.

Metacognitive strategies. No new sub-strategies were found from students' responses to the open-ended question on metacognitive strategies. However, students provided more detailed information on strategy selection: studying different materials in different ways (e.g., "I organize the structure of the text books first". Figure 28 presents all instances for this sub-strategies and frequency for each instance.



- collected errors and mistakes previously made (2)[a]
  concept map
- supplementary content that teacher mentioned in class
- materials that I have missed

- Recall
  - content and questions that teacher explained in class
- Focus
  - focus on the materials that I haven't mastered well
  - find out and work on the problems I couldn't solve previously
  - focus on the teacher's summarization
- Memorizing
  - materials for different subjects
  - the most important concepts and facts
- Subject matter

  a. focus on specific subject matters
  - the subjects that I am interested in
  - memorizing humanities subject matters (2)
  - spend more time on understanding science subjects in daily study

  b. alternate/combine/separate
  - alternate between science subjects and humanities subjects
  - alternate different subjects
- Practice/exercise
  - extra exercise book (2)
  - extra materials that are relevant to the test

B. Metacognitive strategy
- Strategy selection

  a. organize/summarize
  - organize study material
  - organize the structure of textbooks
  - summarize the note
  - summarize and organize information for each unit

  b. synthesize or contrast
  - contrast study materials

<u>Motivational and Emotional</u>

- Competitiveness
  - like competition, enjoy winning
  - think about my competitors
- Seif-motivate
  - display mottos on the computer screen
  - continue to study by seeing other student study intensely
- Emotion management
  - keep a happy mood
  - stay normal by treating the test as ordinary exercises
  - take it easy
  - don't to be too nervous
  - train myself not to be tense
  - don't give myself too much pressure
    don't aim for too high test scores

<u>Environmental Management</u>

- Intake
  - water (2)
  - tea
- time management

a. time assignment
    - arrange study time for each subject
      make the most of my study time
    - spend more time on the subjects that I am interested in
    - study after playing for several days
- Seeking assistance
    - would like someone to monitor me
- Material preparation
    - Stationery
- Bodily concerns
    - Rest/Sleep
        - keep fresh
        - have a good sleep (3)
    - Relax by

      a. playing sport
        - playing soccer
        - playing badminton and ping-pong

      b. entertainment
        - listen music (4)
        - playing games
        - appropriate entertainment
        - read essay
        - read cartoon

      c. eating
        - drink water or eat candies

      d. others
        - relax if I am tired (2)
        - stop and put my head on the desk
        - chat with sister or friends

Other Strategies

- I use my brain to think.
- I excuse myself from study.
- I hope to make a good progress
- I don't spend too much time to prepare for test, because knowledge is accumulated day by day, study for test could not make too much improvement.
- I study for living.
- When I study for tests, I always be detracted by some matter.

Figure 28. Test-preparation strategies from open-ended questions.

[a] The number in parentheses is frequency of the corresponding instance. The instances without a number indicate one observation.

Motivational/Emotional Strategies

Additional motivational/emotional strategies were found in three areas: competitiveness (e.g., like competition, think about my competitor); self-motivate (e.g., display mottos on the computer screen, continue to study by seeing other student study intensely); and emotion management (e.g., stay normal by treating the test as ordinary exercises, take it easy, don't give myself too much pressure). Figure 28 displays all instances for each sub-strategy and frequency for each instance.

Environmental management strategies

Students presented several additional strategies in this section. Those strategies were placed into five subcategories: Intake (e.g., drink water or tea); time management (e.g., make the most of my study time); seeking assistance (e.g., "I like someone to monitor me"); material preparation (e.g., check whether the stationery is completed); and bodily concerns (e.g., have a good sleep, relax by playing sport, entertainment or eating). All instances for each sub-category and frequency for each instance are presented in Figure 28.

Test-taking Strategies

Cognitive/Metacognitive Strategies

Cognitive strategies. Additional cognitive strategies were observed in three areas: marking (e.g., circle important words and sentences); recall (e.g., "If I can not solve the test item, I will close my eyes for a while, and read the item again", recall what teacher said); and using scrap papers (e.g., use test as a scrap paper

and write down the solving steps on the test paper directly). Figure 29 displays all instances for each sub-strategy and frequency for each instance.

Cognitive/Metacognitive

A. Cognitive strategy
- Mark/underline/highlight
  - circle words and sentences
- Recall
  - close eyes
  - what teacher said
  - relevant information of the questions
- using scrap paper
  - use test paper as scrap paper

B. Metacognitive strategy
- Self-checking
  - observe other students' progress (e.g., by hearing other students turning pages or asking questions to examiners) (2)[a]
- Strategy selection

a. problem-solving step
  - organize thoughts about problem solutions
  - list solution steps in mind for questions that require a lot of writing
  - write down solution steps for fill-in-the-blank questions

b. using information
  - infer or guess an answer from all given information
  - write down all relevant information for the problem
  - consider common sense

c. sum up/several questions together
  - summarize main ideas from the text for reading questions
  - solve several questions together to increase speed

Test Tactics

A. Test-wiseness
- Guessing
  - trust my first intuition
  - between A and B, I always choose B
  - take one of the choices randomly at the end of the test
  - answer the question I cannot solve, then come back later
- Error-avoiding strategy
  - check whether my handwriting is clear (2)
  - listen examiner's instructions
  - pay attention to printing errors informed by examiners
  - answer carefully
  - check whether the answers in the answer sheet match to the answers in the test paper
  - check name and class
  - ensure the accuracy of simple questions

B. Test organization
- Assessing
  - assign more time to items with more weights
- Marking
  - erase the marks
- Sequencing
  - check questions with more weights first
  - solve questions with more weights first

Motivational and Emotional

- Emotion management
  - be calm (3)
  - reduce influence of negative emotion
  - straighten my back to concentrate
  - reduce exhaustion by not spending too much time on the questions that I can't solve
- Uneasy feeling
  - By examiner's behavior
  - By examiner's bad attitude
- Self-motivate
  - by seeing others' working hard
- Worry
  - lag behind
  - have unlucky feeling

Environmental Management

- Intake
  - think about whether the food will let my body feel uncomfortable
- Seek assistance
  - when test items need to be revised
  - when test is not clear (2)
- Stationary /test papers
  - check stationery
  - exchange my pencil lead
  - check whether all test sheets are in order
- Bodily concern
  - Relax by

    a. eating
    - drink water (2)
    - eat candies

    b. eyes
    - by looking outside (2)
    - close my eyes

    c. others
    - think of irrelevant things
    - hum a song (2)
    - take deep breath (2)
    - wipe sweat
    - put my head on the desk and ponder
    - take a break

Other Strategies

- I complain about myself not having studied hard
- I wonder whether test items are wrong.
- I think of what will I do after the test.

Figure 29. Test-taking strategies from open-ended questions.

[a] The number in parentheses is frequency of the corresponding instance. The instances without a number indicate one observation.

Metacognitive strategies. Student wrote additional metacognitive strategies in two areas: self-checking (e.g., observe other students' progress); and strategy selection (e.g., list solution steps in mind, consider common sense, and summarize main ideas from the text). Figure 29 presents all instances for each sub-strategy and frequency for each instance.

Test Tactics

Test-wiseness. Additional test-wiseness strategies were found in two exiting areas: guessing (e.g., "trust my first intuition", "answer the question I cannot solve and come back later"); and error-avoiding (e.g., check whether my handwriting is clear, pay attention to printing errors, check whether the answers in the right place). All instances for each sub-strategy and frequency for each instance are listed in Figure 29.

Test organization. Additional test organization strategies were placed into three subcategories: assessing (e.g., assign more time to items with more weights); marking (e.g., erase the marks at the end of the tests); and sequencing (solve or check questions with more weights first). All instances for each sub-category and frequency for each instance are presented in Figure 29.

Motivational/Emotional Strategies

Additional motivational/emotional strategies were found in four areas: uneasy feeling (e.g., by examiner's behavior or bad attitude); worry (e.g., lag behind, unlucky feelings); self-motivated (e.g., seeing those students who are working hard for the test); and emotion management (e.g., be calm, reducing influence of negative emotion, "reducing exhaustion by not spending too much time on the

questions that I can not solve"). Figure 29 presents all instances for each sub-strategy and frequency for each instance.

Environmental Management

Additional strategies in environmental management were placed into four subcategories: intake (e.g., consider whether the food will let the body feel uncomfortable); seeking assistance (e.g., when test items need to be revised, when test is not clear); stationery/test papers (e.g., check whether all test sheets are in order); and bodily concerns (e.g., relax eyes, take break during the test, take a deep breath). All instances for each sub-strategy and frequency for each instance are presented in Figure 29.

CHAPTER 4

DISCUSSION

Test Preparation Strategies Used by Chinese Students

Cognitive/Metacognitive Strategies

Cognitive strategies used by Chinese students were *memorizing*, *reviewing*, *outlining/note-taking*, *understanding*, *repeating*, and *solving. Memorizing* and *solving* were the most and the least frequently used strategies, respectively, among the tenth-grade Chinese students participated in this study. Since the lowest mean among the sub-strategies was 2.29, 1 being "almost never" and 2 "sometimes," it seems that Chinese students use all strategies examined in this research at least from time to time. Chinese students also reported using other strategies that were not listed in the questionnaire items, such as recalling, focusing on certain contents, reviewing or working on extra materials, and strategies related to specific subject matters.

One possible explanation for the higher reported use of *memorizing* strategies as compared to *solving* could be found in some students' responses to the open-ended questions. Some students like to solve and understand problems on science or math on a daily basis to spare more time to focus on memorizing other subject matters immediately before the test. Prior to tests, Chinese teachers assign homework involving review of contents. Likewise, parents also assign their

children extra exercises (Xie, Seefeldt, & Tam, 1996) to help them get ready for the test. These exercises might involve *memorizing* more than *solving* problems because parents have seen their children working on a large quantity of practices including solving problems in daily homework assignments. Chen and Lin (1995) stated that teachers assign homework to students as much as possible daily and Chinese students have to spend four to six hours working on them every evening. Thus, for test preparation, Chinese students might have used the limited time for *memorizing* or *reviewing* their "collected errors" that were made previously in homework assignments or previous tests. In a qualitative research by Zhang (2001), it was also found that Chinese students focused on memorizing of basic knowledge for test preparation.

Chinese students, as well as their teachers and parents, view extra reviews and exercises as a way to achieve high scores and a high rank in class. They believe that additional exercises help them earn extra points needed for ranking higher than those who might not study as hard. Chen and Stevenson (1989) also reported that Chinese parents and teachers perceive additional practices as a useful contribution to children's success at school.

All metacognitive strategies (*planning*, *strategies selection*, and *self-checking*) examined by the questionnaire items were used by Chinese tenth graders. Chinese students reported using *self-checking* strategy less frequently, compared to the other two strategies. They also reported using organization, summarization, and contrasting strategies when studying various materials. There has been no study investigating metacognitive strategies used in test preparation in Chinese

students. Further studies investigating metacognitive activities in students from various grades and countries are warranted.

Motivational Strategies and Emotional Awareness

The six strategies examined (*task value*, *effort*, *persistence*, *confidence*, *anxiety of emotionality*, and *anxiety of worry*) were all employed by Chinese students. Students also reported about their competitiveness, self-motivation, and emotion management strategies in their responses to open-ended questions. *Task value* and *effort* scores were higher than those of the other strategies and awareness, and the *confidence* level was the lowest in the current sample. Previous studies also reported similar observations in Chinese students; Chinese students were less willing to endorse items that had a self-praise connotation, and they appeared to be less confident than Western counterparts, even though their test scores were higher (e.g., Chan, 2000; Rogers, 1998; Whang & Hancock, 1994). These findings may be explained by Chinese collectivist culture which advocates more self-effacing and modest values (Bond, Leung, & Wan, 1982).

Students' remarks on competitiveness in their written responses deserve an attention. The education system in China promotes competition due to using test scores and ranks for eligibility to key schools and colleges. Thus, scoring well on examinations and doing better than other students may drive students to study hard. In this study, the *task value* items focused on the importance of doing well on tests. That is, the intrinsic value on learning was not examined. Therefore, how Chinese students attribute their study habits is to be further examined.

In this study, Chinese students reported expending *effort, valuing* tests, and

being *persistent* during test preparation, as indicated by high averages. The findings correspond well with the cultural belief about success in China. Most Chinese attribute success to hard work and effort rather than ability (Dweck, 1999; Hau & Salili, 1991; Tweed & Lehman, 2002). Chinese parents regard the hard-work principle as the first step to academic success (Stevenson & Lee, 1990), and many of them believe that intelligence itself is not something innate, but rather something which can be improved by hard work (Watkins & Biggs, 1996). Hao and Salili (1991) also stated that Chinese students are taught by teachers and parents at a very early age that one can learn study skills by working hard, and in so doing one will develop higher ability. Thus, it is likely that teachers' and parents' attitudes influence student motivation and attitudes towards their study.

Environmental Management Strategies

Five environmental management strategies (*assistance*, *place*, *background noise*, *alone/peer*, and *design*) examined by the questionnaire items were all used by Chinese students. Chinese students reported more frequently that they *ask assistance* and study in a formally *designed* environment. They also reported additional strategies such as material preparation and bodily concerns.

The informal *design* such as studying on the floor, bed, or sofa may not be viewed as good study behaviors by Chinese students. In Chinese culture informal positions and postures might be considered as not being serious in studying or not an effective way for study. Chinese parents provide desks for their elementary children to do homework and have them spend as much time as possible for

studying (Lamm, 1986). Henderson (1990) reported that 95 percent of the Chinese fifth-graders have desks at home, compared to only 63 percent of American fifth-graders. Supervised by their rigid parents, Chinese students might have developed their habit for studying in a formal way since young.

Test Taking Strategies Used by Chinese Students

Cognitive/Metacognitive Strategies

Cognitive strategies used by Chinese students in test-taking were *memory aid*, *repeating*, *cue using*, and *understanding*. *Cue using* and *memory aid* were the most and least frequently used strategies, respectively, among the tenth graders in the current study. Students also reported additional strategies such as underlining, recalling, and using scrap papers.

Memorizing was reported as the most frequently used strategies for test preparation. However, *memory aid* was least frequently used during tests. Thus, to assist memory during the test, students may learn to use memory aids, for example, "writing down information as soon as they receive the test" or "imagining where the information appeared," to facilitate retrieving valuable information that had been stored in memory.

Students reported using all three metacognitive strategies (*planning*, *strategy selection*, and *self-checking*) examined by the questionnaire items. *Self-checking* again was the least frequently used strategy in test taking, compared to the other two strategies. Strategy selections for solving different types of items were also reported in written responses.

Chinese students scored low in *self-checking* in both test-preparation and test-taking. Previous research indicated that providing explicit instructions on problem-solving processes and feedback can improve test takers' monitoring accuracy and test performance (Nietfeld & Schraw, 2002). Providing a self-check template that guide monitoring (Delclos & Harrington, 1991; King, 1991) could be a positive way to facilitate *self-checking* process in Chinese students. Specific templates that best suit Chinese students are to be further examined.

Test Tactics

Five test-wiseness strategies (*eliminating*, *anticipating*, *guessing*, *error-avoiding*, and *hints using*) examined by the questionnaire were all used by Chinese students. *Eliminating* options and *anticipating* answers were the most and the least frequently used strategies, respectively. Additional strategies such as guessing and error-avoiding were also mentioned by some students. Option elimination was also the most commonly used test-taking strategies in Stough's (1992) study. In addition, the *eliminating* strategy was significantly correlated with high test scores (Stough, 1992). Other strategies such as *error-avoiding* and *hints using* were also frequently used by students in other studies (e.g., Parham, 1996; Towns & Robinson, 1993). Chinese students also reported applying these strategies as well, indicating that Chinese students use some of the strategies that have been called "test-wiseness" recommended in the U.S. However, as compared to *eliminating*, the *anticipating* strategy (e.g., thinking an answer before reading the answer choices) was reported less frequently used test-wiseness strategy.

Chinese students reported using three strategies in test organization: *time-using*, *assessing*, and *marking*. *Time-using* and *marking* were more frequently used than *assessing*. *Assessing* item difficulties and allocating time for solving the items were found to have a positive relationship with achievement in mathematics (Hong et al., in press). Schraw (1994) also indicated that assessing item difficulty as a monitoring process could help students perform better on tests. A possible explanation for the low frequency of *assessing,* as compared to the other strategies, could be that most tests in Chinese high schools are sequenced from easy to hard questions within each section of the test, and test items are labeled with points, representing difficulty level.

Motivational Strategies and Emotional Awareness

All six strategies (*effort*, *task value*, *persistence*, *confidence*, *anxiety of worry* and *emotionality*) examined by the questionnaire items were employed during tests by Chinese students. Consistent with the findings of test-preparation strategies, Chinese students had highest scores in *effort* expenditure and *valuing* of testing; the average *confidence* score was the lowest. Students also expressed their uneasy feeling and wrote about their self-motivation and emotion management strategies they used during tests.

In their written statements, some students related their uneasy feeling to teachers' attitudes and behaviors exhibited while they monitor testing sessions. For example, teachers' expressions such as anger, impatience, or exhaustion could create uneasiness in students. Other behaviors such as whispering with other examiners, talking or yelling to a student, strolling in the classroom, or just

standing beside a student, could make some students feel uncomfortable during the test.

Environmental Management Strategies

Students thought about eating (*Intake*) (e.g., I think whether I am hungry or not before taking tests) and sought *assistance* during tests. They also reported checking stationary and test papers and expressed their bodily concerns during the test.

Seeking *assistance* was reported as the most frequently used strategy by Chinese tenth graders during test preparation as well as testing. This may be attributed to parents' and teachers' support that they have been receiving in the past and other school factors related to tests (e.g., test preparation sessions led by older students). Chinese students received more help from their parents compared to students from other countries (Chen, 2001; Chen & Stevenson, 1989; Gu, 1997; Stevenson & Lee, 1990). Chinese teachers, as compared to American counterparts, had shown more concerns and felt more responsible for their students. That is, Chinese teachers think that it is their responsibility to help children understand what was presented in class and spend extra time to help students without extra pay (Gu, 1997). It is possible that the learning environment they have experienced might have helped students feel free to seek assistance while studying for tests and during tests.

Differences in Test Preparation Strategies Among High, Medium, and Low Achievement Groups

Cognitive/Metacognitive Strategies

Cognitive and metacognitive strategies did not distinguish the three achievement groups in both Chinese language and mathematics. These findings from Chinese tenth graders do not replicate those of other previous studies in the U.S. Studies with U.S. students have shown that successful learners were more likely to use cognitive and metacognitive strategies (e.g., Gadzella & Baloglu, 2003; Pintrich & DeGroot, 1990; Pressley, 1986; Zimmerman & Martinez-Pons, 1986). However, a study conducted with Chinese students in Hong Kong found no relationship between achievement and cognitive and metacognitive strategies (Rao, Moely, & Sachs, 2000). It is possible that the examination driven education system in China might prompt all students, regardless of ability, to regulate their cognitive activities. However, it was the motivation level (i.e., effort and persistence) that made differences in Chinese students, but not cognitive and metacognitive strategies they reported using. This discrepancy is a worthwhile topic for in-depth research using both qualitative and quantitative methodology.

Motivational Strategies/Emotional Awareness

Whereas group differences in cognitive and metacognitive strategies were not significant, there were statistically and substantially significant group differences in motivational/emotional strategies and awareness. In Chinese language and mathematics, medium and/or high achievers *valued* test preparation and expended *efforts* more than low achievers. High achievers reported having a

lower level of anxiety (both *worry* and *emotionality*) when preparing for tests, as compared to the other groups. In addition, high achievers in mathematics, as compared to low achievers, reported having more *confidence* and having been more *persistent* in test preparation.

In summary, low achievers' motivation levels were low and anxiety levels were high and vice versa. Most Chinese believe that success is largely determined by diligence. This belief may also lead low achievers to exert less effort in academic pursuits. Low achievers, in order to protect their self-esteem, attribute their current failure and/or future poor performance to low effort rather than low ability (Rao, Moely, & Sachs, 2000). Numerous studies with other cultures have also found similar results (Hong & O'Neil, 2001; Pokay & Blum, 1990). The Cassady and Johnson (2001) suggested that feelings aroused in situations where one is acutely concerned about his or her level of performance impacts that particular performance. Therefore, it would seem most likely that students who have tendency to worry would not be able to concentrate on preparing for tests. Various physical symptoms (e.g., insomnia or upset stomach) resulted from anxious emotionality would also interfere with students while preparing for tests.

Environmental Management Strategies

High-, medium-, and low-achievers did not differ in formal or informal sitting arrangement (*design*), studying with peers or alone (*alone/peer*), frequency of *assistance* seeking, and having a specific *place* to study or not. Chinese students spend a large amount of time studying at school or at home. The learning environment are managed by adults—teachers and parents—leaving little room

for students' choice for environmental management. For example, after regular school hours, Chinese students are still required to stay in the classroom for various schoolwork led by their homeroom teachers, working either individually or in groups (Chen & Stevenson, 1989; Hess, Chang, & McDevitt, 1987).

However, low-achieving students in Chinese language had a tendency to cram before the test (*time management*), indicating that cramming may not be helpful for test performance in Chinese language. On the other hand, low math achievers reported having a tendency to study with *background noise* (e.g., music) and also to eat (*intake*) when they study for the test. Cramming is in general found to be ineffective test-preparation strategy (Annis, 1986; Tigner, 1999). In previous studies (e.g., Hong & Lee, 2000; Plant, Ericsson, Hill, & Asberg, 2005), high achievers in general preferred a quiet environment as compared to low achievers when studying. It is important to note that the findings are not consistent across the two subject matters. The current study did not gather data to further elaborate these discrepancies. Qualitative analyses of the relationship between subject matters and study behaviors would be an important research topic for future studies. Providing help for low achievers to establish a study plan and to manage their study time efficiently may help them prepare for tests more effectively.

Difference in Test Taking Strategies Among High, Medium, and Low Achievement Groups

Cognitive/Metacognitive Strategies

Group differences were found in two cognitive strategies but not in

metacognitive strategies. High and medium achievers in Chinese language reported employing *cue using* and *understanding* strategies more often than did low achievers. In test preparation, group differences were not found in any cognitive or metacognitive strategies in the current sample. It is likely that test-taking circumstances bring out different cognitive behaviors in students. It might be beneficial that low achievers learn to utilize cues in test items and focus on understanding items to perform well on tests.

Group differences were not found in metacognitive strategies. Previous research on metacognitive strategies during tests has shown conflicting results. Whereas some studies have shown a positive relationship between test performance and metacognitive strategies used during tests (e.g., Phakiti, 2003), a large number of studies did not find any relationship (Purpura, 1997; Schraw, 1997). Instructions that combined both cognitive and metacognitive strategies might enhance test performance (O'Malley, 1987; Wenden, 1987). An intervention study with such training would be helpful to further understand the phenomenon.

Test Tactics

High-, medium-, and low-achieving students did not differ in *anticipating* answers, *guessing*, *avoiding errors*, *using hints*, *assessing* items difficulties, and *sequencing* easy to difficult items. Findings were consistent in both subject matters. Previous research (e.g., Lo & Slakter, 1973; Wu & Slakter, 1978) indicated that even though Chinese students in Taiwan used similar test-taking strategies as American students (e.g., *guessing*), Chinese students' overall test-wiseness scores were lower than American students. Wu and Slakter (1978)

also found that older Chinese students, as compared to younger students, exhibited more test-wiseness because older students had more test experiences. More studies are desired to understand the lack of differences in these test tactics found within tenth-grade among different levels of achievers.

However, group differences were significant in other test-tactics. Low achievers in Chinese language achievement group did not use often test tactics such as *eliminating*, *time-using*, and *marking,* as compared to high and medium achievers. Nevertheless, the same strategies did not distinguish three achievement groups in mathematics. It might be that for mathematics, *eliminating* or *marking* did not make differences due to the test format. Unlike Chinese language tests, multiple-choice questions in mathematics tests in China require students to apply knowledge and calculate the exact answers. Students who cannot solve the problem cannot guess which options to eliminate. In such mathematics tests, *eliminating* may not be a useful strategy to use.

Test-wiseness includes strategies independent of the test-taker's knowledge of the subject matter (Millman et al., 1965). Studies have indicated that teaching and training students test-wiseness and test-taking strategies is effective for improving students' academic achievement (Chittooran & Miles, 2001; Kenny & Faunce, 2004; Scruggs & Mastropieri, 1986; Slaketer, Koehler & Hampton; 1970). Thus, it may be helpful to provide such instructions to students, especially low achievers, to improve their test performance.

Emotional/Motivational Strategies and Awareness

Except for emotionality, the findings were consistent in Chinese language and

mathematics. High achievers had more confidence, expended more effort, and had less worry anxiety. Whereas low achievers in Chinese language showed high emotionality while taking tests, no group differences were found in mathematics. The inconsistent pattern was also detected in previous studies. Whereas worry is negatively related to test performance (e.g., Hong, 1998; Kim & Rocklin, 1994; Morris, 1978; Sapp, 1995), the relationship between emotionality and test performance is not well established (e.g., Kim & Rocklin, 1994). Studies indicated that emotionality may have no relationship, weak relationship (Williams, 1996) or even positive relationship with academic performance (e.g., Kim & Rocklin, 1994).

High-, medium-, and low-achievers did not differ in *task value* and *persistence*. That is, all students valued testing and persisted during both Chinese language and mathematics tests. Even though low achievers indicated that they persisted in solving test items, they scored lower in *effort* as compared to the other groups. The *persistence* items (e.g., I keep working even on difficult items) were conceptually related highly with *effort* items (e.g., I work as hard as possible on my test items). Thus, this seemingly contradictory findings need to be further investigated.

When the findings from test-taking strategies were compared with those of test-preparation strategies, *task value* deserves further elaboration. Students in all achievement groups had similar *task value* about the test (e.g., "It is important for me to do well on my tests"). However, for the test-preparation situation, low achievers did not value test preparation as high as high achievers (e.g., "Studying for tests is important for me because I like to get high test scores"). Low achievers

might have low expectation about getting high test scores through studying hard for tests, thereby expending less effort, even though they still value the test.

Environmental Management Strategies

The group difference in *assistance* was found only among Chinese language achievement groups, indicating that high-achieving students sought *assistance* from teachers or examiners more often than did low-achieving students during tests. However, in both subject matters, students did not differ in *intake* and sitting *design*. This may be because most students may perceive that they do not have much control over the testing environment. For most final examinations in Chinese schools, examination rooms are already designated and students enter the room 10 to 20 minutes before the test. Students then sit at a desk assigned to them. Although in classroom tests, they have some control over sitting options, students might have responded to the questionnaire items while thinking about the final examination. It is also likely that Chinese students, high and low achievers, are not concerned about the sitting or eating before and during the tests.

Conclusions

Several conclusions can be drawn based on the findings of this study. Scales and subscales in *TPSQ* and *TTSQ* gave a full picture of test strategies used by Chinese students in cognitive/metacognitive, motivational/emotional, and environmental management in test-preparation and test-taking. Students on the whole used the *memorization* strategy more frequently as compared to *solving* in

test-preparation. While taking tests, students used *cue using* and *understanding* strategies more frequently compared to *memory aid* and *repeating*. *Planning* and *strategy selection* were also used to some extent during test-preparation and test-taking, whereas *self-checking* strategies were not frequently used.

Overall, most cognitive strategies and metacognitive strategies did not distinguish the three achievement groups, although some strategies were used more by high achievers than low achievers. Some cognitive strategies that were found effective for U.S. students did not differentiate the achievement groups in Chinese students. Chinese students perceived that they used most of the cognitive/metacognitive strategies examined in this study, but they may not know how to apply these strategies properly. Thus, direct instruction on strategies use for test preparation and test taking would help Chinese students identify relevant test strategies and use them with an intention to improve their test performance. Although cultural differences may account for some aspects of these differences in the use of cognitive/metacognitive strategies, further studies with interventions will shed more light on the achievement-strategy relationship in Chinese students.

Interestingly, most test tactics were not significantly different in three achievement groups except *eliminating*, *time management*, *and marking*. In light of a previous study that found a significantly low test-wiseness scores in Chinese students as compared to American students, providing test-wiseness instructions to Chinese students might be a good step to take. Proper uses of test tactics might be helpful for reducing error variances in test scores as well as for improving test performance in Chinese students, where test scores are important

for advancement in schooling.

Chinese students expended *effort* for preparing for the test and *valued* tests. However, their *confidence* levels were low as found in other cross-culture studies. Studies on confidence or self-efficacy have indicated its positive relationship to learning and achievement. It would be interesting to see whether increasing confidence in Chinese students would make difference in achievement over and beyond the cultural phenomenon observed in studies including the current one. Low achievers, as compared to high achievers, had lower confidence and higher worry anxiety when preparing for tests and taking tests. It would be beneficial to provide instructions to reduce test anxiety and improve content knowledge and study skills, which would, in turn, improve confidence level in these students.

Chinese students, especially high achievers, sought help when they needed when preparing for tests or during tests. They also preferred to study without *background sound*. However, most environmental management strategies (e.g., *design*, *alone/peer*, *place*) did not distinguish the three achievement groups.

Participants' responses to open-ended questions revealed that Chinese students concern about reviewing subject-matter contents. They also provided various examples of strategy selection. Statements of motivational/emotional management and bodily concerns provided valuable information of how students regulated their emotion and physically prepared for the test. However, most of these strategies may or may not be culturally founded. Studies using students from other cultures are needed for proper comparisons.

The two questionnaires, *TPSQ* and *TTSQ*, are comprehensive, assessing

various aspects of test-related behaviors. Teachers and researchers not only can use them to assess students' test-preparation strategies and test-taking strategies, but also refer items for teaching their students' study strategies and test strategies.

Limitations of and Recommendations for the Current Study

First, students took about 40 minutes to complete the two questionnaires. Although it is difficult to obtain two class times for data collection, it is recommended that data be collected in two different periods. It was found that some students were not serious in completing questionnaires (e.g., a zigzag pattern found toward the end of the second questionnaire).

Second, only Chinese language and mathematics scores from a final exam were used to determine low-, medium-, and high-achievers. Although the findings were similar across the two subject matters in many instances, some differences were also found. Thus, studies using scores from other subject matters should be followed. In addition, within each subject matter, exam scores from various tests (e.g., midterms, final, and standardized tests) may be combined to assess the students achievement level more accurately.

Third, opened-ended questions at the end of each section should have a clear note regarding what specific areas (e.g., cognitive/metacognitive) the item is asking of students to respond. Although the questionnaires used in this study attached the open-ended questions at the bottom of each section (e.g., cognitive/metacognitive), students did not distinguish the categories/scales when

they answered the open-ended items, as many students wrote extra strategies in non-corresponding sections (e.g., extra environmental management strategies were written in the cognitive/metacognitive section).

Recommendations for Future Research

The following recommendations are provided for future studies investigating students' use of test-preparation strategies and test-taking strategies.

1. Intervention studies utilizing information from the current findings are recommended. The current study only examined student perceptions. Thus, to determine effective strategies for Chinese students, intervention studies would be beneficial.
2. Future studies may expand sampling to include a wide range of school populations with various achievement levels and student backgrounds (e.g., the province-wide key schools and non key high schools). Longitudinal studies would help understand the developmental changes or stability in test strategies.
3. Male or female students might use different strategies. An examination of gender differences would be valuable.
4. Cross-culture studies are needed to determine cultural differences among various ethnic groups.
5. Qualitative research studies may be conducted to obtain more in-depth and detailed information on test strategies and their relationship to learning and achievement to enrich knowledge base in this field.

APPENDIX I

LETTER TO PARTICIPATING TEACHERS IN CHINA (ENGLISH)

Dear teacher,

The purpose of this letter is to seek your cooperation in carrying out a research study. I am a Master's student at the University of Nevada, Las Vegas. I plan to conduct research to explore what strategies Chinese students use for test preparation and test taking. This study will also determine differences in strategy use between high and low test performers.

In this study, students will fill out two questionnaires: Test-Preparation Strategies Questionnaire (*TPSQ*) and Test-Taking Strategies Questionnaire (*TTSQ*). A cover page will be attached on top of the two questionnaires. It includes descriptions of the study and demographic items. After students answer the demographic questions (e.g., class number, grade, sex), students will respond to the questionnaire by identifying different types of test-preparation and test-taking strategies which they may use in test preparation and test taking.

We are seeking your help in distributing and collecting questionnaires and providing directions to students. We would appreciate it if you encourage students to answer the questionnaires candidly. The entire data collection will last about 40 minutes. The following lists the procedure for the data collection:

1. Describe the purpose of the study.
2. Distribute the cover page and questionnaires to students.
3. Read the direction typed on the questionnaires. Stress that students answer all items and not spend too much time on individual items.
4. Monitor students as they fill out the questionnaires.
5. Collect the completed cover page and questionnaires.

Students' scores in their Chinese and Mathematic final examinations are also needed for the study. Please contact education administrator and teachers to

access students' final exam scores in Chinese and Mathematics in July and email them to me. (I will have to return to the U.S. before July due to my travel Visa issue.)

The data collection will begin in late May though early June when I will be in Guangzhou. The information you and your students provide will be confidential. School and student names will not be part of the report. Questionnaires will be accessed only by the researcher.

If you have any questions, please call me at (206) 778-3372 or send email to pengy@unlv.nevada.edu. Thank you very much for your consideration.

Sincerely,

Yun Peng, Master's student
University of Nevada, Las Vegas

Eunsook Hong, Professor,
University of Nevada, Las Vegas

APPENDIX II

LETTER TO PARTICIPATING TEACHERS IN CHINA (CHINESE)

敬爱的教师：

您好！ 此信的目的是请求您在一个研究项目中给予协助。我是内华达拉斯韦加斯大学的硕士研究生。我正准备进行一项有关中国学生在备考和考试中运用备考策略和考试策略的研究，并找出低分学生和高分学生在运用这些策略时的差异。

研究中，学生将会填写两份问卷：备考策略调查问卷（*TPSQ*）和考试策略调查问卷（*TTSQ*）。一张问卷封面将附在两份问卷之上。问卷封面包括研究主题的描述和学生个人信息项目。当学生完成个人信息的问题（例如：年级、班别、性别），学生将会通过识别他们在备考和考试中可能运用到的不同类型的备考策略和考试策略来回答问卷的问题。

我们请您帮助我们分发和收集问卷，并向学生提供问卷的填答说明。我们将非常感谢如果您鼓励学生坦诚地回答问卷。问卷数据收集的全过程将需要 40 分钟。以下列出收集问卷的步骤：

1. 描述此研究的目的。
2. 给学生分发问卷封面和问卷。
3. 给学生宣读印在问卷中的填答说明。请向学生强调他们需要完成问卷中所有的问题， 以及不要在个别问题上花过多的时间。
4. 监督学生填写问卷。
5. 收集已完成的问卷封面和问卷。

此项研究同时需要学生的语文和数学期末考试成绩。请在七月份与教务员或科任教师联系，获取学生的语文和数学期末考试成绩，并把它们用电子邮件发给我(由于签证签发的日期，我必须在七月前回到美国)。

此项研究将会在五月和六月份进行。届时，我将会在广州。您和您学生提供的信息将会是保密的。学校和学生的姓名将不会列入研究分析和报告中。 调查问卷将只会由研究者经手。

如果你有任何问题， 请打电话致（206）778-3372 或发电子信函到 pengy@unlv.nevada.edu . 非常感谢您的支持！

此致，
敬礼！

硕士研究生：彭云
内华达大学拉斯韦加斯分校

教授：Eunsook Hong
内华达大学拉斯韦加斯分校

APPENDIX III

COVER PAGE OF QUESTIONNAIRES (English)

Dear Student,

The two questionnaires that follow are about how students prepare for their tests (Test Preparation Strategy Questionnaire) and strategies students use during the test (Test Taking Strategy Questionnaire).

In these questionnaires you are asked to report how you study for tests and how you actually take tests. There are no right and wrong answers to these questions.

Your participation in this study will help us understand strategies Chinese students use for test preparation and test taking. Your answers to these questions will not be analyzed individually but only as part of the group.

Thank you very much for your cooperation.

Please fill in the following items:

School name:
Grade:
Class:
Your ID number:
Your name:
Sex (check): ( ) Boy
( ) Girl

☞ Go to next page

APPENDIX III

COVER PAGE OF QUESTIONNAIRES

Dear Student,

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In these questionnaires you are asked to report how you study for tests and how you actually take tests. There are no right and wrong answers to these questions.

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Thank you very much for your cooperation.

Please fill in the following items:

School name:
Grade:
Class:
Your ID number:
Your name:
Sex (check): ( ) Boy
( ) Girl

☞ Go to next page

APPENDIX IV

COVER PAGE OF QUESTIONNAIRE (Chinese)

亲爱的同学：

以下两份调查问卷内容是有关学生如何准备考试（备考策略调查问卷）和如何在考试中运用策略的（考试策略调查问卷）。

在这些调查问卷中，请你提交你是如何准备考试和参加考试的。问卷中没有正确或错误的答案。

你的参与将会帮助我们了解中学生的备考策略和考试策略。你的回答只会被作为群体分析中的一部分，而不会被作为单独分析。

非常感谢你的合作！

请填写以下项目：

学校名称：_____

年级：_____

班级：_____

学号：_____

姓名：_____

性别（打钩）：　（　）男生
　　（　）女生

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APPENDIX V

TEST PREPARATION STRATEGY QUESTIONNAIRE (ENGLISH)

*Test Preparation Strategy Questionnaire (TPSQ, 2004)**

Directions: A number of statements which people have used to describe themselves are given below. Read each statement and indicate how you generally think or feel by circling 1, 2, 3, or 4. **Think of situations in which you have prepared for tests**. There are no right or wrong answers. Do not spend too much time on any one statement. (1 = Almost never, 2 = Sometimes, 3 = Often, 4 = Almost always)

	Almost never	Sometimes	Often	Almost always
1. When I study for tests, I review notes	1	2	3	4
2. I write down important information when I study for tests	1	2	3	4
3. I solve problems from previous examples, practices, or homework that might appear in the test	1	2	3	4
4. I repeatedly read study the material until I am satisfied	1	2	3	4
5. I memorize facts, definitions, formulas, or rules when preparing for tests	1	2	3	4
6. When I prepare for tests, I make sure I understand concepts	1	2	3	4
7. I determine what to study before I begin	1	2	3	4
8. I check whether I know the material while I am studying for tests by asking myself or having others quiz me	1	2	3	4
9. Depending on the material I need to study (e.g., concepts, facts, formulas, or computations), I have different study approaches to test-preparation	1	2	3	4
10. I review book chapters, when I prepare for tests	1	2	3	4
11. I summarize what I heard in class or read in textbooks when I study for tests	1	2	3	4
12. I make up and solve problems that might appear in the test	1	2	3	4
13. I practice or rework many times until I think I am ready for the test	1	2	3	4
14. I focus on memorizing the material when I study for tests	1	2	3	4
15. I focus on understanding the material when I study for tests	1	2	3	4
16. I try to understand the goal of the test before I attempt to study	1	2	3	4
17. I keep track of my progress while I am studying for	1	2	3	4

	Almost never	Sometimes	Often	Almost always
18. To understand the material, I draw graphs, maps, charts, diagrams, or tables	1	2	3	4
19. I think through the steps for studying in my mind before I begin to study	1	2	3	4
20. As I work on test preparation, I ask myself questions to stay on track	1	2	3	4
21. I have my own, special, strategy for understanding concepts	1	2	3	4
22. When I study for tests, I review homework I did a while ago	1	2	3	4
23. I take notes while studying for tests	1	2	3	4
24. When I study for tests, I solve items in quizzes and tests that I took in the past	1	2	3	4
25. I recite the material over and over	1	2	3	4
26. I make sure I memorize the material	1	2	3	4
27. I try to explain to myself (or to peers) the meaning of the information I am studying	1	2	3	4
28. I ask myself questions about what the test would require me to do	1	2	3	4
29. While studying, I know how much the material I have left to complete test preparation	1	2	3	4
30. When memorization of facts or definitions is required, I make them meaningful to me first before I memorize them	1	2	3	4
31. I develop a plan for what and how to study for test before I begin	1	2	3	4
32. As I study, I judge whether I am learning the material for tests	1	2	3	4
33. When I need to memorize the material, I use memory aids such as tables, charts or flash cards	1	2	3	4
34. When I study for tests, I review practice tests	1	2	3	4
35. While reviewing the material for the test, I take detailed notes on concepts, formulas, or other important information	1	2	3	4
36. I solve problems from book chapters as part of test preparation	1	2	3	4
37. I review the material again and again until I feel ready for the test	1	2	3	4
38. I concentrate on memorizing information for tests	1	2	3	4

	Almost never	Sometimes	Often	Almost always
39. I analyze material from different viewpoints.....	1	2	3	4
40. I start reading or memorizing when I study for tests, without thinking about different ways to study.....	1	2	3	4
41. I ask myself, how well I am doing, as I proceed through test preparation.....	1	2	3	4
42. I have my own, special, strategy for memorizing facts.....	1	2	3	4

43. What else do you do when you study for tests? If you engage in certain study activities that are not described in this questionnaire, please write in the space below.

Directions: Read each statement and indicate how you generally think or feel by circling 1, 2, 3, or 4. **Think of situations in which you have prepared for tests**. There are no right or wrong answers. Do not spend too much time on any one statement. (1 = Almost never, 2 = Sometimes, 3 = Often, 4 = Almost always)

	Almost never	Sometimes	Often	Almost always
1. When I prepare for a test, I feel confident for the upcoming test because I study for it.....	1	2	3	4
2. I work as hard as possible on my test preparation.....	1	2	3	4
3. While I am preparing for tests, I think about failing tests and I lose my concentration.....	1	2	3	4
4. It is important for me to learn the material so that I do well on my tests.....	1	2	3	4
5. I keep studying even on difficult material.....	1	2	3	4
6. When I prepare for tests, I feel very panicky thinking about the test.....	1	2	3	4
7. For most of test preparations, I am confident that I will study well as I planned.....	1	2	3	4
8. I don't study hard for tests because I just hope to get by.....	1	2	3	4
9. When I study for tests, I think about how important it is to get good test scores.....	1	2	3	4
10. I think studying for test is a useful way for me to learn.....	1	2	3	4

	Almost never	Sometimes	Often	Almost always
11. I don't give up even if the material is difficult.....	1	2	3	4
12. Thinking about the test, I get very tense during test preparation.....	1	2	3	4
13. I am confident that I use good test-preparation strategies.....	1	2	3	4
14. I put forth my best effort on test preparation.....	1	2	3	4
15. Studying for tests is important for me because I like to get high test scores.....	1	2	3	4
16. For most tests in the past, I have prepared well for the tests.	1	2	3	4
17. I work hard to do well even if I don't like to prepare for tests.....	1	2	3	4
18. Thinking about test taking interferes with my study for tests..	1	2	3	4
19. I study hard for tests because doing well on tests is important to me.....	1	2	3	4
20. When something that I am studying gets difficult, I spend extra time trying to understand it.....	1	2	3	4
21. While studying for tests, I have an uneasy, upset feeling by just the thought of taking the test.....	1	2	3	4
22. Before I take tests, I feel that I needed more time for test preparation or I should have studied more for the test.....	1	2	3	4
23. I concentrate fully when preparing for tests.....	1	2	3	4
24. I don't study for tests because I don't care how I do on tests.....	1	2	3	4
25. During I prepare for tests, I find myself thinking about the consequences of failing.....	1	2	3	4
26. I try to learn all the material that might be on the test, even if it is difficult or boring.....	1	2	3	4
27. I feel very edgy when preparing for tests.....	1	2	3	4
28. I am not good at test-preparation.....	1	2	3	4
29. When I study for tests, I go over the material as many times as I can to get higher test scores.....	1	2	3	4
30. I don't study for tests because doing well on tests is of little interest to me.....	1	2	3	4

31. What else do you think or do when you study for tests? If you think or do things that are not described in this questionnaire, please in the space below.

Directions: Read each statement and indicate how you generally think or feel by circling 1, 2, 3, or 4. **Think of situations in which you have prepared for tests**. There are no right or wrong answers. Do not spend too much time on any one statement. (1 = Almost never, 2 = Sometimes, 3 = Often, 4 = Almost always)

	Almost never	Sometimes	Often	Almost always
1. I tend to study lying on the floor when I am preparing for tests	1	2	3	4
2. I like to study in a group for test preparation	1	2	3	4
3. I like some background music or certain sound when I study for tests	1	2	3	4
4. I like to eat when I study for tests	1	2	3	4
5. I make sure to take a break from time to time when I study for tests	1	2	3	4
6. When I am not sure whether I know the material, I ask my peers or teacher	1	2	3	4
7. I can study in any place for test preparation	1	2	3	4
8. When I study for tests, I like to study at the desk	1	2	3	4
9. I prefer to study alone when preparing for tests	1	2	3	4
10. I seek a quite area for studying for tests	1	2	3	4
11. I don't think about eating or about feeling hungry during test preparation	1	2	3	4
12. I choose when I want to study for important tests (e.g., morning, afternoon, or evening)	1	2	3	4
13. I ask my peers or teacher when I have a question	1	2	3	4
14. I like to use the same place when I study for tests	1	2	3	4
15. I make sure that my body feels comfortable before I begin to study for tests	1	2	3	4
16. If I have a choice, I would study with my friends rather than studying alone	1	2	3	4
17. Background noise such as music, TV, or people talking bothers me	1	2	3	4
18. Before I study for tests, I make sure that I am not hungry or too full	1	2	3	4
19. I tend to cram because I study the night before the test	1	2	3	4
20. I ask my parents or siblings when the material is difficult	1	2	3	4
21. I like to study in different places, rather than in the same place, for test preparation	1	2	3	4
22. I like to use sofa or bed when studying for tests instead of desk and chair	1	2	3	4

	Almost never	Sometimes	Often	Almost always
23. If I had to choose, I would choose to study alone instead of studying with friends	1	2	3	4
24. I prefer to study while music is playing	1	2	3	4
25. Before I study for tests, I feel that I am hungry or that I need to eat something	1	2	3	4
26. I study in small blocks of time when there are a lot of material to study	1	2	3	4
27. When I have a question, I ask someone who might know the material	1	2	3	4
28. I have a specific place to do my test preparation	1	2	3	4

29. What else do you do when you study for tests? If you engage in certain study activities that are not described in this questionnaire, please write in the space below.

Thank you very much for your cooperation!

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* The *Test Preparation Strategy Questionnaire* was translated into Chinese by Yun Peng.

APPENDIX VI

TEST PREPARATION STRATEGY QUESTIONNAIRE (CHINESE)

*Test Preparation Strategy Questionnaire (TPSQ, 2004) -- Chinese Version**

备考策略调查问卷（*TPSQ*, 2004)*

填答说明：以下题目是学生对自己情况的陈述。阅读每一道题目，**回想你备考的实际情况，**根据你通常的想法和感受选择 1，2，3 或 4。问卷没有正确或不正确的答案。不要在任何一道题目中花过长的时间。（1 =几乎从未如此，2 = 有时如此， 3 =经常如此， 4 =几乎总是如此）

	几乎从未如此	有时如此	经常如此	几乎总是如此
1. 在备考复习的时候，我复习笔记。	1	2	3	4
2. 在备考复习的时候，我把重要的信息写下来。	1	2	3	4
3. 我解决可能在考试中出现的以前的作业题、例题、和练习题。	1	2	3	4
4. 我反复阅读学习资料，直到自己满意为止。	1	2	3	4
5. 在备考复习的时候，我记忆事实、定义、公式、或定律。	1	2	3	4
6. 备考复习的时候，我确信自己理解概念。	1	2	3	4
7. 我在开始复习之前，已安排好复习的内容。	1	2	3	4
8. 我给自己提问题或让其他人给我提问题，来检查自己是否掌握学习内容。	1	2	3	4
9. 对于不同的学习内容（例如：概念、事实、公式、或计算），我有不同的学习方法来复习备考。	1	2	3	4
10. 在备考复习的时候，我复习课本的章节。	1	2	3	4
11. 在备考复习的时候，我总结课堂上所听到的和课本上所阅读到的内容。	1	2	3	4
12. 我会自编在考试中可能会出现的题目，并给予解答。	1	2	3	4
13. 我练习或重做多次，直到自己觉得已准备好应付考试。	1	2	3	4
14. 在备考复习的时候，我着重记忆学习内容。	1	2	3	4
15. 在备考复习的时候，我着重理解学习内容。	1	2	3	4
16. 我先试图明白考试的目标，然后才开始学习。	1	2	3	4
17. 在备考复习的时候，我检查自己的复习进度。	1	2	3	4
18. 我会画图解、表格、关系图来帮助理解学习内容。	1	2	3	4
19. 开始复习之前，我在脑海里计划好复习的步骤。	1	2	3	4
20. 在备考复习的过程当中，我问自己问题以检查复习状况。	1	2	3	4
21. 我有自己独特的学习方法去理解概念。	1	2	3	4
22. 备考复习的时候，我复习不久前做过的作业。	1	2	3	4
23. 我在备考复习的时候会记笔记。	1	2	3	4

	几乎从未如此	有时如此	经常如此	几乎总是如此
24. 备考复习的时候，我解答以前小测和考试当中的题目。	1	2	3	4
25. 我反复背诵复习资料。	1	2	3	4
26. 我确认自己记得复习资料。	1	2	3	4
27. 我试图把学习内容的含义解释给自己(或同学)听。	1	2	3	4
28. 我会问自己考试将需要我做些什么	1	2	3	4
29. 正在复习的时候，我总会知道还需要复习多少内容才完成考试复习的任务。	1	2	3	4
30. 当需要记忆事实和定义的时候，我先使它们成为有意义的信息，然后再记忆。	1	2	3	4
31. 在备考复习之前，我会制定考试计划来指导我将复习什么和如何复习。	1	2	3	4
32. 当正在复习的时候，我会判断自己是否在理解考试的内容。	1	2	3	4
33. 当需要记忆的时候，我运用表格、图表、或小卡片等辅助记忆的方法。	1	2	3	4
34. 在备考复习的时候，我复习模拟试题。	1	2	3	4
35. 当复习备考资料的时候，我对概念、公式、或其它重要的信息做详细的笔记。	1	2	3	4
36. 解决课本的题目是我备考复习中的一部分。	1	2	3	4
37. 我一遍又一遍地复习考试内容，直到我觉得已准备好应付考试。	1	2	3	4
38. 对于考试，我着重于记忆知识。	1	2	3	4
39. 我从不同的角度去分析学习内容。	1	2	3	4
40. 当我备考复习的时候，我开始阅读和记忆复习资料，而没有思考如何去学习。	1	2	3	4
41. 在备考复习过程当中，我会问自己表现如何。	1	2	3	4
42. 我有自己的独特的方法去记忆事例。	1	2	3	4

43. 你在备考复习当中还做了些什么？如果你还有其它问卷中没有描述到的学习行为，请把它们写在以下空白处。

填答说明：阅读每一道题目，**回想你备考的实际情况**，根据你通常的想法和感受选择 1，2，3 或 4。问卷没有正确或不正确的答案。不要在任何一道题目中花过长的时间。（1 =几乎从未如此，2 = 有时如此， 3 =经常如此， 4 =几乎总是如此）

	几乎从未如此	有时如此	经常如此	几乎总是如此
1. 在备考的时候，我对即将来临的考试有信心，因为我复习准备过这次考试。	1	2	3	4
2. 我尽可能努力地去备考。	1	2	3	4
3. 在准备考试的时候，我想到考试不及格而且注意力不集中。	1	2	3	4
4. 掌握知识内容对于我来说是重要的，所以我在考试中做得好。	1	2	3	4
5. 即使遇到难的内容，我仍坚持学习。	1	2	3	4
6. 当我准备考试的时候，我对考试感到非常恐慌。	1	2	3	4
7. 对于大多数的考试复习，我有信心将复习计划落实好。	1	2	3	4
8. 因为我只希望通过考试，所以我没有努力为考试复习。	1	2	3	4
9. 当备考复习的时候，我会想到取得好成绩是多么重要。	1	2	3	4
10. 我认为对于我来说，考试是学习的一个有用的途径。	1	2	3	4
11. 尽管学习的内容难，但我不会放弃。	1	2	3	4
12. 想到考试，我复习时就感到紧张。	1	2	3	4
13. 我确信我在运用有效的备考策略。	1	2	3	4
14. 我尽最大的努力准备考试。	1	2	3	4
15. 备考复习对于我来说是重要的，因为我喜欢取得高分。	1	2	3	4
16. 对于以前大多数考试来说，我准备得很好。	1	2	3	4
17. 尽管我不喜欢为考试而复习，但我仍努力去做好。	1	2	3	4
18. 想到参加考试的情形就会影响我的考试复习。	1	2	3	4
19. 我很努力地为考试复习，因为在考试中发挥好对于我来说是重要的。	1	2	3	4
20. 当学习遇到困难的时候，我额外多花时间去弄明白它。	1	2	3	4
21. 当备考复习的时候，想到要参加考试，我会感到心神不安和烦恼。	1	2	3	4
22. 在参加考试之前，我感到自己还需要更多的时间去准备考试或应该为考试投入更多的学习。	1	2	3	4
23. 我备考的时候，全神贯注。	1	2	3	4
24. 因为我不在乎在考试中发挥如何，所以我没有为考试复习。	1	2	3	4
25. 在准备考试的过程中，我觉得自己会想到考试不及格的后果。	1	2	3	4
26. 我试图学习所有将可能出现在考试当中的内容，尽管它们很难或是沉闷的。	1	2	3	4
27. 当备考的时候，我感到紧张。	1	2	3	4
28. 我不擅长如何备考。	1	2	3	4

	几乎从未如此	有时如此	经常如此	几乎总是如此
29. 在备考复习的时候，我把复习资料尽可能地看完一遍又一遍，以取得高分。	1	2	3	4
30. 我考试不复习，因为考试考得好对于我来说没有什么。	1	2	3	4

31。当你备考复习的时候，你还有其它的想法和做法么？如果你的想法和做法没有在本问卷中描述，请把它们写在以下空白处。

填答说明：阅读每一道题目，**回想你备考的实际情况**，根据你通常的想法和感受选择 1，2，3 或 4。问卷没有正确或不正确的答案。不要在任何一道题目中花过长的时间。（1 =几乎从未如此，2 = 有时如此， 3 =经常如此， 4 =几乎总是如此）

	几乎从未如此	有时如此	经常如此	几乎总是如此
1. 在备考复习的时候，我往往躺在地上学习。	1	2	3	4
2. 我喜欢小组学习来进行备考复习。	1	2	3	4
3. 在备考复习的时候，我喜欢听一些背景音乐或某些声音。	1	2	3	4
4. 在备考复习的时候，我喜欢吃东西。	1	2	3	4
5. 在备考复习的时候，我确保做到不定期地休息。	1	2	3	4
6. 当我不确定自己是否懂得学习内容的时候，我会问同学或老师。	1	2	3	4
7. 我能在任何地方学习来准备考试。	1	2	3	4
8. 在备考复习的时候，我喜欢在书桌上学习。	1	2	3	4
9. 在备考复习的时候，我喜欢单独学习。	1	2	3	4
10. 我找安静的地方备考复习。	1	2	3	4
11. 在备考复习的时候，我不会想到吃东西和感到饥饿。	1	2	3	4
12. 我为重要的考试选择复习的时间 (例如：早上，中午，或晚上) 。	1	2	3	4
13. 我有问题的时候，我会问同学和老师。	1	2	3	4
14. 在备考复习的时候，我喜欢在同一个地方学习。	1	2	3	4
15. 在开始进行备考复习的时候，我确保我的身体感到舒适。	1	2	3	4

	几乎从未如此	有时如此	经常如此	几乎总是如此
16. 如果必须选择，我将选择和同学们一起学习，而不是自己一个人学习。	1	2	3	4
17. 背景声音，例如音乐声，电视声，或人们谈话的声音会影响我复习。	1	2	3	4
18. 在备考复习之前，我确保自己不会太饿或太饱。	1	2	3	4
19. 我往往显得仓促，因为我在考试前一天晚上才开始复习。	1	2	3	4
20. 当复习内容困难的时候，我会问我的父母或兄弟姐妹。	1	2	3	4
21. 为准备考试，我喜欢在不同的地方，而不是在同一个地方学习。	1	2	3	4
22. 我往往喜欢在沙发或床上学习，而不是在书桌和椅子上学习。	1	2	3	4
23. 如果我必须选择，我将选择自己一个人学习，而不是和同学们一起学习。	1	2	3	4
24. 我喜欢在音乐声中学习。	1	2	3	4
25. 在备考复习之前，我感到饥饿或需要吃东西。	1	2	3	4
26. 有很多内容需要复习的时候，我把时间分成多个时间段来复习。	1	2	3	4
27. 如果我有问题，我会问懂得这个学习内容的人。	1	2	3	4
28. 我有特定的地点进行备考复习。	1	2	3	4

29. 你在备考复习当中还做了些什么？如果你还有其它问卷中没有描述到的学习行为，请把它们写在以下空白处。

感谢您的合作！

* 中文版本--备考策略调查问卷由彭云女士翻译。

APPENDIX VII

TEST TAKING STRATEGY QUESTIONNAIRE (ENGLISH)

*Test Taking Strategy Questionnaire (TTSQ, 2004)**

Directions: A number of statements which people have used to describe themselves are given below. Read each statement and indicate how you generally think or feel by circling 1, 2, 3, or 4. **Think of situations in which you have taken tests**. There are no right or wrong answers. Do not spend too much time on any one statement. (1 = Almost never, 2 = Sometimes, 3 = Often, 4 = Almost always)

	Almost never	Sometimes	Often	Almost always
1. I draw tables or figures as soon as I receive the test so I don't forget what I memorized	1	2	3	4
2. I repeat reading questions	1	2	3	4
3. I underline key words in the test items	1	2	3	4
4. I try to understand just what the test question is asking	1	2	3	4
5. I determine how to solve a test item before I begin	1	2	3	4
6. I keep track of my progress during the test	1	2	3	4
7. Depending on test items (e.g., concepts, facts, formulas, or computations), I have different approaches to solving problems	1	2	3	4
8. I draw graphs, charts, diagrams, tables, or concept maps to understand test items	1	2	3	4
9. I write down on the test facts, definitions, or formulas I memorized	1	2	3	4
10. I redo the questions until I am satisfied	1	2	3	4
11. I pay attention to the key terms in the questions by marking or underlining	1	2	3	4
12. I read and understand the question before answering	1	2	3	4
13. I try to understand the goal of a problem before I attempt to answer	1	2	3	4
14. As I work on test items, I ask myself questions to stay on track	1	2	3	4
15. I have my own, special, strategy for solving conceptual problems	1	2	3	4
16. I try to remember the material that I studied by trying to imagine where they were	1	2	3	4
17. I recheck questions to see if I understood	1	2	3	4
18. I underline key terms and clue words in the question	1	2	3	4
19. I read the questions carefully to understand the meaning of the question	1	2	3	4

	Almost never	Sometimes	Often	Almost always
20. I use memory aids such as tables or figures in my head or on the test sheet	1	2	3	4
21. I ask myself questions about what a problem requires me to do before I do it	1	2	3	4
22. I ask myself, how well I am doing, as I proceed through the test	1	2	3	4
23. I have my own, special, strategy for solving test items on facts and definitions	1	2	3	4
24. I recite silently what I memorized	1	2	3	4
25. I read the questions and my answers over and over until I am satisfied	1	2	3	4
26. I watch for clue words such as all, every, nothing, always	1	2	3	4
27. During test, I ask myself how this test item relates to what I already know	1	2	3	4
28. I develop a plan for the solution of a problem before I begin	1	2	3	4
29. I check whether I followed correct reasoning or steps to answer the question	1	2	3	4
30. I do not have a strategy for test-taking; I just start reading items and answer them	1	2	3	4

31. What else do you do when you take a test? If you use certain strategies or do things that are not described in this questionnaire, please write in the space below.

Directions: Read each statement and indicate how you generally think or feel by circling 1, 2, 3, or 4. **Think of situations in which you have taken tests**. There are no right or wrong answers. Do not spend too much time on any one statement. (1 = Almost never, 2 = Sometimes, 3 = Often, 4 = Almost always)

	Almost never	Sometimes	Often	Almost always
1. I examine carefully all alternatives before attempting to choose the correct answer	1	2	3	4
2. I anticipate the answer after I read the question, then look for the answer	1	2	3	4
3. I guess if there is no penalty for answering wrong	1	2	3	4
4. I read the instructions carefully	1	2	3	4
5. I pay attention to items that give away an answer to another question in a later part of the test	1	2	3	4
6. I work as rapidly as possible with reasonable assurance of accuracy	1	2	3	4
7. First, I count how many questions there are and then measure time for each item	1	2	3	4
8. I mark omitted items or items which could use further consideration	1	2	3	4
9. I answer easy questions first and then work on difficult questions	1	2	3	4
10. I rule out choices that contradict the question	1	2	3	4
11. I try to think of an answer before reading the choices	1	2	3	4
12. I guess whenever elimination of options provides sufficient chance of profiting	1	2	3	4
13. I keep the directions in mind when answering the test items	1	2	3	4
14. I use Information obtained from other questions and options	1	2	3	4
15. I use time remaining after completion of the test to reconsider answers	1	2	3	4
16. I look through questions first to determine which items are easy and which are difficult	1	2	3	4
17. I mark questions I am not sure of to go back to review them when I am finished	1	2	3	4
18. I answer difficult questions first and then work on easy questions	1	2	3	4
19. I eliminate answer choices known to be incorrect and choose from among the remaining options	1	2	3	4

	Almost never	Sometimes	Often	Almost always
20. I use scrap paper or space in the test to figure out answers before looking at the answer choices.....	1	2	3	4
21. I guess especially if one or more of the wrong alternatives can be identified.....	1	2	3	4
22. I check the questions with phrases that make the question negative, such as "not," "except," or "false.".....	1	2	3	4
23. Questions from other sections or parts of the test help me answer the items that I don't know	1	2	3	4
24. I pay attention to how much time is left so I can finish in the allotted time.....	1	2	3	4
25. When I receive the test, I look through questions to assess roughly how long it would take to complete the test.....	1	2	3	4
26. I mark any items I wish to check over at the end of the testing time.....	1	2	3	4
27. I just start the test from the first item, finish the test, and then go back to first item if there is still time.....	1	2	3	4
28. I eliminate obvious incorrect answers first before attempting to choose the correct answer.....	1	2	3	4
29. I think of an answer before I find the answer among the alternatives.....	1	2	3	4
30. I guess whenever elimination of some choices provides sufficient chance of guessing correctly.....	1	2	3	4
31. I check to make sure I have answered every question.	1	2	3	4
32. I utilize relevant content information in other test items and options.....	1	2	3	4
33. During any remaining time, I check answers to assess correctness and avoid careless mistakes.....	1	2	3	4
34. I look through problems before solving to determine the type of problems.....	1	2	3	4
35. I mark questions that I want to check again.....	1	2	3	4
36. If I don't know the correct answer right away, skip that question and come back to it later.....	1	2	3	4

37. What else do you do when you take a test? If you use certain strategies or do things that are not described in this questionnaire, please write in the space below.

Directions: Read each statement and indicate how you generally think or feel by circling 1, 2, 3, or 4. **Think of situations in which you have taken tests**. There are no right or wrong answers. Do not spend too much time on any one statement. (1 = Almost never, 2 = Sometimes, 3 = Often, 4 = Almost always)

	Almost never	Sometimes	Often	Almost always
1. While taking tests, I feel confident that I will receive an excellent score for the test	1	2	3	4
2. I work as hard as possible on my test items	1	2	3	4
3. While I am taking tests, I get so nervous I forget facts that I really know	1	2	3	4
4. It is important for me to do well on my tests	1	2	3	4
5. I keep working even on difficult items	1	2	3	4
6. I feel very panicky when I take tests	1	2	3	4
7. I am not good at taking tests	1	2	3	4
8. I concentrate fully when solving test problems	1	2	3	4
9. I think that solving problems on the test is a useful way to learn the subject matter	1	2	3	4
10. I do well on tests	1	2	3	4
11. I work as hard as I can even if the questions are difficult.	1	2	3	4
12. While taking tests, I think about failing tests and I lose my concentration	1	2	3	4
13. Doing well on tests is important because that means I understand the content	1	2	3	4
14. I don't give up even if the questions are hard	1	2	3	4
15. During the tests, I feel very tense	1	2	3	4
16. When I take tests, I expect to be among the people who score really well on tests	1	2	3	4
17. I work hard to do well even if I don't like tests	1	2	3	4
18. Good test scores are valuable for me	1	2	3	4
19. I doubt whether I can do well on tests	1	2	3	4
20. I try to do well on tests to receive high test scores	1	2	3	4
21. While taking tests, I get concerned about what would happen if do poorly	1	2	3	4
22. I want to do well on tests because test scores are important for my future	1	2	3	4
23. I go through all items and try as many times as I can to get higher test scores	1	2	3	4
24. While taking tests, I have an uneasy, upset feeling	1	2	3	4

	Almost never	Sometimes	Often	Almost always
25. I am confident I will do well on tests because I do well on my past tests, quizzes, and/or homework assignments..	1	2	3	4
26. When I take tests, I just hope to get by.....	1	2	3	4
27. I think about my course grade while working on my test items.....	1	2	3	4
28. I don't care how I do on tests.....	1	2	3	4
29. When the test items get difficult, I spend extra time and effort trying to complete them.....	1	2	3	4
30. I feel very edgy during the test.....	1	2	3	4

31. What else do you think or do when you take tests? If you think or do things that are not described in this questionnaire, please in the space below.

Directions: Read each statement and indicate how you generally think or feel by circling 1, 2, 3, or 4. **Think of situations in which you have taken tests**. There are no right or wrong answers. Do not spend too much time on any one statement. (1 = Almost never, 2 = Sometimes, 3 = Often, 4 = Almost always)

	Almost never	Sometimes	Often	Almost always
1. I make sure I am comfortable before I begin to solve test items.....	1	2	3	4
2. I don't think about eating or about feeling hungry just before taking tests.....	1	2	3	4
3. I ask examiner/teacher for clarification when necessary, if it is permitted.....	1	2	3	4
4. I do not think of comfort of chair or desk space before I start taking tests.....	1	2	3	4
5. I think whether I am hungry or not before taking tests.....	1	2	3	4
6. I do not hesitate to ask questions to examiner (teacher) when a question is not clear, if it is permitted.....	1	2	3	4
7. Before I take test, I make sure I have a good chair and desk space.....	1	2	3	4

	Almost never	Sometimes	Often	Almost always
8. I make sure that I am not hungry or too full while taking tests	1	2	3	4
9. Even if I need clarification for test items, I do not ask examiner/teacher	1	2	3	4
10. I don't care where I sit for tests	1	2	3	4
11. Just before I take a test, I feel that I am hungry or that I need to eat something	1	2	3	4
12. I do not ask teacher/examiner even when I have some questions on test items	1	2	3	4

13. What else do you do when you take a test? If you use certain strategies or do things that are not described in this questionnaire, please write in the space below.

Thank you very much for your cooperation!

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* The *Test Taking Strategy Questionnaire* was translated into Chinese by Yun Peng.

APPENDIX VIII

TEST TAKING STRATEGY QUESTIONNAIRE (CHINESE)

*Test Taking Strategy Questionnaire (TTSQ, 2004) – Chinese Version**

考试策略调查问卷（TTSQ, 2004)*

填答说明：以下题目是学生对自己的情况的陈述。阅读每一道题目，**回想你考试的实际情况**，根据你通常的想法和感受选择 1，2，3 或 4。问卷没有正确或不正确的答案。不要在任何一道题目中花过长的时间。（1 =几乎从未如此，2 = 有时如此， 3 =经常如此， 4 =几乎总是如此）

	几乎从未如此	有时如此	经常如此	几乎总是如此
1. 当我拿到试卷的时候，我马上默写表格或图，那么我就不会忘记所记得的内容。	1	2	3	4
2. 我重复阅读题目。	1	2	3	4
3. 我在题中划出关键词。	1	2	3	4
4. 我尝试理解试题所问的问题。	1	2	3	4
5. 在解题之前，我决定如何去解决考试题目。	1	2	3	4
6. 在考试的时候，我不断检查自己答题的进度。	1	2	3	4
7. 对于不同的考试题目（例如：概念、事实、公式、或计算方法），我有不同的方法来解题。	1	2	3	4
8. 我画图、表格、或概念关系图来理解考试题目。	1	2	3	4
9. 在考试中，我把记得的事实，概念或公式写下来。	1	2	3	4
10. 我重做试题直到我满意为止。	1	2	3	4
11. 我注意题目中的关键条件，并作标记或划底线。	1	2	3	4
12. 我在答题之前先阅读和理解题目。	1	2	3	4
13. 在尝试解题之前，我试图明白题目考察的目的。	1	2	3	4
14. 当我做考试题目的时候，我问自己问题以检查答题的进度。	1	2	3	4
15. 我有自己独特的策略来解决概念问题。	1	2	3	4
16. 我试图回忆学习过的内容，回想他们曾在哪里出现过。	1	2	3	4
17. 我重复检查问题来看看自己是否已理解了。	1	2	3	4
18. 我在题目中划出关键条件和提示词。	1	2	3	4
19. 我仔细阅读题目以明白题目的意思。	1	2	3	4
20. 我用记忆辅助物， 例如在脑中呈现表格、图表或把它们写在考卷上。	1	2	3	4
21. 我在解题之前会问自己问题，到底题目要求我做什么。	1	2	3	4
22. 在进行考试的过程当中，我问自己表现得如何。	1	2	3	4
23. 我有自己独特的策略来解决有关事实和定义的问题。	1	2	3	4
24. 我默念我所记得的内容。	1	2	3	4

25. 我把问题和答案反复阅读，直到满意为止。..... 1 2 3 4
26. 我注意提示词例如 “全部” 、“每个” 、”没有” 、“通常”。..... 1 2 3 4
27. 考试的时候，我问自己这道考题与我所知道的知识有多大联系。..... 1 2 3 4
28. 在解题之前，我有解题的方案。..... 1 2 3 4
29. 我检查自己是否沿着正确的推理和步骤回答问题。..... 1 2 3 4
30. 我没有考试策略，只是读题之后就作答。..... 1 2 3 4

31. 你在考试当中还做了些什么？如果你还有其它问卷中没有描述到的某种策略或行为，请把它们写在以下空白处。

填答说明：阅读每一道题目，**回想你考试的实际情况，**根据你通常的想法和感受选择 1，2，3 或 4。问卷没有正确或不正确的答案。不要在任何一道题目中花过长的时间。（1 =几乎从未如此，2 = 有时如此， 3 =经常如此， 4 =几乎总是如此）

	几乎从未如此	有时如此	经常如此	几乎总是如此
1. 在选择正确答案之前，我细查所有的选项。.....	1	2	3	4
2. 当阅读完题目之后，我先预测答案，然后才看选项答案。.....	1	2	3	4
3. 如果错误答案不会倒扣分，我会猜着回答。.....	1	2	3	4
4. 我仔细阅读考试说明。.....	1	2	3	4
5. 我能注意到某些题目会给出试卷中其他问题的答案。.....	1	2	3	4
6. 在一定的正确度保证中，我尽可能迅速地做卷子。.....	1	2	3	4
7. 我首先数有多少个问题，然后估算每题要用的时间。.....	1	2	3	4
8. 我标记不能做的问题或还需要再做考虑的问题。.....	1	2	3	4
9. 我先回答容易的问题然后再做难的问题。.....	1	2	3	4
10. 我排除与问题相矛盾的选项。.....	1	2	3	4
11. 在阅读选项之前，我试图想想答案。.....	1	2	3	4
12. 当排除选项提供足够机会答对题目时，我会推测答案。.....	1	2	3	4
13. 当回答考试题目时，我在脑里保持答题的方向。.....	1	2	3	4
14. 我运用其它问题和选项所提供的信息。.....	1	2	3	4
15. 我运用完成考试后剩下的时间重新考虑答案。.....	1	2	3	4
16. 我先通阅问题来决定哪道题是容易题，哪道题是难题。.....	1	2	3	4
17. 我标记不肯定的题目，以便完成时回去检查。.....	1	2	3	4

	几乎从未如此	有时如此	经常如此	几乎总是如此
18. 我先回答难题，然后再做容易的题目。	1	2	3	4
19. 我排除不正确的答案，从剩下的选项中选择。	1	2	3	4
20. 我用草稿纸或试题的空白处做出答案，再看答案选项。	1	2	3	4
21. 特别是在一个选项或多个错误选项被确认时，我会去推测答案。	1	2	3	4
22. 我查看题目中的否定用语，例如“不”、“除了”、“错误的”等。	1	2	3	4
23. 试卷其它部分的题目，也许能帮助解答我不懂的题目。	1	2	3	4
24. 我留意还剩下多少时间，这样我就能在允许的时间内完成考试。	1	2	3	4
25. 当我拿到试卷的时候，我浏览试题估算试卷需要多长时间完成。	1	2	3	4
26. 我标记希望在考试最后一段时间里要检查的题目。	1	2	3	4
27. 我从第一道试题开始做，完成试卷，如果还有时间的话，然后回到第一道题。	1	2	3	4
28. 在我尝试选择正确答案之前，我先排除明显错误的答案。	1	2	3	4
29. 我挑选选项之前，先思考答案。	1	2	3	4
30. 每当排除一些选项能提供足够的机会推测出正确答案的时候，我会去推测出答案。	1	2	3	4
31. 我检查以保证我已回答每一道题目。	1	2	3	4
32. 我会利用其它题目和选项中的相关内容信息。	1	2	3	4
33. 在剩下的时间里，我检查答案以达到准确，和避免粗心的错误。	1	2	3	4
34. 我在解题之前通读问题，以确定问题的类型。	1	2	3	4
35. 我标记想要检查的题目。	1	2	3	4
36. 如果我不能马上知道正确的答案，就跳过那道题，以后再回来。	1	2	3	4

37. 你在考试当中还做了些什么？如果你还有其它问卷中没有描述到的某种策略或行为，请把它们写在以下空白处。

填答说明：阅读每一道题目，**回想你考试的实际情况，**根据你通常的想法和感受选择 1，2，3 或 4。问卷没有正确或不正确的答案。不要在任何一道题目中花过长的时间。（1 =几乎从未如此，2 = 有时如此， 3 =经常如此， 4 =几乎总是如此）

	几乎从未如此	有时如此	经常如此	几乎总是如此
1. 当参加考试的时候，我感到自信，我将在这次考试中取得好成绩。.....	1	2	3	4
2. 我尽可能努力地做考试题目。.....	1	2	3	4
3. 在参加考试的时候，我感到紧张而忘记自己确实知道的事实。.....	1	2	3	4
4. 在考试中能发挥好，对于我来说是重要的。.....	1	2	3	4
5. 尽管是难题，我仍坚持去做。.....	1	2	3	4
6. 在考试的时候，我感到恐慌。.....	1	2	3	4
7. 我不擅长考试。.....	1	2	3	4
8. 解答题目的时候，我注意力十分集中。.....	1	2	3	4
9. 我认为解答考试中的问题，对于我来说是学习学科内容的有用途径。..	1	2	3	4
10. 我在考试中发挥的很好。.....	1	2	3	4
11. 尽管问题很难，我尽可能努力地去做。.....	1	2	3	4
12. 考试的时候，我想到考试不及格而且注意力不集中。.....	1	2	3	4
13. 在考试中做得好是重要的，因为这说明我掌握了这些内容。.....	1	2	3	4
14. 尽管问题很难，我从不放弃。.....	1	2	3	4
15. 考试当中我感到十分紧张。.....	1	2	3	4
16. 当我考试的时候，我期望能挤身在考试高分人群中。.....	1	2	3	4
17. 我努力去做好试题，尽管我不喜欢考试。.....	1	2	3	4
18. 考试高分对于我来说是重要的。.....	1	2	3	4
19. 我怀疑自己是否能在考试中发挥得好。.....	1	2	3	4
20. 我试图在考试中做得好以取得好成绩。.....	1	2	3	4
21. 当考试的时候，我担忧如果我考差了，后果将如何。.....	1	2	3	4
22. 我想考得好，因为考试成绩对于我的前途来说是重要的。.....	1	2	3	4
23. 我检查所有题目，尽可能去尝试多遍以取得高分。.....	1	2	3	4
24. 当考试的时候，我感到心神不安和烦恼。.....	1	2	3	4
25. 我自信能考得好，因为我通常在以前的考试、测验，和 (或) 作业中做得好。.....	1	2	3	4
26. 当我考试的时候，只求及格。.....	1	2	3	4
27. 在做试题的时候，我在想学科考试成绩。.....	1	2	3	4
28. 我不在乎我考得如何。.....	1	2	3	4
29. 当试题难的时候，我试图额外多花时间和努力完成它。.....	1	2	3	4
30. 在考试中，我感到非常紧张。.....	1	2	3	4

31. 你在考试当中还做了些什么？如果你还有其它问卷中没有描述到的某种策略或行为，请把它们写在以下空白处。

填答说明：阅读每一道题目，**回想你考试的实际情况，**根据你通常的想法和感受选择 1，2，3 或 4。问卷没有正确或不正确的答案。不要在任何一道题目中花过长的时间。（1 =几乎从未如此，2 = 有时如此， 3 =经常如此， 4 =几乎总是如此）

	几乎从未如此	有时如此	经常如此	几乎总是如此
1. 在开始解答试题的时候，我确信自己感觉良好。	1	2	3	4
2. 在考试之前，我不会想到吃东西或感到饥饿。	1	2	3	4
3. 如果允许的话，在必要的时候我会问监考员或老师做出解释说明。	1	2	3	4
4. 在开始考试之前，我不会想椅子和桌子的空间是否舒服。	1	2	3	4
5. 在参加考试之前，我会想自己是否饿了。	1	2	3	4
6. 在允许的情况下，当试题表述不清的时候，我也不会犹豫问监考员或老师问题。	1	2	3	4
7. 在考试之前，我确保我有一张好椅子和合适的课桌空间。	1	2	3	4
8. 我确保自己在考试的时候不会太饿或太饱。	1	2	3	4
9. 尽管我需要题目的解析说明，我也不会问监考人或老师。	1	2	3	4
10. 我不在乎坐在哪个位置上考试。	1	2	3	4
11. 在考试之前，我感到饥饿或需要吃东西。	1	2	3	4
12. 尽管我对试题有问题，我也不会问监考员或老师。	1	2	3	4

13. 你在考试当中还做了些什么？如果你还有其它问卷中没有描述到的某种策略或行为，请把它们写在以下空白处。

感谢您的合作！

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* 中文版本--考试策略调查问卷由彭云女士翻译。

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